LISBON
SCHOOL OF
ECONOMICS &
MANAGEMENT
UNIVERSIDADE DE LISBOA

MASTER IN

MONETARY AND FINANCIAL ECONOMICS

FINAL MASTERS PROJECT

DISSERTATION

DECREASING STANDARD WORKING HOURS, WORK SHARING AND EMPLOYMENT

DAVID ALEXANDRE BICHO JORGE

SEPTEMBER - 2015

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ORIENTATION:

VÍTOR ESCÁRIA

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RESUMO

Reduzir o número de horas de trabalho normal é uma medida que tem sido adotada em muitos países com o objetivo de reduzir o desemprego, através da distribuição do trabalho por mais trabalhadores. Neste estudo é analisado o efeito do *work sharing* na economia portuguesa, particularmente comparando o que acontece, em termos de emprego, nos estabelecimentos que reduzem o número de horas de trabalho normal com aqueles que mantém ou aumentam esse número. Pode ser observado que a diminuição do número de horas normal tem um efeito significativo no aumento do emprego nos estabelecimentos, o que significa que uma redução do número de horas de trabalho normal pode ter um efeito significativo, mas pequeno, no aumento do emprego.

ABSTRACT

Reducing the number of standard working hours is a measure that has been used in many countries in order to reduce unemployment, by distributing work for more workers. In this study it is analyzed the effect of work sharing in the Portuguese economy, particularly by comparing the consequences, regarding employment, in establishments that reduce the number of standard working hours with those that maintain or increase it. It can be observed that the reduction of standard working hours have a significant effect on increasing employment of establishments. This means that the reduction of standard working hours may have a significant, but small effect on increasing employment of establishments

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1. INTRODUCTION

Work sharing, i.e. reducing the number of standard working hours in order to be allocated by a larger number of workers, is a measure that has been used in many countries to try to reduce unemployment. It can also be used as a temporary measure in times of economic downturn in order to increase flexibility and reduce labor costs.

Work sharing arises from the idea that unemployment can be reduced with a reduction of working hours per worker. If there are workers who prefer to work fewer hours and if there are unemployed workers who would like to get a job, work sharing is thus an appealing idea. Other arguments for reducing the number of working hours are the possible positive effects that can occur on health, increased labor supply and welfare improvement. An increase in leisure of employed workers and a decrease of an "excess" of leisure for the unemployed can lead to a welfare increase.

However, a decrease in the number of standard working hours can lead to a wage decrease, which leads to a reduction of worker's welfare if they would prefer to work longer. If wages remain constant, which is possible due to nominal wage rigidity, labor costs will increase for employers, which may lead to a substitution of labor by capital and a decrease in output, which could lead to higher unemployment.

According to Calmfors and Hoel (1989), a reduction in the number of working hours can lead to a labor demand reduction and employment may even decrease. The causes are:

- Hourly wage may increase because workers will want to keep their real income / purchasing power.

- Even if the wage per hour remains the same, hourly costs to employers are expected to increase due to the fixed costs of a worker.
- Work productivity per hour may decrease because the proportion of time to start and finish work increases (shift change costs).
- There is an increase in the relative cost of hiring new workers relative to the cost of overtime pay.
- The use of capital may decrease due to diminish usage time of the stock of capital.

This paper aims to analyze the effect of work sharing in the Portuguese economy, particularly comparing what happens, in terms of employment, in establishments that reduce the number of standard working hours with establishments that maintain or increase it.

This work is organized as follow: chapter 2 presents a literature review focused on the effects of reducing the number of standard working hours on the economy, specifically on employment, both at theoretical and empirical level. It contains also the measures that the European Union countries have taken in terms of working hours to deal with the Great Recession. Chapter 3 presents an analysis of the effects of reducing the number of standard working hours in Portugal, in which it is analyzed its effects on employment, wages and overtime hours. Conclusion remarks are presented in chapter 4.

2. LITERATURE REVIEW

It can be found in the literature several models that allow us to analyze the effect of work sharing on employment.

2.1. Theory

Hunt (1999) presents a model in which the company's profit depends on the number of hours, number of employees and capital. This model allows us to analyze what is the best company's response to a reduction in the number of working hours.

The profit function is defined as:

$$Max_{h,N,K}\ g(h, N, K) - whN - fN - pw(h - h_s)N - rK. \quad (1)$$

Where: h_s: standard hours, h: hours per worker, with $h > h_s$, w: hourly wage, r: rental rate of capital, N: employment (number of workers), K: capital, f: fixed cost of employment, p: overtime premium.

If fixed costs per worker are high, the number of initial working hours is greater than the number of standard hours, then a reduction in the number of standard working hours leads to an increase in labor costs due to increased costs of overtime hours. There will be a scale effect which tends to reduce employment and working hours per week, and a substitution effect, which transfers resources from labor to capital.

The marginal cost of hiring a new worker (MC_N) and the marginal cost of increasing the number of hours (MC_h) are given by the following expressions:

$$MC_N: wh + f + pw(h-h_s). \quad (2)$$

$$MC_h: wN + pwN = (1+p)wN \quad (3)$$

The marginal cost of adding hours is not affected by the number of standard work hours (h_s), but only by wage (w) and overtime premium (p), while the marginal cost of increasing the number of workers increases as the number of standard hours is reduced, because overtime premium will be greater than before. In this case, assuming that the workers marginal productivity holds, the optimal number of workers will fall.

However, the model assumes that the number of working hours is above the standard number of hours. If a company has a number of working hours between the old and the new standard level, the effect of reducing working hours is ambiguous in unemployment, and expected to be negative in the output.

The model presented by Marimón and Zilibotti (2000) comes to similar conclusions to the Hunt's model (1999). Reducing the number of working hours may not reduce unemployment significantly, and has a negative effect on output.

Another model that can be used to examine this issue was presented by Raposo and Van Ours (2010), wherein production function assumes a Cobb-Douglas technology, and where the product is given by $Y = h^{\gamma}N$, with $\gamma < 1$. This means that the effect on employment depends on the number of optimal working hours which means that output depends proportionally to the number of employees and there are diminishing returns to hours in output. Wage is given by:

$$W = f + wh + pw(h - h_s)d. \quad (4)$$

Where d is a dummy variable value 1 if $h \geq h_s$, and 0 otherwise. The profit function is then defined as:

$$\Pi(h,N) = h^{\gamma} N - WN. \quad (5)$$

Maximizing profit function, when the number of standard hours reduces, the employment effect depends on the new number of optimal hours:

- Case 1: occurs when the optimal number of working hours is below the new standard working hours. In this case, the optimal number of hours is independent of the standard number of hours, so the standard hours variation does not change the level of employment.
- Case 2: occurs when the optimal number of hours is higher than the new standard hours but lower than the old standard hours. In this case, the effect on employment level depends on the premium for overtime and fixed labor costs.
- Case 3: occurs when the optimal number of hours is higher than the old standard hours. In this case the level of employment falls because the cost of labor increases as the marginal cost per hour has not changed. Companies will reduce the number of workers and increase the working hours.

In addition to these models that show the response of employment due to changes in the number of standard hours, there are several other theoretical models that address the work sharing by focusing specifically on some aspects.

Calmfors and Hoel (1988) conclude, in a model with fixed output, that a reduction of the number of standard working hours together with an increased overtime premium can lead to an increase in employment. But if companies maximize

profits, reducing the number of standard working hours, keeping everything else constant, leads to an increase in the cost per worker relative to the cost of overtime, leading the company to replace workers for overtime hours.

Rocheteau (2000) used a shirking-matching model, which consist in the existence of asymmetric information between the worker and the employer, with the possibility of employees work fewer hours than those agreed, depending on the probability of being discovered by employers. Rocheteau concluded that in countries with high unemployment, a reduction of standard working hours can lead to a reduction in unemployment. In the same model, with a low unemployment rate, the reduction of standard working hours has a negative effect on economy (reduction of the companies and workers welfare).

Ortega (2003) used a model with heterogeneous firms, whereas that the existence of equal number of working hours for all firms in the economy is not the most efficient solution because there are companies that have a bigger "search for hours", and there are others with a lower demand for hours.

Domminguez, Ullíbarri and Zabaleta (2011) concluded that reducing the number of working hours may increase employment since, for a low level of productivity, causes an increase in capital (substitution of labor by capital) which leads to a productivity growth, which combined with an rise in salary (per hour) leads to a consumption increase. However, if the initial productivity is high, productivity increase will be smaller, and there will be lower gains that adjustment costs, which makes the economic situation worse.

Moreover, Lührmann and Weiss (2010) suggested that an increase in the number of working hours leads to an increase of higher qualifications worker's income but a decrease of their leisure time, which means that they have less time to household chores, so they will hire low-skilled workers for that task, leading to a decline of low-skilled workers unemployment.

Most theoretical models demonstrate that work sharing may not have a positive effect on employment, existing models where the effect is negative, apart from having a negative effect on the output. However, work sharing can result on certain conditions. If unemployment is high or if productivity in the economy is low, according to some models, work sharing can lead to a decrease in unemployment.

2.2. Empirical Studies

In addition to theoretical work, work sharing has also been object of attention from some empirical studies. According to some of these studies, work sharing leads to an increase in workers real wages but the effects on unemployment and output are ambiguous. Workers who are employed do not want to reduce its nominal wage, so the decrease in working hours leads to increased income per hour. This made employers to increase hourly wage, in spite of recruit new workers, leading to a possible fall in production and employment due to increased production costs.

Mattesini and Quintieri (2006) found positive employment outcomes as a result of reducing the number of standard working hours in Italy during the Great Depression. This was due to a more flexible market, a high degree of substitutability between insiders and outsiders, and because hourly wage did not increased with the reduction of working hours.

Logeay and Schreiber (2006) also achieved similar results, studying France data between 1999 and 2001, when the number of standard working hours was reduced while contributions to companies' social security were reduced and a moderate wage increase was negotiated, which as a whole led to a decrease in unemployment. However, the results of Schreiber (2008) show that if it had been applied only the work sharing policy in that same period, employment probably would had decreased. Chemin and Wasmer (2009) made a comparison between the French region of Alsace with the rest of France because in this region the decrease of the number working hours lead to a lower effect that in the rest of the country, and concluded that the effect of reducing the number of standard working hours had not a significantly different effect on unemployment. Estevão and Sá (2008) concluded that reducing the number of standard working hours in France did not lead to increased leisure hours because it led to an increase in overtime hours or led to an increase searching for a second job.

Kapteyn, Kalwij and Zaidi (2003), in a paper involving several OECD countries and a timeline between 1960 and 2001, come to the conclusion that reducing the number of standard working hours has a positive effect on employment in the short term, but the effect is negligible in the long run due to rising hourly wages.

Skuterud (2007) observed in Quebec, Canada, that reducing the number of standard working hours between 1997 and 2000 did not increase employment. Kawaguchi, Naito and Yokoyama (2008) found evidence in Japan that the diminishing of the number of standard hours between 1988 and 1997 did not lead to a decrease in the number of hours of effective work at the same level, leading to an increase in the

hourly wage (due to more overtime hours worked) and not contributing to an employment increase.

Sanchez (2013) concluded that in Chile the reduction of working hours also led to an increase in the hourly wage as Skans (2004) for Sweden. Baek and Oh (2004) estimated that a reduction in the number of working hours led to a reduction of industrial activity in South Korea.

Schank (2006) concluded that the reduction in the number of working hours in Germany between 1995 and 1999 led to an increase in the hourly wage to maintain the monthly income, which means that workers had increased their utility, because income did not change but the leisure time increased, although employment had not increased. Moreover, Steiner and Peters (2000) conclude that in the Federal Republic of Germany, between 1978 and 1998, lower number of standard working hours has not reduced unemployment, and wage compensation led to an increase in unemployment.

Andrews et al. (2012) used a differences-in-differences model, analyzing the effect of increasing the number of hours worked in companies on employment in Germany between 2001 and 2006, concluding that companies that increase the number of working hours increased more employment that companies that did not. Therefore, symmetrically, work sharing may not increase employment.

For Portugal there are also studies on this topic. Raposo and Van Ours (2010) found evidence that reducing the number of hours worked between 1996 and 1997 led to an improvement in employment in Portugal. Varejão (2009), otherwise,

concluded that reducing the number of hours worked in Portugal in the same period led to a decrease in labor demand.

Empirical studies seem to indicate that work sharing has a positive effect on employment if executed in certain circumstances, as no increase in hourly wage, tax cuts or flexibility of the labor market. But in most cases, there is an increase in the hourly wage by reducing the number of working hours, so there is not a reduction in unemployment.

2.3. Working hours and the Great Recession

Given the crisis of 2008, several countries used measures to limit its impact on employment. The OECD (Lang, Clauwaert and Schomann 2013) gave a description of what made the European countries in response to the Great Recession in relation to the number of working hours. One of the measures used was an increase in maximum number of working hours per worker in order to increase competitiveness in relation to other countries. This measure has been implemented in countries like Greece, Ireland, Portugal, Cyprus, Poland, Lithuania and Romania. Other countries have adopted measures to increase the limit on overtime or reduce the overtime premium, namely Belgium and Poland. Another measure used was the decrease in the number of holidays and increasing after work hours (night, weekends and holidays), applied in countries like the Czech Republic, Hungary, Slovenia and Portugal.

The majority of these measures was contrary to the logic of work sharing, which in a high unemployment environment could further hinder the unemployed to change their situation.

Other countries have taken measures opposed by reducing the number of working hours in order to preserve jobs in an environment of lower demand. Among the countries that have adopted such measures are Germany, Austria, Sweden, France and Slovenia.

However OECD remarked that work sharing should be used as a temporary measure during a recession because it has negative effects on workers income.

There was no standardization of measures adopted regarding working hours. It could be used in order to improve competitiveness, increasing working hours, or it could be used in order to preserve jobs.

3. ANALYSIS OF THE EFFECT OF DECREASING THE NUMBER OF STANDARD WORKING HOURS ON EMPLOYMENT

This section aims to build a model that shows the effect of decreasing the number of standard working hours on employment.

3.1. Data

The data used in this analysis are the database of the Personnel Records of the Office for Strategy and Studies (Portuguese Ministry of Economy) that contains data for all firms with at least one wage-earner.

Database is divided between workers, establishments[1] and companies[2]. The information provided includes a wide range of variables and characteristics relating to workers as well as the company and the establishment in which they operate, providing a rich source of information for empirical work. Data are collected in October each year from more than two million workers.

On this paper is analyzed the yearly changes that occurred between 2003 and 2007. This period was chosen to use data from years that have not been affected by the Great Recession.

For this analysis, database includes all employees which received full pay during the reference period. All other records were deleted from the dataset.

Was then obtained a database with 235.571 establishments for 2003/2004 variation, 248.603 establishments for 2004/2005, 262.569 establishments for 2005/2006 and 260.793 establishments for 2006/2007.

3.2. Methodology

Firstly, it was computed the median number of standard working hours of each establishment, for being more robust than the average, to determine the number of standard working hours of an establishment.

[1] Local unit that under a single system of ownership or control, exclusively or principally produces a homogeneous group of goods or services in a single location.

[2] Economic entity engaged in a particular activity, which consists of a head office and stores with several locations.

It was also computed the median number of overtime hours, the average total wage[3], the average wage[4] and the average overtime premium of each establishment.

Then, it was computed nominal variables, divided in three categories: establishments that decreased, maintained or increased the number of employees, standard working hours, overtime hours, total wage, wage and overtime premium between two consecutive years. It was also computed nominal variables for establishments that decreased, maintained or increased the number of employees and standard working hours between year *t* and year *t+2* (two years lag). If the establishment increased the number of employees, the computed nominal variable assumes the value 1, if it maintained, the nominal variable assumes the value 2, and if it decreased, the computed nominal variable assumes the value 3.

These variables were computed because the objective of this analysis is to observe the effect on employment in establishments that decreased the number of standard working hours. It is also useful to note the effect of varying the number of working hours in wage and in overtime hours.

To use this comparison, the measure of association used was Cramer's V measure because it gives good norming from 0 to 1 regardless of sample size.

[3] Includes base pay, bonuses and allowances paid regularly and overtime premium

[4] Includes base pay and bonuses and allowances.

Spearman's correlation was also measured. Typically, this test is not used in nominal variables, but in this case, for some variables, given the way they were built (equal to 1, if the variable increased, equal to 2 if maintained, and equal to 3 if decreased), it makes sense to be calculated because it indicates the direction of the association between the variables.

Pearson's correlation test was also computed, but not for the same kind of variables. It was computed the variation occurred on the number of employees, standard working hours, overtime hours, total wage, wage and overtime premium between two consecutive years to perform the test.

3.3. Measures of association

Observing Table I, the association between establishments that vary the number of standard working hours and establishments ranging employment is very small if existent.

Table I – Association between the Number of Standard Working Hours variations in establishments with Employees variations

	2003/2004	2004/2005	2005/2006	2006/2007
Cramer's V[5]	0,017*	0,024*	0,022*	0,021*
Spearman's Correlation	0,008*	0,006*	0,001	0,002
Pearson's Correlation	0,011*	0,002	-0,001	0,003

Source: Personnel Records, Ministry of Economy - Office for Strategy and Studies, 2003, 2004, 2005, 2006, 2007 (computed by the author)

(*) Statistically significant (5 per cent)

Cramer's V is equal or lower than 0,024 for the four periods. Analyzing Spearman's Correlation, for variations occurred between years 2003 and 2004, there is a very small positive correlation (0,008), as for variations occurred between years 2004 and 2005 (0,006), which means that a decrease of the number of standard working hours was correlated with a decrease of the number of employees in establishments. The direction of association is contrary to the theory, but the correlation is so weak that any conclusive findings may not be made. Moreover, correlation for periods 2005/2006 and 2006/2007 are not statistically significant.

Similar conclusions can be made for the two years lag analysis (see Table II)

[5] For this analysis, the following scale was used for Cramer's V: less than 0,099, very week association; from 0,1 to 0,199, weak association; from 0,2 to 0,299, moderate association; form 0,3 to 1, strong association.

Table II – Association between the Number of Standard Working Hours variations in establishments with Employees variations: (two years lag)

	2003/2005	2004/2006	2005/2007	2006/2008
Cramer's V	0,015*	0,019*	0,017*	0,019*
Spearman's Correlation	0,005*	0,005*	0,002	-0,003
Pearson's Correlation	0,009*	0,004*	-0,001	0,001

Source: Personnel Records, Ministry of Economy - Office for Strategy and Studies, 2003, 2004, 2005, 2006, 2007, 2008 (computed by the author)

(*) Statistically significant (5 per cent)

Observing Tables V and VI, the association between establishments that changed the number of standard working hours and establishments ranging overtime hours and/or wages (total wage, wage and overtime premium), is very small.

Correlation between establishments that vary the number of standard working hours and establishments that vary total wage and wage is weak but positive. This means that a reduction in standard working hours can lead to a decrease in wage. Theory predicts that the effect of a reduction in the number of standard working hours in wage can be negative or null, because employees would want to keep their purchasing power and raise their hourly wage. The direction of association conforms with theory because there is a weak association, which favors the wage maintain hypothesis, but positive, which favors the wage decrease hypotheses.

The correlation between establishments that vary the number of standard working hours and establishments that vary overtime wage is very weak or not statistically significant.

The same goes for the association between establishments that changed the number of standard working hours and establishments ranging overtime hours. It was expected that a decrease in the number of normal working could led to an increase in the number of overtime hours, but there is no correlation on this data.

The variation of standard working hours seems to have some association with the sector and with the region of establishments. The effect of the variation occurred between the different years appears to be similar.

Observing Tables VIII and IX, there is some association between establishments that vary employment and establishments that change total wage and/or wage. There appears to be a negative correlation between employment variation and wage variation.

Association between employment variation and overtime hours variation is very small using Cramer's V and null using Spearman's Correlation.

The variation of employees in establishments appears to be more associated to the sector in comparison with the region of the establishment.

The effect of the variation occurred between the different years appears to be very similar.

3.4. Estimation

Besides the correlation analysis a model was estimated to observe the effect of reducing the number of standard working hours on employment. It was created a logistic regression to compute the probability of an establishment that has decreased the number of standard working hours has increased the number of employees.

A dummy variable was created for establishments that decreased or not the number of standard working hours. This variable was used to compute the probability of an establishment that has decreased the number of standard working hours has increased the number of employees.

The following equation was estimated:

$$\begin{aligned} aum\_emp_{t,t+1} = {} & \beta_0 + \beta_1\ dim\_hor + \beta_2\ aum\_nhext + \beta_3\ dif\_nhext + \\ & + \delta_1\ Reg_1 + \ldots + \delta_i\ Reg_i + \theta_1\ Sect_1 + \ldots + \theta_j\ Sect_j + \lambda_1\ Est_1 + \ldots + \\ & + \lambda_k\ Est_k + \beta_4\ habil\_inf + \beta_5\ habil\_med + \beta_6\ nqual\_sup + \\ & + \beta_7\ nqual\_qual + \beta_8\ ctcont\_sterm + \beta_9\ crtrab\_parc. \end{aligned} \quad (6)$$

Where:

aum_emp is a dummy variable equal to one if there was an increase in employment in the establishment between year *t* and year *t+1*, and zero otherwise;

dim_hor is a dummy variable equal to one if there has been a decrease in the number of standard working hours in the establishment between year *t* and year *t+1*, and zero otherwise;

aum_nhext is a dummy variable equal to one if there has been an increase in the number of overtime working hours in the establishment between year *t* and year *t+1*, and zero otherwise;

dif_nhext is the difference between the average number of overtime in the establishment between year *t* and year *t+1;*

Reg_i are several dummy variables representing each of Portuguese NUTS II region or other countries, and *i* represents the different regions (Norte, Centro, Lisboa, Alentejo, Algarve, Região Autónoma da Madeira, Região Autónoma dos Açores and other countries), being equal to one if the establishment is in that region, and zero otherwise;

$Sect_j$ are also dummy variables representing each sector of the economy, , and *j* represents the different sectors (Agriculture; Fishing; Mining; Manufacturing; Electricity, Gas and Water; Construction; Commerce; Hotels and Restaurants; Transport and Communications; Financial Sector; Real Estate Sector; Public Administration; Education; Health and other sectors) being equal to one if the establishment belongs to a sector, and zero otherwise;

Est_k are dummy variables that take into account the size of establishment (Micro Establishment that have between 1 and 9 employees, small establishments that have between 10 and 49 employees, medium-sized establishments that have between 50 and 249 employees, and large establishments, with more than 250 employees[6]).

habil_inf and *habil_med* are variables that represent the establishment's proportion of workers with low and standard qualifications, respectively;

nqual_sup and *nqual_qual* are variables that represent the establishment's proportion of high-skilled and qualified workers, respectively;

[6] Usually these settings are used to characterize the companies, but can also be adapted to the establishments, which are analyzed in this paper.

ctcont_sterm is a variable that represent the establishment's proportion of workers with permanent contract;

crtrab_parc is a variable that represent the establishment's proportion of part-time workers.

Regi, Sectj, Estk, habil_inf, habil_med, nqual_sup, nqual_qual, ctcont_sterm and *crtrab_parc* are variables that aim to understand what the effect on employment in establishments with similar characteristics. *Dim_hor* is a variable that aims to capture the effect of the reduction of the number of standard working hours in these establishments with similar characteristics, but whose main difference was have existed or not a decrease in the number of standard working hours. *aum_nhext* and *dif_nhext* are variables that aim to observe the overtime changes effect on employment.

This model was estimated to developments that occurred in establishments between two consecutive years, between 2003 and 2007.

Firstly, the model was estimated only with one variable (dim_hor). Observing Table III, it can be seen that establishments that reduced the number of standard working hours had a 4.5 percent higher chance to increase employment than establishments that did not diminish the number of standard working hours.

Then, other variables were added to the model. As the variables were added, the parameter for dim_hor (β_1) decreases. Considering the variables related to the number of overtime working hours in the estimation (aum_nhext and dif_nhext), the parameter decreases to 4 percent. Adding the region, the sector, and the size of the

establishment, the parameter decreases to 2.4 percent, and adding the establishment's proportion of workers with low and standard qualifications and with high-skilled and qualified workers, the parameter is not statistically significant at five per cent.

However, adding establishment's proportion of workers with permanent contract in the model, the parameter increases to 1.9 percent and it is statistically significant.

Table III – Estimation: decreasing standard working hours effect on employment increase in establishments between two consecutive years: from 2003 to 2007: different models.

Added variables	B	Sig.	Exp(B)
dim_hor	,044	,000	1,045
nhext	,040	,000	1,040
Reg	,042	,000	1,043
Sect	,030	,000	1,030
Est	,024	,001	1,024
habil	,014	,050	1,014
nqual	,012	,101	1,012
ctcont	,019	,011	1,019
crtrab	,019	,011	1,019

Source: Personnel Records, Ministry of Economy - Office for Strategy and Studies, 2003, 2004, 2005, 2006, 2007 (computed by the author)

Observing Table IV, it can be seen that establishments that reduced the number of standard working hours had a 1.9 percent higher chance to increase employment than establishments that did not diminish the number of standard working hours. This means that the reduction of standard working hours may have a significant, but small effect on increasing employment of establishments.

Table IV – Estimation: employment increase in establishments between 2003 and 2007

	B	S.E.	Wald	Sig.	Exp(B)
dim_hor	,019	,007	6,491	,011	1,019
aum_nhext	,392	,012	1126,582	,000	1,480
dif_ nhext	-,005	,001	41,922	,000	,995
Reg_Norte	-,429	,250	2,953	,086	,651
Reg_Algarve	-,377	,250	2,274	,132	,686
Reg_Centro	-,466	,250	3,486	,062	,627
Reg_Lisboa	-,443	,250	3,137	,077	,642
Reg_Alentejo	-,499	,250	3,990	,046	,607
Reg_Açores	-,415	,250	2,750	,097	,660
Reg_Madeira	-,469	,250	3,516	,061	,625
Sect_Agricultura	,138	,019	52,956	,000	1,148
Sect_Pesca	,253	,111	5,201	,023	1,287
Sect_Indústria_Extrac	,313	,042	56,606	,000	1,368
Sect_Indústria_Transf	,252	,013	352,385	,000	1,287
Sect_Electricidade_Gás_Água	-,347	,060	33,963	,000	,707
Sect_Construção	,486	,014	1286,971	,000	1,626
Sect_Comércio	-,007	,013	,267	,605	,993
Sect_Alojamento_Restauração	,249	,014	317,971	,000	1,283
Sect_Transportes_Comunicações	,236	,017	201,282	,000	1,266
Sect_Financeiro	,051	,019	7,432	,006	1,053
Sect_Imobiliário	,179	,014	157,153	,000	1,196
Sect_Adm_Pública	,337	,039	76,096	,000	1,401
Sect_Educação	,343	,022	239,024	,000	1,409
Sect_Saúde	,271	,016	284,195	,000	1,312
Micro_Empresas	-,787	,040	386,175	,000	,455
Pequenas_Empresas	-,159	,040	15,651	,000	,853
Médias_Empresas	,051	,042	1,481	,224	1,052
habil_inf	-,552	,015	1360,159	,000	,576
habil_med	-,437	,015	882,733	,000	,646
nqua_sup	,040	,012	11,382	,001	1,041
nqua_qual	-,019	,008	4,944	,026	,982
ctcont_sterm	-,488	,007	4642,769	,000	,614
crtrab_parc	,014	,027	,257	,612	1,014
Constant	,519	,253	4,187	,041	1,680

Source: Personnel Records, Ministry of Economy - Office for Strategy and Studies, 2003, 2004, 2005, 2006, 2007 (computed by the author)

Observing the other variables on the estimation, if there has been an increase in the number of overtime working hours in the establishment (aum_nhext), there was a 48 percent higher chance that that establishment increased the number of employees. Companies that need to increase their production can both increase the number of working hours and increase the number of workers.

However, the difference between the average number of overtime hours in the establishment between two consecutive years had a negative impact on employment.

During the studied period, only 4.4 percent of establishments that decreased the number of standard working hours increased overtime hours.

Observing the establishments' characteristics, establishments with higher proportion of workers with low (habil_inf) and standard (habil_med) qualifications had lower chance of increase the number of employees. The same goes to establishments with higher proportion of workers with permanent contract. Establishment's proportion of part-time workers had no effect on employment.

4. CONCLUSION

Reducing the number of hours worked by employees in order to be allocated by a larger number of workers, is a measure that has been used in many countries to try to reduce unemployment.

Most theoretical models demonstrate that work sharing may not have a positive effect on employment, existing models where the effect is negative, apart from having a negative effect on the output. However, work sharing can result in certain conditions. If unemployment is high or if productivity in the economy is low, according to some models, work sharing can lead to a decrease in unemployment.

Empirical studies seem to indicate that work sharing has a positive effect on employment if executed in certain circumstances, as no increase in hourly wage, tax cuts or flexibility of the labor market. But in most cases, there is an increase in the hourly wage by reducing the number of working hours, so there is not a reduction in unemployment.

In this study it can be observe that establishments that reduced the number of standard working hours had a 1,9 percent higher chance to increase employment than establishments that did not diminish the number of standard working hours, which means that the reduction of standard working hours have a significant effect on increasing employment of establishments. This means that the reduction of standard working hours may have a significant, but small effect on increasing employment of establishments.

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6. APPENDIX

Table V – Association between the Number of Standard Working Hours variations in establishments with other variables: Cramer's V

	2003/2004	2004/2005	2005/2006	2006/2007
Overtime Hours Variation	0,017*	0,016*	0,015*	0,021*
Wage Variation	0,044*	0,038*	0,040*	0,039*
Normal Wage Variation	0,046*	0,038*	0,041*	0,040*
Overtime Premium Variation	0,013*	0,019*	0,020*	0,034*
Region	0,118*	0,032*	0,116*	0,118*
Sector	0,141*	0,063*	0,123*	0,124*

Source: Personnel Records, Ministry of Economy - Office for Strategy and Studies, 2003, 2004, 2005, 2006, 2007 (computed by the author)

(*) Statistically significant (5 per cent)

Table VI – Association between the Number of Standard Working Hours variations in establishments with other variables: Spearman's Correlation

	2003/2004	2004/2005	2005/2006	2006/2007
Overtime Hours Variation	-0,002	0,007*	-0,001	-0,004*
Total Wage Variation	0,040*	0,012*	0,021*	0,026*
Wage Variation	0,041*	0,010*	0,021*	0,026*
Overtime Premium Variation	0,004*	0,008*	-0,001	0,000

Source: Personnel Records, Ministry of Economy - Office for Strategy and Studies, 2003, 2004, 2005, 2006, 2007 (computed by the author)

(*) Statistically significant (5 per cent)

Table VII – Association between the Number of Standard Working Hours variations in establishments with other variables (absolute values): Pearson's Correlation

	2003/2004	2004/2005	2005/2006	2006/2007
Employees Variation	0,011*	0,002	-0,001	0,003
Employees Variation (two years lag)	0,009*	0,004*	-0,001	0,001
Overtime Hours Variation	0,007*	0,008*	0,010*	0,002
Total Wage Variation	0,004*	0,000	0,001	0,005*
Wage Variation	0,003	0,001	0,001	0,005*
Overtime Premium Variation	0,010*	0,006*	0,007*	0,000

Source: Personnel Records, Ministry of Economy - Office for Strategy and Studies, 2003, 2004, 2005, 2006, 2007, 2008 (computed by the author)

(*) Statistically significant (5 per cent)

Table VIII – Association between the Employees variations in establishments with other variables: Cramer's V

	2003/2004	2004/2005	2005/2006	2006/2007
Overtime Hours Variation	0,040*	0,045*	0,040*	0,041*
Total Wage Variation	0,134*	0,172*	0,172*	0,167*
Wage Variation	0,135*	0,173*	0,175*	0,169*
Overtime Premium Variation	0,084*	0,092*	0,088*	0,091*
Region	0,109*	0,023*	0,024*	0,028*
Sector	0,024*	0,108*	0,108*	0,120*

Source: Personnel Records, Ministry of Economy - Office for Strategy and Studies, 2003, 2004, 2005, 2006, 2007 (computed by the author)

(*) Statistically significant (5 per cent)

Table IX – Association between the Employees variations in establishments with other variables: Spearman's Correlation

	2003/2004	2004/2005	2005/2006	2006/2007
Overtime Hours Variation	-0,003	0,000	0,002	-0,002
Wage Variation	-0,042*	-0,050*	-0,051*	-0,057*
Normal Wage Variation	-0,044*	-0,052*	-0,053*	-0,059*
Overtime Premium Variation	0,012*	0,015*	0,013*	0,014*

Source: Personnel Records, Ministry of Economy - Office for Strategy and Studies, 2003, 2004, 2005, 2006, 2007 (computed by the author)

(*) Statistically significant (5 per cent)

Table X – Association between the Employees variations in establishments with other variables (absolute values): Pearson's Correlation

	2003/2004	2004/2005	2005/2006	2006/2007
Overtime Hours Variation	0,008*	0,011*	0,021*	0,008*
Wage Variation	-0,034*	-0,028*	-0,032*	-0,033*
Normal Wage Variation	-0,036*	-0,030*	-0,035*	-0,035*
Overtime Premium Variation	0,013*	0,023*	0,027*	0,019*

Source: Personnel Records, Ministry of Economy - Office for Strategy and Studies, 2003, 2004, 2005, 2006, 2007 (computed by the author)

(*) Statistically significant (5 per cent)