Testing urban efficiency wages in France and Spain*

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Abstract

This paper analyzes the existence of efficiency wages in the French and Spanish labor markets, within an urban efficiency wage theoretical framework. Using data from the French and Spanish time use surveys for the year 2009-2010, results support the main hypothesis of urban efficiency wage models. In particular, that leisure and shirking at work are substitutes, that there is a negative relationship between commuting and leisure, and that there are positive relationships between commuting-shirking at work and commuting-earnings. These results represent the second test of this relationship in the literature, and the first empirical estimate of these relationships for France and Spain. The results show the existence of a direct link between commuting and earnings, which may be helpful in improving the functioning of labor markets.

Keywords: urban efficiency wages; shirking; leisure; commuting; time use data

JEL Codes: J22; J30

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1. Introduction

Commuting is the time/distance between home and the workplace, and its analysis has gained importance in the literature in the most recent decade. Commuting has increased substantially in developed countries (Kirby and LeSage, 2009; Gimenez-Nadal and Molina, 2014), and for many workers represents a significant part of the working day. Furthermore, commuting has been ranked among the lowest activities in terms of "instant enjoyment" for workers (Kahneman et al., 2004; Kahneman and Krueger, 2006), and has been associated with high levels of stress (Wener et al., 2003; Frey and Stutzer, 2008; Gottholmseder et al., 2009), psychological and health problems (Hansson et al., 2011; Künn-Nelen, 2016), low levels of welfare (Frey and Stutzer, 2008; Novaco and Gonzalez, 2009; Dickerson, Hole and Munford, 2014), and decreased productivity (Grinza and Rycx, 2020). Two of the frameworks that have been developed for its analysis are the Monocentric (Alonso, 1964; Mills, 1967; Muth, 1969) and Polycentric models (Muller, 1981; Garreau, 1991; Knox and McCarthy, 2005).

One relationship that has been analyzed in prior research is that between wages and commuting, with studies finding a positive correlation between these two factors (e.g., Leigh, 1986; Zax, 1991; White, 1999; Fu and Ross, 2013; Ruppert et al., 2016). Among the most commonly used theories that establish this positive correlation, is that of efficiency wages, in which firms are willing to pay higher wages than equilibrium wages in order to promote worker productivity and discourage shirking at work (Shapiro and Stiglitz, 1984). However, these authors identify the problem of setting efficiency wages when workers' time endowment is unobserved, since the value of shirking depends upon the time endowment. More recently, studies of urban efficiency wages incorporate a spatial component, assuming that commuting time is a shock to time endowments that ultimately affects workers' productivity (Ross and Zenou, 2008, Zenou, 2009). Urban efficiency wage models provide a theoretical framework within which to simultaneously study the range of relationships among commuting, wages, employment and unemployment, and other time endowments.[1]

[1] Urban efficiency wages models do not consider the possible existence of monopsony in labour markets (Manning, 2003). Monopsony is characterized by the presence of many individuals looking for work and only a few employers, who can afford to offer a lower salary than they would have to offer if there was more competition for workers. Furthermore, trade unions can provide a counterweight to bargaining power and the unilateral exercise of monopsonic power, promoting higher wages. Thus, with monopsony, the theoretical relationship between commuting and wages may not be as positive as expected.

Studies of urban efficiency wages include Zenou and Smith (1995), who develop a model that links efficiency wages and involuntary unemployment; and Zenou (2006), who demonstrates that efficiency wage mechanisms increase with the distance to the job. Ross and Zenou (2008) develop an urban efficiency wage model that assumes that leisure time and shirking at work are substitutes, while commuting has negative impacts on leisure. Employees who devote comparatively more time to commuting have comparatively less time to devote to leisure activities, and thus have incentives to shirk at work, which decreases their effort at work, and thus commuting and wages should be positively correlated to avoid shirking. However, the Ross and Zenou (2008) hypothesis of substitution between leisure and shirking at work has remained as a benchmark assumption that leads to a theoretical ambiguity, as model results were based on that assumption. So far, only Gimenez-Nadal, Molina and Velilla (2018) have studied the direct relationships between shirking, leisure, commuting, and wages in the US, providing empirical support to urban efficiency wage models in general, and to Ross and Zenou (2008) in particular. Other authors have used urban efficiency wages to study the spatial dependence of unemployment (Brueckner and Zenou, 2003; Gobillon, Selod and Zenou, 2007; Patacchini and Zenou, 2007; Picard and Zenou, 2015), while Fleisher and Wang (2001) studied efficiency wages in urban and rural China. However, these studies are either theoretical or focused on countries such as the US, China, and the UK, and the particular cases of France and Spain have not appeared in the literature, to the best of our knowledge.

In that context, this paper addresses the different relationships that can be derived from the Ross and Zenou (2008) urban efficiency wage model, in terms of earnings and the time uses of workers. In particular, leisure and shirking at work should be substitutes, while commuting time has a negative relationship with leisure and a positive one with shirking at work. Furthermore, commuting time should present a positive relationship with labor earnings. We use data from the 2010 French Time Use Survey (FTUS), and the 2009-2010 Spanish Time Use Survey (STUS), to test the assumptions and predictions of urban efficiency wage models in those specific labor markets, finding positive evidence for both countries on all the aforementioned relationships.

The contribution of the paper is twofold. First, we analyze whether leisure and shirking at work are substitutes, as argued by Ross and Zenou (2008), representing the second test of this relationship in the literature. The first test is carried out in Gimenez-Nadal, Molina and Velilla (2018) using time use data for the United States. In doing so, we use data for France and Spain,

which is the first time that these countries are analyzed within the framework of urban efficiency wages. We test the various implications of the model in terms of time endowments and labor earnings, and we find a negative correlation between leisure and shirking, supporting the substitution hypothesis. Estimates also show a negative correlation between leisure and commuting, indicating that commuting is a shock to time endowments that affects leisure (Ross and Zenou, 2008, Zenou, 2009), and a positive correlation between commuting and shirking, which is more relevant to non-supervised occupations. We also find a positive correlation between commuting and monthly worker earnings. These results are consistent with the assumptions and predictions of the model, giving empirical support to the urban efficiency wage theory in both France and Spain.

We must acknowledge that the data and empirical analyses employed in this paper do not allow us to talk about causal links, but only conditional correlations. In this setting, prior research has used better identification strategies for the variations in commuting time to find a causal effect of commuting on shirking (Ross and Zenou, 2008; Van Ommeren and Gutierrez-i-Puigarnau, 2011). The former provides indirect causal evidence, while the latter finds a significant impact of commuting on worker absenteeism. However, we use a more precise source of information on worker shirking behaviors, arising from time use surveys, as argued by Gimenez-Nadal, Molina and Velilla (2018). This current paper shows conditional correlations, consistent with the urban efficiency wages theory, and in line with similar patterns studied causally by prior research, using new and accurate variables for worker shirking behaviors. Thus, it is still valuable to replicate these conditional correlations in other contexts, given the lack of causal estimates. To the best of our knowledge, this work constitutes the first empirical analysis of urban efficiency wages in European countries, using time use data.

The remainder of the paper is organized as follows. Section 2 describes the theoretical framework underlying the empirical correlations to be tested. Section 3 contains the data and variables, and Section 4 shows the econometric analysis. Section 5 presents our results, and Section 6 sets out our main conclusions.

2. Theoretical framework

Ross and Zenou (2008) assume that workers' residential locations (*x*) are endogenously chosen, while workplaces remain fixed in a centralized, monocentric, and normalized city. Then, employment is exogenously concentrated in a Business District (BD), so that workers choose their residences in terms of the commuting distance, $BD = 0 < x < 1 = x_f$, with x_f being the city fringe. In that context, workers can be either employed or unemployed, and have utility functions, $V(l, e)$, that depend on their leisure time (*l*), and on their effort at work (*e*), understood as the opposite to shirking at work.

The main assumption of the model is that leisure and shirking at work are not independent but, rather, are considered substitutes, in such a way that:

$$\frac{\partial^2 V(l,e)}{\partial l \partial e} > 0.$$

Then, as commuting times are considered shocks to time endowments that have a negative impact on leisure time, low levels of leisure at home imply increasing benefits of taking leisure while at work, i.e., more shirking. Thus, the indirect utility of workers over the life cycle can be expressed as:

$$I = (1-u)\big(wT + V(1-T-tx, e)\big) - R(x) - \tau x + uV_0,$$

where *u* denotes the unemployment rate, *w* represents (exogenous) wages, *T* denotes (exogenous) paid work time, *tx* and τx are the time and monetary costs of commuting from distance *x*, $R(x)$ is the price of living in *x*, and V_0 is the normalized instant utility of the unemployed.

There are two types of workers, shirkers (*S*) and non-shirkers (*NS*), providing different efforts at work, $e^S < e^{NS}$, and consequently having differential unemployment rates due to the existence of supervision mechanisms: $u^{NS} < u^S$. If leisure and shirking are substitutes, then two scenarios develop, depending on whether firms can observe employees residential location or not. First, if firms cannot observe workers commuting, workers residing close to jobs will provide more effort at work (i.e., will shirk less) than those with longer commutes, as their shorter commutes mean more time for leisure and, thus, less incentive to shirk.

There is a point $0 < \tilde{x} < 1$ that separates shirker and non-shirkers in the city, and higher wages reduce the fraction of shirkers in the city:

$$\frac{\partial \tilde{x}}{\partial w} > 0,$$

due to increases in the income difference between shirkers and non-shirkers, $wT(u^S - u^{NS})$. Furthermore, Ross and Zenou (2008) conclude that there is a positive correlation between unemployment and commuting, and an equilibrium in which shirking behaviors cannot be completely eliminated, as long as firms cannot completely observe workers residential location.

If firms can observe workers' residential location, it is optimal for them to wage-discriminate in terms of commuting. If firms can completely observe workers' commutes, they will be able to avoid shirking behaviors, and the authors establish a positive relationship between wages and commuting:

$$w(x) = \frac{(1-u^S)V(1-T-tx, e^S) - (1-u^{NS})V(1-T-tx, e^{NS})}{T(u^S - u^{NS})} + \frac{V_0}{T},$$

such that $w'(x) > 0$. On the other hand, if firms have limited information and can only partially observe workers' locations, the positive correlation between commuting and wages holds, but some workers will still shirk.

Ross and Zenou (2008) studied empirically the relationships between commuting, wages, and employment, finding results in line with the theory that shirking and leisure are substitutes. However, they could not analyze the relationship between leisure and shirking at work. Therefore, as the results depended upon the hypothesis, the result is a theoretical ambiguity.

In summary, five testable assumptions (or results) emerge from the Ross and Zenou (2008) model: 1) A negative correlation between leisure and shirking at work. 2) A negative correlation between leisure and commuting. 3) A positive correlation between shirking at work and commuting. 4) A positive correlation between wages and commuting. 5) A negative correlation between employment rates and commuting.

3. Data and variables

To test the urban efficiency wages theory, we use the 2010 French Time Use Survey (FTUS) and the 2009-10 Spanish Time Use Survey (STUS). The FTUS is conducted by the French Institute of Statistics and Economic Studies ("Institut National de la Statistique et des Études Économiques", INSEE) and the STUS is conducted by the Spanish Institute of Statistics

("Instituto Nacional de Estadística", INE).[2] These time use surveys are intended to cover representative samples of individuals, and are based on diaries where respondents report their activities through a period of time covering the 24 hours of one day (from 4am to 4am of the next day). The use of time use surveys has been reported to have advantages over other surveys using stylized questionnaires to measure time endowments. For instance, diary-based surveys provide more accurate measures of time allocations, and lead to fewer measurement errors, more accurate measurement of patterns of activities, and more reliable estimates (Bianchi et al., 2000; Bonke, 2005; Yee-Kan, 2008; Harms, Berrigan and Gershuny, 2019). Time use surveys have been used widely in recent years and have become one of the preferred tools to study time allocation decisions of individuals (Hamermesh, 1999; Aguiar and Hurst, 2007; Guryan et al., 2008; Hamermesh and Stancanelli, 2015; Jara-Díaz and Rosales-Salas, 2015; Stone and Schneider, 2016).

More importantly, the FTUS and STUS allow us to define the uses of time required to empirically analyze the assumptions and predictions of the theoretical model, including shirking at work.[3] The time devoted to shirking at work is defined, following Burda, Genadek and Hamermesh (2015), and Gimenez-Nadal, Molina and Velilla (2018), as the time spent at the workplace that is not reported as paid work (e.g., time devoted at work to leisure, internet shopping, social media…), and does not include activities related to work breaks, such as meals at work, or compulsory breaks. These activities are coded in time use surveys as "work breaks" and "meals at work" and can be considered as "formal" leisure at work, and are excluded from the definition of shirking at work, as they might include compulsory breaks that are part of the job routines and, as a consequence, cannot be considered as shirking behaviors (Gimenez-Nadal, Molina and Velilla, 2018).[4] The time devoted to leisure is defined as in Aguiar and Hurst (2007), including social life, sports, out-of-home leisure, and home leisure. The time spent commuting to/from work is defined in terms of the FTUS code "63", and the STUS code "910" (activity "travel to/from work").

[2] More information at https://www.insee.fr/en/metadonnees/source/serie/s1224; and at https://www.ine.es/prensa/eet_prensa.htm.

[3] The FTUS and STUS are based on diaries, so they can be used to compute the time devoted to different activities in 10-minute bands. In these time bands, apart from the main activity reported by respondents, there is information on the place where activities are taking place, including the workplace, which allows us to compute the time at the workplace that is not reported as market work.

[4] Results are sensitive to the inclusion of "work breaks" and "meals at work" in the definition of shirking at work.

The samples are restricted to employees between 16 and 65 years of age who filled in diaries on working days, defined as those days in which workers spend more than 60 minutes working (excluding commuting), consistent with Gimenez-Nadal, Molina and Velilla (2018). The final sample for France consists of 5,182 individuals (2,596 men and 2,586 women). In the STUS, the final sample consists of 4,574 employed individuals, of whom 2,486 are men, and 2,088 are women.

Workers are classified in two groups in terms of their occupations, supervised and non-supervised workers, following Levenson and Zoghi (2006), Ross and Zenou (2008), and Gimenez-Nadal, Molina and Velilla (2018). The FTUS includes 19 categories, and from them we consider the following supervised occupations: Agriculture, forestry and fishery; Mining and quarrying; Electricity, gas and steam supply; Water supply and wastes remediation; Construction; Transport and storage; and Administrative support.[5] Then, Sales and trade; Accommodation and food; Information and communication, Financial and Insurance occupations; Real estate; Professional scientists and technicians; Public administration; Education; Health and social work; Arts, recreation and entertainment; Other services; and Extraterritorial occupations, are classified as non-supervised industries. The STUS includes ten categories of occupation, from which we consider Office and administrative support; Farming, fishing, and forestry; Construction and extraction; Installation, maintenance, and repair; Production; and Transportation, all as supervised occupations. That leaves Business administration; Technicians and scientific professionals; Support technicians and professionals; and Sales as non- (or lightly) supervised occupations. This classification leads, in the case of the FTUS data, to 15.93% of female workers and 44.26% of male workers in supervised occupations, vs 84.07% and 55.74% of female and male workers in non-supervised occupations, respectively. In the case of Spain, on the other hand, 39.03% of female workers in are supervised occupations, against 54.14% of their male counterparts. That leaves 60.97% of the female and 45.86% of the male workers in non-supervised occupations.

Table 1 show the average time devoted to leisure, shirking, and commuting per working day in France and in Spain, by the level of supervision of workers. It also shows the p-value of the

[5] The FTUS does not include information on worker occupation, but it does include information on worker industry, in terms of the NACE 2 classification. We use this classification and, for the sake of simplicity and consistency, refer to the industry in which employees work as "occupation".

difference between average values of supervised and non-supervised workers, based on a t-type test of difference of means. In the case of France, supervised workers devote 58.1 minutes to leisure in their working days, while non-supervised workers devote 60.1 minutes to these activities, with the difference between the two groups not being statistically significant at standard levels. Regarding shirking behaviors, non-supervised workers spend about 5.6 minutes per day not working at workplace, vs 7.5 minutes of the supervised, with this difference not being statistically significant. Finally, the average commuting time of non-supervised workers is 59.3 minutes, while supervised workers commute, on average, 66.1 minutes, with the difference between the two groups being statistically significant. In Spain, supervised workers devote 170.8 minutes per working day to leisure, against the 173.2 minutes spent by non-supervised workers, with this difference not being significant at standard levels. For shirking at work, workers in supervised occupations spend 10.5 minutes shirking, vs 7.7 minutes spent by workers in non-supervised occupations, with this difference being significant at the 90% level. Supervised and non-supervised workers spend 58.6 and 52.5 minutes per day, respectively, commuting to/from work, with this difference being significant at the 99% level.

We also have information on monthly labor earnings, defined in income brackets. Specifically, for France, monthly earnings are defined in terms of quintiles, which include "less than the percentile 20", "percentiles 20-40", "percentiles 40-60", "percentiles 60-80" and "percentile 80 and more". In the case of Spain, monthly labour earnings include the income brackets "less than 600 Euros", "600-1200 Euros", "1200-1600 Euros", "1600-2000 Euros", "2000-2500 Euros", "2500-3000 Euros" and "more than 3000 Euros." Table 1 shows the percentage of supervised and non-supervised workers in each of the income categories, for both France and Spain. In France, 7.6% (15.5%) of (non-) supervised workers have an income below the 20th percentile; 21.2% (17.3%) between the 20th and 40th, 25.2% (18.1%) between the 40th and 60th, 22.9% (22.2%) between the 60th and 80th, and 23.1% (26.8%) above the 80th percentile. Differences between supervised and non-supervised workers are significant at standard levels for all the categories, except for individuals between the 60th and 80th percentiles, and statistics suggest a greater concentration of non-supervised workers in both low- and high-income occupations. In Spain, on the other hand, 12.4% (8.4%) of (non-)supervised workers earn less than 600 Euros, 49.9% (36.0%) earn between 600 and 1,200 Euros, 25.2% (23.0%) between 1,200 and 1,600 Euros, 7.1% (14.4%) between 1,600 and 2,000 Euros, 3.4% (8.6%) between 2,000 and 2,500 Euros, 1.3% (5.5%) between 2,500 and 3,000 Euros, and 0.7%

(4.1%) more than 3,000 Euros. These percentages are different for supervised and unsupervised workers for all the income brackets, except for individuals earning in the 1,200-1,600 range, and statistics suggest, similarly to France, a higher percentage of unsupervised workers, relative to supervised workers, in the higher income categories.

The datasets also allow us to compute several variables regarding socio-demographic characteristics. The following variables are defined: gender (i.e., a dummy variable that takes value 1 for males, 0 for females); age, measured in years; and the maximum level of formal education achieved by individuals, in terms of two dummy variables, secondary education and University education. The reference category for education is then those individuals who have not completed secondary education. Additionally, being a native worker, household composition, characterized by a dummy that takes value 1 for individuals who live in couple (0 otherwise), by a dummy that takes value 1 if there are children in the household (0 otherwise), and by the number of individuals in the household. Weekly work hours are accounted for, defined at the individual level, and based on a stylized question that does not represent the market work time variable (which is defined from the diaries, and used in the sample restriction). This set of socioeconomic variables has been common in prior research studying worker time endowments (e.g., Gershuny, 2000; Mattingly and Sayer, 2006; Aguiar and Hurst, 2007; Craig, 2007; McQuaid and Chen, 2012; Dargay and Clark, 2012; Burda, Genadek and Hamermesh, 2015; Gimenez-Nadal, Molina and Velilla, 2020). Furthermore, it resembles the econometric strategy of Ross and Zenou (2008) and Gimenez-Nadal, Molina and Velilla (2018).

Summary statistics of these socio-demographic characteristics for France and Spain are shown in Table 1, by supervision status. In France, 74.3% of supervised workers are males, compared to 40.8% of non-supervised workers. In Spain, these percentages are 62.2% and 50.2%, respectively, and differences by supervision are significant at standard levels in both countries. The average (non-)supervised worker is 41.4 (42.8) years of age in France, and 41.1 (41.1) in Spain, with differences being significant only between French supervised and non-supervised workers. For education, 65.0% (63.9%) of French (Spanish) supervised workers have a secondary education level, and 50.5% (51.8%) of non-supervised employees also have secondary education. Differences are significant at standard levels in both countries. However, there is a higher percentage of University educated individuals in non-supervised occupations, in both France (36.5% vs 13.1%) and Spain (35.8% vs 8.1%), with differences being highly

significant by supervision. Regarding the nationality of workers, 97% of employees are native French in France (with no differences by supervision), while 78.6% of supervised and 89.4% of non-supervised workers are native Spanish in Spain (with the difference being significant at standard levels). Regarding household composition, in France about 66% of employees live in couple, and 47% have children, regardless of the supervision status. However, supervised workers tend to have slightly larger families (2.88 members, vs 2.81 for non-supervised workers, with the difference being significant at the 95% level). In Spain, about 72% of workers live in couple (with no differences by supervision at standard levels). However, only 8.6% of supervised workers have children, and their average family size is 3.3 members, vs 13.8% of non-supervised workers that have children, with an average family size of 3.23 members (with differences being significant at standard levels). Finally, supervised workers seem to work longer hours in France (38.5 hours per week, vs 33.9 hours for non-supervised workers), while in Spain the difference in work hours is not significant (about 40 hours per week).

4. Econometric strategy

Four aspects of the Ross and Zenou (2008) model are to be tested: 1) a negative correlation between leisure and shirking, 2) a negative correlation between leisure and commuting, 3) a positive correlation between shirking and commuting, and 4) a positive correlation between labor income and commuting.[6] In doing this, we follow Ross and Zenou (2008) and Gimenez-Nadal, Molina and Velilla (2018) and estimate, for both supervised and non-supervised workers, the following equations:

$$\log(1+S_i) = \beta_0 + \beta_1 \log(1+L_i) + \beta_2 X_i + \alpha + \varepsilon_i, \quad (1)$$

$$\log(1+L_i) = \beta_0 + \beta_1 \log(1+C_i) + \beta_2 X_i + \alpha + \varepsilon_i, \quad (2)$$

$$\log(1+S_i) = \beta_0 + \beta_1 \log(1+C_i) + \beta_2 X_i + \alpha + \varepsilon_i, \quad (3)$$

$$E_i = \beta_0 + \beta_1 \log(1+C_i) + \beta_2 X_i + \beta_3 h_i + \alpha + \varepsilon_i, \quad (4)$$

[6] The datasets do not include the required information to replicate the employment analysis of Gimenez-Nadal, Molina and Velilla (2018), as housing stock variables, or other variables required to instrument commutes are not included.

where S_i represents shirking time, L_i represents leisure time, C_i represents commuting time, and E_i represents monthly earnings, for worker "i" of our samples. For all the equations to be estimated, X_i is a vector of common sociodemographic variables, α represents region and occupation fixed effects, and ε_i is the error term.[7] Equations (1) to (3) are estimated using ordinary least squares (OLS), and include sample weights provided by the STUS and FTUS.

In Equation (4), the dependent variable measures labor income, defined as monthly earnings in brackets, and thus this equation is estimated using an ordered logit model, which is specifically designed for this type of variable (i.e., categorical variables with several dependent categories). Furthermore, since monthly earnings depend on work hours, Equation (4) also includes a control for weekly hours of work reported by workers (h_i), otherwise estimates could suffer from omitted variable bias. The equation also includes sample weights, and robust standard errors

All time uses are included in the equations in logarithms (plus 1, to avoid computing issues with zero values), so estimated coefficients can be interpreted as the estimated elasticities between these magnitudes, net of the observed heterogeneity captured by X_i. It is important to note that OLS estimates do not allow us to find any causal link, and results are therefore limited to conditional correlations, subject to potential endogeneity and reverse causality.

5. Results

5.1 The relationship between shirking and leisure

Results of estimating Equation (1) are shown in Table 2. Columns (1) and (2) show estimates for French employees in supervised and non-supervised occupations, respectively, while Columns (3) and (4) show analogous estimates for Spain. The elasticity between shirking and leisure is found to be negative and highly significant for both French and Spanish workers. For instance, a 10% increase in the time spent in leisure is associated, on average, with a 0.76% and 0.81% decrease in the time spent shirking at work among supervised and unsupervised employees in France, respectively. In Spain, a 10% increase in leisure is associated with a 1.56%

[7] The vector X_i of sociodemographic controls includes being male, age and its square, secondary education, university education, being native, living in couple, having children, and family size. In the case of France information on regions is not available, and thus the equations include only occupation fixed effects. Robust standard errors are clustered at the regional (NUTS-2) and occupation level for Spain, and at the occupation level in France.

and 1.20% decrease in shirking for supervised and unsupervised workers, respectively. These estimated coefficients appear not to be statistically differentiated at standard levels between supervised and non-supervised occupations, according to a t-type test ($p = 0.910$ for France, $p = 0.595$ for Spain). The estimates are consistent with the benchmark hypothesis of the Ross and Zenou (2008) urban efficiency wages model, regarding the substitution assumption between leisure and shirking at work. Furthermore, such a substitution relationship appears not to depend on the supervision status of workers, in contrast to results for the US in Gimenez-Nadal, Molina and Velilla (2018), where the relationship was stronger for non-supervised workers.

For the remaining explanatory variables, being male is positively correlated with shirking time for Spanish employees, but only for French supervised workers, consistent with Gimenez-Nadal, Molina and Velilla (2018). This suggests that Spanish male employees, and French male employees in supervised occupations, net of observed heterogeneity, shirk more than do their female counterparts. Experience is not significant in general terms, except among French non-supervised employees, for whom we find a negative correlation between shirking and experience, significant at the 90% (as in Gimenez-Nadal, Molina and Velilla, 2018). Regarding education, the only significant coefficient is that associated with secondary education for supervised workers in France. Living in couple is negative and significant at the 90% level, only for Spanish supervised workers, while family size is negative and significant for French supervised workers, in contrast to estimates for the US in Gimenez-Nadal, Molina and Velilla (2018). All in all, these results suggest that shirking behaviors are hardly predicted from socio-demographics, as most of the explanatory variables in the regressions resulted in not being statistically significant at standard levels, and the estimated correlations are different from those in the US. This could be due to different labor market conditions, while differences between supervised and non-supervised occupations may also arise from the different types of jobs (e.g., specialized jobs that require different levels of skill and human capital). Thus, shirking at work seems to be a process that could be determined by a range of stochastic or unobservable factors (e.g., R-squared statistics are below 0.10 for all the columns, in line with results in Gimenez-Nadal, Molina and Velilla, 2018).

5.2 The relationship between leisure and commuting

Table 3 shows estimates of Equation (2) on the relationship between leisure time and commuting time, for supervised and non-supervised employees in France (Columns (1) and (2)), and Spain (Columns (3) and (4)).[8] In France, a 10% increase in commuting is associated with 2.22% and 1.57% decreases in the leisure time of supervised and non-supervised workers, respectively, with both correlations being highly significant (but not different at standard levels, $p = 0.132$). For Spanish workers, the conditional correlation between commuting time and leisure time is found to be negative and highly significant only for workers in non-supervised occupations, consistent with the urban efficiency wages model, while for supervised occupations this correlation is negative but not significant. For instance, a 10% increase in commuting time is associated with a decrease of 0.96% in the time available for leisure activities for unsupervised employees in Spain. Thus, commuting time is found to be a shock to time endowments of workers that affects leisure time, as predicted by Ross and Zenou (2008), although this correlation depends on supervision in Spain, but not in France. Prior research for the US found results similar to those in France, with this relationship also being significant for supervised and non-supervised workers.

Regarding the rest of the explanatory variables, male workers spend more time in leisure activities than do their female counterparts, but the difference is only significant at standard levels for supervised workers in France. This contrasts with estimates in the US, where men were estimated to spend more time in leisure activities than women in both supervised and unsupervised occupations (Gimenez-Nadal, Molina and Velilla, 2018), and with a number of other studies finding gender gaps in leisure time (e.g., Gershuny, 2000; Aguiar and Hurst, 2007; Gimenez-Nadal and Sevilla, 2012; Sevilla et al., 2012). Experience is not significant in general terms, except for Spanish non-supervised workers, where we find a U-shaped relationship between potential experience and leisure time (Gimenez-Nadal and Sevilla, 2012; Gimenez-Nadal, Molina and Velilla, 2018). Education seems not to be related to leisure time in Spain at

[8] Commuting time may be different for different type of workers, as they may, for instance, be selected into different occupations according to their characteristics (e.g., more educated workers are more likely to be in non-supervised occupations) or have different preferences for leisure (Hamermesh and Lee, 2007). For this reason, we regress (log of) commuting time on the set of socio-demographic characteristics (X_i) defined in Equations (1) to (4) plus occupation fixed effects, by supervision level. The results are shown in Table A1 in the Appendix, and the coefficients are in general terms not significant at standard levels, and R-squared statistics are quite low, which is in line with a number of studies suggesting that commuting is a magnitude that depends on stochastic and non-controllable factors, such as weather conditions and traffic congestion (see Gimenez-Nadal, Molina and Velilla, 2020) for a review.

significant levels, while in France the estimated conditional correlation is negative for both supervised and non-supervised workers, as workers with higher education appear to spend less time in leisure activities (consistent with Sevilla et al., 2012). Spanish workers in supervised occupations spend more time in leisure than their non-native counterparts, while being a native worker is not significant in France, nor among Spanish workers in non-supervised occupations. Further research should provide a deeper analysis of such differences between countries and occupational attainment, which is beyond the objective of the present analysis. Having children is also negatively related to leisure time in both Spain and France (though the correlation is not significant for French workers in non-supervised occupations), which is consistent with Kimmel and Connelly (2007) and Gimenez-Nadal and Sevilla (2012). Finally, we find a negative correlation between family size and leisure time, which is only significant among non-supervised workers (in both countries).

5.3 The relationship between shirking and commuting

Results of estimating Equation (3) are shown in Columns (1) and (2) of Table 4 for French supervised and non-supervised workers, and in Columns (3) and (4) for their Spanish counterparts. In France, the correlation between commuting and shirking at work is positive and significant for both kinds of workers (with the differences in terms of the supervision level not being significant, $p = 0.219$). In particular, a 10% increase in commuting time is associated with a 0.58% (1.04%) increase in the time spent shirking at work among French (non-)supervised employees. In Spain, the elasticity between commuting time and shirking at work is positive and significant for employees in non-supervised occupations. However, it is positive and not significant for employees in supervised occupations, robust to results regarding commuting and leisure, in Table 3. Specifically, a 10% increase in commuting time is associated with a 0.89 % increase in the time spent shirking at work among Spanish non-supervised workers.

These results suggest that commuting time is ultimately correlated with more shirking time, as predicted by the urban efficiency wages theory. These conditional correlations, together with the results in Tables 2 and 3, may indicate that the correlation of commuting time and shirking at work is, as claimed by the urban efficiency wages theory, driven by commuting time being a shock to time endowments that impacts leisure, with leisure at work being a substitute for leisure time. Furthermore, supervision mechanisms in Spain seem to moderate the correlations between

leisure and shirking, and between commuting and shirking, but this does not appear to happen in France (at least in statistically significant ways). Thus, estimates are compatible with the main hypothesis and results of the urban efficiency wages model (Ross and Zenou, 2008, Zenou, 2009), and provide empirical support.

Regarding the rest of the explanatory variables, as in Table 2, most of the variables are not statistically significant at standard levels, and the estimated R-squared are also below 0.10. However, there are small differences between estimates in Tables 2 and 4, as the significance of education dummies in the case of France change. Living in couple was negative in Table 2, but only significant for Spanish supervised workers, while in Table 4 it is also significant for Spanish non-supervised workers, and for French supervised workers. The presence of children is now positive and significant for supervised workers in France, while in Table 2 that coefficient was positive but not significant at standard levels. Similarly, family size was negative and significant for supervised French workers in Table 2, but the same coefficient in Table 4 is not significant.

5.4 The relationship between earnings and commuting

Results of estimating Equation (4) are shown in Table 5. Columns (1) and (2) show estimates for French employees in supervised and non-supervised occupations, respectively, while Columns (3) and (4) show similar estimates for Spanish employees.[9] Estimates show a positive and significant correlation between longer commutes and higher monthly earnings in both France and Spain, which are not driven by longer work hours, and are robust to the estimates in the US of Gimenez-Nadal, Molina and Velilla (2018). However, as these estimates are based on an ordered logit model, no direct intuition on the magnitude of that correlation can be derived from these estimated coefficients. Nonetheless, according to a t-type test, the correlations are similar for supervised and unsupervised occupations, at standard levels ($p = 0.117$ in France, $p = 0.574$ for Spain). As a consequence, estimates suggest that the behavior of workers in the French and Spanish labor markets are highly compatible with the Ross and Zenou (2008) urban efficiency wage model, as all the crucial assumptions and results of the model estimated in this

[9] Note that monthly earnings are missing for 906 Spanish employees, who are omitted from the analysis shown in Table 5.

analysis are robust to the theory. These estimates are also in line with prior research reporting a positive correlation between income and commuting.

For the rest of the explanatory variables in Table 5, work hours and monthly earnings are positively correlated for all the columns, as expected. Being male is also positive and significantly correlated with monthly earnings, even after controlling for work hours, sociodemographics, and occupations, in line with a number of studies analyzing gender earnings gaps (Blau and Kahn, 2016; Juhn and McCue, 2017; OECD, 2017). Potential experience is correlated with earnings, forming an "inverted-U" relationship, while education is correlated with earnings in a positive and highly significant way (consistent with Ross and Zenou, 2008; and Gimenez-Nadal and Molina, 2018). These estimates do not change by supervision level, nor by country analyzed, as they are qualitatively similar for supervised and unsupervised workers in Spain and France. However, being a native workers and living in couple are positive and significant for Spanish supervised workers and for French non-supervised workers, but not for their respective counterparts. Further research should focus on exploring these differences by supervision, which is beyond the scope of our present analysis. The presence of children is positively correlated with earnings in Spain (e.g., Killewald, 2012), while coefficients are not significant in France (in line with Lundberg and Rose, 2000, 2002). Similarly, family size is negatively correlated to earnings, and the coefficients are significant in Spain, but not significant in France. This suggests that income and household composition are more sensitively correlated in Spain than in France. The impact of children and household composition on earnings has been previously studied, and may be due to a broad set of factors (a detailed analysis is beyond the scope of the present paper, but see a recent analysis and review by Kunze, 2019).

5.5 Additional results

The results shown in Tables 2, 3, 4, and 5 show estimates in line with the assumptions and predictions of the urban efficiency wages theory and, in particular, with the Ross and Zenou (2008) model. However, the difference between supervised and non-supervised workers in Spain regarding the commuting-shirking relationship may be driven by the fact that non-supervised workers work longer hours and thus shirk more (i.e., they take more breaks). However, this is not the case for workers in supervised occupations in both countries, who work more hours than their non-supervised counterparts. Table 1 shows descriptive statistics of market work time

(in minutes) of supervised and non-supervised workers in the FTUS and STUS data. We observe that French supervised workers spend, on average, 480 minutes per working day in market work activities, while their non-supervised counterparts devote 439 minutes per working day to these activities, with the difference being significant at standard levels. Similarly, in Spain supervised workers spend 465 minutes per working day in market work activities, whereas non-supervised workers spend 458 minutes in similar activities, with the difference also being significant at standard levels.[10]

One concern that may emerge from our previous results is that the classification of workers in terms of supervised or unsupervised occupations may be conditioning the results. While the classification in this study follows the early work of Gimenez-Nadal, Molina and Velilla (2018), some occupations are difficult to codify. For instance, workers in sales occupations may be considered supervised or unsupervised, depending on particular issues unobserved in the time use surveys. For this reason, we have developed several sensitivity analyses. First, we have estimated Equations (1) to (4) pooling together employees in supervised and unsupervised occupations. These estimates (results available upon request) are in line with the urban efficiency wages model, as we find negative correlations between leisure and shirking and between leisure and commuting, and positive correlations between commuting and shirking, and between commuting and earnings. Second, to partially analyze whether a particular occupation is driving our results, we show in Tables A3, A4, A5 and A6 in the Appendix, a sensitivity analysis where, in each column, we estimate the main equations omitting one occupation at a time. Table A4 (A5) shows results for French (non-)supervised occupations, while Table A6 (A7) does the same for the case of Spain. Estimates show that the main results do not depend on the occupation of workers, in general terms, as the signs of the coefficients of interest remain unchanged in all columns, while the significance (or non-significance) level of these coefficients remains in most cases.

[10] We have also estimated a regression of log hours worked, where we include the same explanatory variables as in the previous regressions, the log-of-shirking time, and a dummy for non-supervised workers. Table A2 in the Appendix shows the results of estimating this regression. We first find, for both France and Spain, a statistically significant and positive correlation between being a supervised worker and market work time, which suggests that unsupervised workers work shorter hours. Furthermore, after controlling for the supervision level, the elasticity between market work time and shirking at work is positive and statistically significant, indicating that market work hours and shirking are positively related. However, these results may be biased due to reverse causality issues, and must be taken with caution.

We have used data from the Dutch Time Use Survey 2005, which does not include information on the self-employment status of workers, occupation, and earnings, thus not fully replicating the analysis for France and Spain. However, some basic analyses are shown in Table A7 in the Appendix. These results must be understood cautiously, as they may suffer from omitted variable bias, but they do point to the same conclusions as the estimates shown in the case employees in Spain and France regarding the relationship between commuting, shirking, and leisure.

Finally, we provide some descriptive information about the spatial pattern of where (e.g., cities, suburbs or rural areas) workers live in Spain and France, according to their income. If we find the same pattern of correlation between the analyzed variables for countries that tend to differ in the pattern of where high-wage individuals work and live, that would add consistency to the estimated empirical relationships. To that end, we use data from Eurostat on the degree of urbanization of households, according to their income level. This allows us to distinguish the following degrees of urbanization: "cities", "towns and suburbs", and "rural areas", and we can show the mean and median annual income for France and Spain in those areas. Figures are shown in Table A8 of the Appendix. We observe that the higher average incomes in Spain are found in cities. Furthermore, there is a positive correlation between income and the degree of urbanization, as the average income decreases in towns and suburbs, relative to cities, and then in rural areas, relative to towns and suburbs. In France, however, trends are different, as the higher incomes are found in towns and suburbs. Nonetheless, average incomes in cities are still higher than in rural areas. These trends are equivalent when focusing on medians. We also show the percentage of individuals with income higher than 130% and 150% of the median and mean incomes. These percentages show a positive relationship between income and urbanization However, (and this is robust to the trends shown for average incomes) there seems to be a higher aggregation of high-income individuals in cities in Spain, relative to the same percentages in France.

6. Conclusions

This paper tests urban efficiency wages using French and Spanish time use data from years 2009-2010, within the Ross and Zenou (2008) theoretical framework. The results shown are consistent with the assumptions of the model, and they represent the second empirical test of the

substitution relationship between leisure time and shirking at work. The rest of the analyses are also in line with the Ross and Zenou (2008) model, as results show a negative correlation between commuting and leisure time, and a positive correlation between commuting and the time spent shirking at work. Moreover, results show a positive correlation between commuting and monthly earnings, controlling for work hours. Despite that a number of prior analyses have analyzed the relationship between wages and commuting, this is the first time that France and Spain are analyzed within the framework of urban efficiency wages.

Our results show significant differences between France and Spain in comparison to the US (Gimenez-Nadal, Molina and Velilla, 2018). In particular, in the US the correlation between leisure time and shirking at work was negative and significant, being stronger for non-supervised workers. In Spain and France, on the other hand, the correlation is negative, but differences between supervised and non-supervised workers are not significant at standard levels. Regarding the correlation between commuting time and leisure time, for the US that correlation was negative and significant for both supervised and non-supervised workers, but stronger for the latter. In Spain, this correlation is negative for all workers, but it is only significant for non-supervised workers, while in France it is negative and highly significant, and with no differences between supervised and unsupervised workers. For the relationship between commuting and shirking, results for the US and Spain are similar, as the correlation is positive, but only significant among non-supervised workers. In France, the correlation between commuting and shirking is positive and significant for both supervised and non-supervised workers, with no significant differences between them. Finally, for the relationship between commuting and earnings (wages for the US, and monthly earnings in the case of France and Spain), results are similar for the US, Spain, and France. Despite these differences among the estimates for France and Spain, relative to the US (Gimenez-Nadal, Molina and Velilla, 2018), the results are compatible with the existence of urban efficiency wages in those countries. To extent to which such cross-country differences are due to potential measurement errors and different definitions of occupations, it is worthy of analysis, and more research on this issue is needed.

The empirical analysis shown here has important implications for employers and firms, as it may allow us to distinguish which workers are more prone to shirking behaviors while at work, thus decreasing their productivity, although it is true that eliminating breaks at work would be counterproductive (Hamermesh, 1990). Thus, if non-supervised workers earn more and also

shirk more, perhaps shirking at work actually increases productivity. Further research on this issue is needed.

Both leisure and commuting are found to be significantly related to shirking, although these correlations appear stronger among non-supervised employees indicating that supervision mechanisms influence the ability of workers to shirk, although they cannot completely eliminate shirking. In that way, increasing wages for workers with longer commutes may act as an incentive to workers to reduce their shirking behaviors. This may be the key element in increasing productivity, especially in certain Spanish occupations where the correlation between earnings and commuting decreases when omitted from the analysis.

The empirical analysis has the limitation that both surveys represent a cross-section of individuals, and we do not have the necessary information to instrument commuting, and thus estimates cannot be interpreted as causal results. There are endogeneity issues among commuting, earnings, and other time uses, arising from the fact that we cannot control for both variant and time-invariant unobserved heterogeneity of individuals. However, through time use surveys we can explicitly examine relationships among variables that are typically not observed in the large, census style or administrative data. Showing these conditional correlations is valuable, just as they were valuable in the U.S. context with Gimenez-Nadal, Molina and Velilla (2018), especially because it is important to know whether these effects can apply to other contexts. In the US, the rich tend to live on the outskirts of the metro area, while in Europe this is not always the case, and so the intrinsic correlation between commuting and unobserved human capital may vary significantly across countries. The fact that similar results are found in different countries with different contexts indicates that these relationships are genuine and do not depend on the context of the country.

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Table 1. Summary statistics

	Supervised		Non-supervised		Difference
VARIABLES	Mean	S.D.	Mean	S.D.	*p*-value
FRANCE					
Leisure time	58.060	75.384	60.060	75.795	(0.234)
Shirking time	5.599	20.660	7.467	29.813	(0.115)
Commuting time	66.091	52.594	59.293	52.973	(<0.001)
Market work time	479.698	114.630	439.457	141.166	(<0.001)
Monthly earnings					
< Perc. 20	0.076	0.265	0.155	0.362	(<0.001)
Perc. 20-40	0.212	0.409	0.173	0.378	(<0.001)
Perc. 40-60	0.252	0.435	0.181	0.385	(<0.001)
Perc. 60-80	0.229	0.420	0.222	0.416	(0.598)
Perc 80+	0.231	0.421	0.268	0.443	(0.004)
Being male	0.743	0.437	0.408	0.491	(<0.001)
Age	41.414	10.451	42.763	10.490	(<0.001)
Educ.: Secondary	0.650	0.477	0.505	0.500	(<0.001)
Educ.: University	0.131	0.337	0.365	0.482	(<0.001)
Being French	0.969	0.173	0.969	0.172	(0.835)
Living in couple	0.666	0.472	0.660	0.474	(0.253)
Any children	0.473	0.499	0.469	0.499	(0.499)
Family size	2.877	1.317	2.807	1.290	(0.040)
Weekly work hours	38.458	8.168	33.947	11.074	(<0.001)
N. Observations	1,561		3,621		
SPAIN					
Leisure time	170.797	109.559	173.158	110.949	(0.710)
Shirking time	10.405	27.278	7.667	22.237	(0.079)
Commuting time	58.640	46.817	52.521	39.760	(0.004)
Market work time	464.759	147.998	457.754	158.765	(0.073)
Monthly earnings					
< 600 Euros	0.124	0.330	0.084	0.277	(<0.001)
600-1,200 Euros	0.499	0.500	0.360	0.480	(<0.001)
1,200-1,600 Euros	0.252	0.434	0.230	0.421	(<0.125)
1,600-2,000 Euros	0.071	0.257	0.144	0.351	(<0.001)
2,000-2,500 Euros	0.034	0.181	0.086	0.280	(<0.001)
2,500-3,000 Euros	0.013	0.115	0.055	0.228	(<0.001)
> 3,000 Euros	0.007	0.082	0.041	0.199	(<0.001)
Being male	0.622	0.485	0.502	0.500	(<0.001)
Age	41.058	10.900	41.098	10.709	(0.878)
Educ.: Secondary	0.639	0.480	0.518	0.500	(<0.001)
Educ.: University	0.081	0.273	0.358	0.479	(<0.001)
Being Spanish	0.786	0.410	0.894	0.308	(<0.001)
Living in couple	0.747	0.435	0.706	0.456	(0.141)
Any children	0.086	0.280	0.138	0.345	(<0.001)
Family size	3.331	1.221	3.233	1.209	(0.090)
Weekly work hours	40.372	11.46	41.142	12.69	(0.100)
N. Observations	2,161		2,413		

Note: The samples (STUS 2009-2010, FTUS 2010) are restricted to employees who work the diary day. Summary statistics include sample weights. T-type test *p*-values correspond to the difference between supervised and non-supervised workers.

Table 2. Shirking and leisure

	Log(1+shirking)			
	FRANCE		SPAIN	
	(1)	(2)	(3)	(4)
VARIABLES	Supervised	Non-supervised	Supervised	Non-supervised
Log(1+leisure)	-0.076***	-0.081**	-0.156***	-0.120***
	(0.015)	(0.028)	(0.055)	(0.041)
Being male	0.196*	0.004	0.155**	0.165**
	(0.082)	(0.085)	(0.062)	(0.083)
Potential experience	0.003	-0.025*	-0.019	0.003
	(0.021)	(0.013)	(0.012)	(0.012)
Potential experience sq.	-0.008	0.034	0.021	-0.006
	(0.036)	(0.024)	(0.020)	(0.026)
Educ.: Secondary	-0.195*	0.270	0.046	-0.027
	(0.100)	(0.160)	(0.127)	(0.158)
Educ.: University	0.057	0.288	0.080	0.301
	(0.186)	(0.189)	(0.243)	(0.187)
Being native	-0.329	-0.005	-0.261	-0.083
	(0.283)	(0.211)	(0.195)	(0.143)
Living in couple	-0.131	-0.121	-0.193*	-0.140
	(0.115)	(0.091)	(0.109)	(0.084)
Any children	0.155	0.063	-0.117	-0.090
	(0.107)	(0.080)	(0.148)	(0.092)
Family size	-0.098**	-0.018	-0.008	0.006
	(0.037)	(0.029)	(0.037)	(0.037)
Constant	2.876***	1.756***	1.668***	1.027***
	(0.344)	(0.295)	(0.544)	(0.237)
Occupation F.E.	Yes	Yes	Yes	Yes
Region F.E.	No	No	Yes	Yes
Observations	1,561	3,621	2,161	2,413
R-squared	0.022	0.035	0.088	0.091

Note: Robust standard errors clustered at the occupation-regional level in parentheses. The samples (STUS 2009-2010, FTUS 2010) are restricted to employees who work the diary day. Estimates include sample weights. The dependent variable is the log of shirking time. * Significant at the 90% level, ** significant at the 95% level, *** significant at the 99% level.

Table 3. Leisure and commuting

	Log(1+leisure)			
	FRANCE		SPAIN	
	(1)	(2)	(3)	(4)
VARIABLES	Supervised	Non-supervised	Supervised	Non-supervised
Log(1+commuting)	-0.222***	-0.157***	-0.061	-0.096***
	(0.024)	(0.026)	(0.044)	(0.024)
Being male	0.156**	0.121	0.159	0.114
	(0.054)	(0.089)	(0.098)	(0.089)
Potential experience	-0.005	0.006	-0.016	-0.025***
	(0.026)	(0.016)	(0.013)	(0.009)
Potential experience sq.	0.003	-0.011	0.030	0.051***
	(0.062)	(0.028)	(0.022)	(0.017)
Educ.: Secondary	-0.205	-0.280*	0.100	0.077
	(0.173)	(0.146)	(0.094)	(0.174)
Educ.: University	-0.518***	-0.404**	0.123	0.273
	(0.076)	(0.181)	(0.163)	(0.189)
Being native	0.108	-0.095	0.318*	0.211
	(0.253)	(0.213)	(0.177)	(0.213)
Living in couple	-0.176	-0.171	0.012	0.026
	(0.259)	(0.150)	(0.063)	(0.070)
Any children	-0.250*	-0.114	-0.257**	-0.303*
	(0.105)	(0.104)	(0.119)	(0.154)
Family size	0.041	-0.099*	-0.034	-0.073**
	(0.079)	(0.050)	(0.036)	(0.031)
Constant	3.176***	3.812***	5.190***	5.281***
	(0.209)	(0.281)	(0.328)	(0.258)
Occupation F.E.	Yes	Yes	Yes	Yes
Region F.E.	No	No	Yes	Yes
Observations	1,561	3,621	2,161	2,413
R-squared	0.030	0.034	0.056	0.058

Note: Robust standard errors clustered at the occupation-regional level in parentheses. The samples (STUS 2009-2010, FTUS 2010) are restricted to employees who work the diary day. Estimates include sample weights. The dependent variable is the log of leisure time. * Significant at the 90% level, ** significant at the 95% level, *** significant at the 99% level.

Table 4. Shirking and commuting

	Log(1+shirking)			
	FRANCE		SPAIN	
	(1)	(2)	(3)	(4)
VARIABLES	Supervised	Non-supervised	Supervised	Non-supervised
Log(1+commuting)	0.058**	0.104***	0.020	0.089***
	(0.018)	(0.023)	(0.038)	(0.025)
Being male	0.173**	0.044	0.126**	0.151*
	(0.061)	(0.047)	(0.063)	(0.080)
Potential experience	0.009	-0.008	-0.016	0.007
	(0.009)	(0.013)	(0.013)	(0.013)
Potential experience sq.	-0.001	0.016	0.017	-0.014
	(0.017)	(0.027)	(0.020)	(0.027)
Educ.: Secondary	-0.079	0.139	0.033	-0.038
	(0.076)	(0.122)	(0.128)	(0.150)
Educ.: University	-0.311***	0.089	0.064	0.264
	(0.058)	(0.135)	(0.257)	(0.188)
Being native	-0.227	-0.103	-0.313	-0.113
	(0.170)	(0.149)	(0.221)	(0.137)
Living in couple	-0.156**	-0.028	-0.197*	-0.152*
	(0.043)	(0.039)	(0.111)	(0.087)
Any children	0.148**	0.088	-0.074	-0.042
	(0.041)	(0.059)	(0.147)	(0.074)
Family size	-0.011	0.008	-0.002	0.016
	(0.028)	(0.021)	(0.037)	(0.038)
Constant	0.464*	0.072	0.816**	0.095
	(0.222)	(0.227)	(0.386)	(0.217)
Occupation F.E.	Yes	Yes	Yes	Yes
Region F.E.	No	No	Yes	Yes
Observations	1,561	3,621	2,161	2,413
R-squared	0.036	0.020	0.072	0.084

Note: Robust standard errors clustered at the occupation-regional level in parentheses. The samples (STUS 2009-2010, FTUS 2010) are restricted to employees who work the diary day. Estimates include sample weights. The dependent variable is the log of shirking time. * Significant at the 90% level, ** significant at the 95% level, *** significant at the 99% level.

Table 5. Monthly earnings and commuting

	Monthly earnings (Ordered Logit)			
	FRANCE		SPAIN	
	(1)	(2)	(3)	(4)
VARIABLES	Supervised	Non-supervised	Supervised	Non-supervised
Log(1+commuting)	0.196***	0.121***	0.118*	0.077*
	(0.044)	(0.025)	(0.061)	(0.041)
Monthly work hours	0.100***	0.077***	0.006***	0.004***
	(0.010)	(0.005)	(0.001)	(0.001)
Being male	1.031***	0.906***	1.309***	0.905***
	(0.122)	(0.069)	(0.167)	(0.136)
Potential experience	0.133***	0.159***	0.099***	0.138***
	(0.020)	(0.013)	(0.023)	(0.019)
Potential experience sq.	-0.157***	-0.213***	-0.167***	-0.190***
	(0.041)	(0.027)	(0.041)	(0.039)
Educ.: Secondary	1.203***	1.331***	0.512***	1.297***
	(0.141)	(0.115)	(0.167)	(0.226)
Educ.: University	3.215***	3.361***	1.080***	2.653***
	(0.233)	(0.151)	(0.305)	(0.313)
Being native	0.007	0.942***	0.854***	0.494
	(0.323)	(0.193)	(0.197)	(0.341)
Living in couple	0.057	0.174*	0.280*	0.012
	(0.162)	(0.099)	(0.161)	(0.172)
Any children	0.207	-0.043	0.343*	0.510***
	(0.176)	(0.104)	(0.201)	(0.186)
Family size	-0.040	-0.067	-0.102*	-0.116**
	(0.065)	(0.042)	(0.052)	(0.049)
Occupation F.E.	Yes	Yes	Yes	Yes
Region F.E.	No	No	Yes	Yes
Observations	1,561	3,621	1,795	1,873

Note: Robust standard errors clustered at the occupation-regional level in parentheses. The samples (STUS 2009-2010, FTUS 2010) are restricted to employees who work the diary day and report non-null earnings. Estimates include sample weights. The dependent variable is monthly earnings (in brackets). * Significant at the 90% level, ** significant at the 95% level, *** significant at the 99% level.

Appendix A: Additional results

Table A1. Estimates on commuting time

	Log(1+commuting)			
	FRANCE		SPAIN	
VARIABLES	(1) Supervised	(2) Non-supervised	(3) Supervised	(4) Non-supervised
Being male	0.024	0.111	0.350***	0.007
	(0.069)	(0.065)	(0.080)	(0.081)
Potential experience	0.004	0.008	0.001	-0.021*
	(0.011)	(0.009)	(0.008)	(0.011)
Potential experience sq.	-0.008	-0.020	-0.033**	0.029
	(0.018)	(0.014)	(0.016)	(0.022)
Educ.: Secondary	-0.042	0.315**	-0.297***	0.018
	(0.060)	(0.103)	(0.098)	(0.094)
Educ.: University	0.165**	0.228	-0.253	0.052
	(0.057)	(0.187)	(0.208)	(0.129)
Being native	-0.096	-0.469***	0.211	0.060
	(0.233)	(0.120)	(0.137)	(0.157)
Living in couple	-0.031	-0.086	0.191**	0.124**
	(0.078)	(0.066)	(0.092)	(0.057)
Any children	0.027	-0.071	-0.234**	-0.149
	(0.074)	(0.108)	(0.104)	(0.113)
Family size	0.016	-0.014	-0.009	-0.017
	(0.018)	(0.044)	(0.028)	(0.025)
Constant	3.706***	3.855***	3.728***	3.869***
	(0.334)	(0.199)	(0.271)	(0.271)
Occupation F.E.	Yes	Yes	Yes	Yes
Region F.E.	No	No	Yes	Yes
Observations	1,561	3,621	2,161	2,413
R-squared	0.011	0.071	0.100	0.044

Note: Robust standard errors clustered at the occupation-regional level in parentheses. The samples (STUS 2009-2010, FTUS 2010) are restricted to employees who work the diary day. Estimates include sample weights. The dependent variable is the log of commuting time. * Significant at the 90% level, ** significant at the 95% level, *** significant at the 99% level.

Table A2. Work time, supervision, and shirking

	Log(1+market work time)	
	(1)	(2)
	France	Spain
Log(1+shirking)	0.183**	0.586***
	(0.074)	(0.062)
Supervised worker	0.692***	0.468**
	(0.023)	(0.196)
Being male	0.075*	0.045
	(0.036)	(0.055)
Potential experience	-0.002	-0.007
	(0.008)	(0.009)
Potential experience sq.	0.009	0.005
	(0.017)	(0.016)
Educ.: Secondary	0.034	0.032
	(0.100)	(0.098)
Educ.: University	-0.057	0.221
	(0.119)	(0.133)
Being native	-0.189	-0.217
	(0.113)	(0.145)
Living in couple	-0.072**	-0.113*
	(0.028)	(0.065)
Any children	0.110**	-0.063
	(0.039)	(0.072)
Family size	0.002	0.005
	(0.019)	(0.026)
Constant	-0.558	-3.062***
	(0.511)	(0.409)
Occupation F.E.	Yes	Yes
Region F.E.	No	Yes
Observations	5,182	4,574
R-squared	0.014	0.091

Note: Robust standard errors clustered at the occupation-regional level in parentheses. The samples (STUS 2009-2010, FTUS 2010) are restricted to employees who work the diary day and report non-null earnings. Estimates include sample weights. The dependent variable is the log of market work time. * Significant at the 90% level, ** significant at the 95% level, *** significant at the 99% level.

Table A3. Sensitivity analysis – Supervised occupations, France

OMITTED IND:	Agr., forest., fishery (1)	Mining, quarrying (2)	Electr, gas, steam supply (3)	Water supply (4)	Construction (5)	Transport, storage (6)	Admin. support (7)
Log(1+shirking)							
Log(1+leisure)	-0.075***	-0.075***	-0.099***	-0.069***	-0.078***	-0.071***	-0.076***
	(0.014)	(0.014)	(0.020)	(0.010)	(0.019)	(0.015)	(0.016)
Constant	2.678***	2.716***	2.538***	2.821***	2.561***	3.036***	3.039***
	(0.352)	(0.342)	(0.409)	(0.335)	(0.422)	(0.266)	(0.234)
Observations	1,520	1,553	749	1,514	1,291	1,291	1,448
R-squared	0.021	0.023	0.033	0.022	0.022	0.019	0.022
Log(1+leisure)							
Log(1+commuting)	-0.213***	-0.216***	-0.223***	-0.221***	-0.212***	-0.242***	-0.230***
	(0.024)	(0.024)	(0.048)	(0.025)	(0.026)	(0.023)	(0.028)
Constant	3.772***	3.640***	4.156***	3.844***	3.661***	3.848***	3.894***
	(0.235)	(0.239)	(0.554)	(0.201)	(0.133)	(0.257)	(0.241)
Observations	1,520	1,553	749	1,514	1,291	1,291	1,448
R-squared	0.030	0.029	0.046	0.029	0.030	0.032	0.027
Log(1+shirking)							
Log(1+commuting)	0.054**	0.053**	0.048	0.056**	0.074***	0.062**	0.060**
	(0.017)	(0.017)	(0.028)	(0.018)	(0.012)	(0.021)	(0.020)
Constant	0.579*	0.615*	1.104***	1.046***	1.156***	1.023**	0.983**
	(0.259)	(0.251)	(0.181)	(0.226)	(0.225)	(0.286)	(0.267)
Observations	1,520	1,553	749	1,514	1,291	1,291	1,448
R-squared	0.029	0.032	0.058	0.034	0.040	0.035	0.038
Monthly earnings							
Log(1+commuting)	0.192***	0.191***	0.257***	0.192***	0.189***	0.166***	0.205***
	(0.045)	(0.044)	(0.058)	(0.045)	(0.048)	(0.049)	(0.047)
Observations	1,520	1,553	749	1,514	1,291	1,291	1,448

Note: Robust standard errors clustered at the occupation-regional level in parentheses. The samples (STUS 2009-2010, FTUS 2010) are restricted to employees who work the diary day. Estimates include sample weights. The dependent variables are the log of shirking time, the log of leisure time, and monthly earnings (in brackets). * Significant at the 90% level, ** significant at the 95% level, *** significant at the 99% level.

Table A4. Sensitivity analysis – Non-supervised occupations, France

OMITTED IND:	Sales and trade	Accomm., food	Infor., comm.	Financial, insurance	Real estate	Techn., scientific	Public admin.	Education	Health, social	Arts, recreation	Other services	Extraterrit orial occ.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Log(1+shirking)												
Log(1+leisure)	-0.085**	-0.082**	-0.081**	-0.090***	-0.081**	-0.086**	-0.072*	-0.056**	-0.098***	-0.077**	-0.082**	-0.080**
	(0.033)	(0.029)	(0.030)	(0.028)	(0.029)	(0.029)	(0.033)	(0.023)	(0.027)	(0.029)	(0.030)	(0.029)
Constant	1.775***	2.117***	1.941***	1.980***	1.857***	2.001***	1.702***	1.756***	2.053***	1.870***	1.836***	1.817***
	(0.347)	(0.272)	(0.309)	(0.278)	(0.311)	(0.302)	(0.312)	(0.328)	(0.369)	(0.312)	(0.306)	(0.302)
Observations	3,048	3,460	3,464	3,420	3,577	3,460	3,084	2,762	2,943	3,542	3,469	3,602
R-squared	0.032	0.034	0.036	0.037	0.035	0.036	0.034	0.040	0.035	0.035	0.037	0.035
Log(1+leisure)												
Log(1+commuting)	-0.147***	-0.160***	-0.158***	-0.156***	-0.154***	-0.166***	-0.164***	-0.132***	-0.169***	-0.153***	-0.166***	-0.158***
	(0.029)	(0.027)	(0.027)	(0.027)	(0.026)	(0.024)	(0.026)	(0.029)	(0.027)	(0.027)	(0.024)	(0.026)
Constant	3.537***	4.089***	3.965***	4.157***	3.871***	3.972***	3.632***	4.214***	4.077***	3.788***	3.695***	3.716***
	(0.281)	(0.293)	(0.287)	(0.271)	(0.280)	(0.293)	(0.312)	(0.282)	(0.360)	(0.274)	(0.292)	(0.283)
Observations	3,048	3,460	3,464	3,420	3,577	3,460	3,084	2,762	2,943	3,542	3,469	3,602
R-squared	0.033	0.034	0.035	0.033	0.034	0.036	0.039	0.027	0.039	0.034	0.036	0.034
Log(1+shirking)												
Log(1+commuting)	0.110***	0.107***	0.108***	0.101***	0.103***	0.104***	0.109***	0.074***	0.110***	0.103***	0.105***	0.105***
	(0.024)	(0.023)	(0.023)	(0.024)	(0.024)	(0.024)	(0.024)	(0.009)	(0.027)	(0.024)	(0.024)	(0.023)
Constant	0.144	-0.046	-0.053	0.035	-0.036	-0.094	0.184	0.187	-0.039	0.267	0.234	0.220
	(0.226)	(0.236)	(0.238)	(0.230)	(0.221)	(0.239)	(0.250)	(0.156)	(0.263)	(0.219)	(0.225)	(0.215)
Observations	3,048	3,460	3,464	3,420	3,577	3,460	3,084	2,762	2,943	3,542	3,469	3,602
R-squared	0.024	0.021	0.020	0.021	0.020	0.020	0.023	0.015	0.022	0.020	0.021	0.021
Monthly earnings												
Log(1+commuting)	0.113***	0.121***	0.115***	0.117***	0.118***	0.118***	0.119***	0.271***	0.044	0.121***	0.116***	0.121***
	(0.026)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.027)	(0.035)	(0.027)	(0.025)	(0.025)	(0.025)
Observations	3,048	3,460	3,464	3,420	3,577	3,460	3,084	2,762	2,943	3,542	3,469	3,602

Note: Robust standard errors clustered at the occupation-regional level in parentheses. The samples (STUS 2009-2010, FTUS 2010) are restricted to employees who work the diary day. Estimates include sample weights. The dependent variables are the log of shirking time, the log of leisure time, and monthly earnings (in brackets). * Significant at the 90% level, ** significant at the 95% level, *** significant at the 99% level.

Table A5. Sensitivity analysis – Supervised occupations, Spain

OMITTED OCC:	Office and admin.	Farm., fish., forestry	Construction extraction	Installation, repair	Production	Transport
	(1)	(2)	(3)	(4)	(5)	(6)
Log(1+shirking)						
Log(1+leisure)	-0.158**	-0.154**	-0.188***	-0.178***	-0.078	-0.157***
	(0.061)	(0.060)	(0.061)	(0.061)	(0.050)	(0.055)
Constant	1.980***	2.036***	2.085***	2.257***	1.640***	1.771***
	(0.654)	(0.627)	(0.663)	(0.632)	(0.566)	(0.517)
Observations	1,719	1,996	1,643	1,806	1,508	2,133
R-squared	0.096	0.084	0.095	0.093	0.095	0.089
Log(1+leisure)						
Log(1+commuting)	-0.054	-0.097**	-0.055	-0.086**	0.010	-0.060
	(0.050)	(0.045)	(0.055)	(0.042)	(0.049)	(0.044)
Constant	5.374***	5.675***	5.429***	5.507***	5.554***	5.187***
	(0.413)	(0.342)	(0.411)	(0.356)	(0.349)	(0.329)
Observations	1,719	1,996	1,643	1,806	1,508	2,133
R-squared	0.057	0.068	0.056	0.070	0.059	0.055
Log(1+shirking)						
Log(1+commuting)	0.031	0.028	0.004	0.025	0.009	0.019
	(0.043)	(0.044)	(0.046)	(0.041)	(0.039)	(0.038)
Constant	1.052**	1.117**	1.086**	1.241***	1.173***	0.810**
	(0.481)	(0.440)	(0.488)	(0.442)	(0.435)	(0.387)
Observations	1,719	1,996	1,643	1,806	1,508	2,133
R-squared	0.079	0.069	0.069	0.073	0.091	0.072
Monthly earnings						
Log(1+commuting)	0.118*	0.169***	0.109*	0.055	0.077	0.230***
	(0.061)	(0.064)	(0.064)	(0.067)	(0.066)	(0.086)
Observations	1,421	1,694	1,369	1,495	1,225	1,771

Note: Robust standard errors clustered at the occupation-regional level in parentheses. The samples (STUS 2009-2010, FTUS 2010) are restricted to employees who work the diary day. Estimates include sample weights. The dependent variables are the log of shirking time, the log of leisure time, and monthly earnings (in brackets). * Significant at the 90% level, ** significant at the 95% level, *** significant at the 99% level.

Table A6. Sensitivity analysis – Non-supervised occupations, Spain

OMITTED OCC:	Business admin. (1)	Technicians, scientific (2)	Support professionals (3)	Sales (4)
Log(1+shirking)				
Log(1+leisure)	-0.136**	-0.126**	-0.125***	-0.072**
	(0.053)	(0.048)	(0.047)	(0.027)
Constant	0.578*	0.760***	0.768**	0.690**
	(0.345)	(0.250)	(0.302)	(0.340)
Observations	1,958	1,804	1,936	1,541
R-squared	0.093	0.098	0.083	0.115
Log(1+leisure)				
Log(1+commuting)	0.113***	0.081**	0.073**	0.092***
	(0.026)	(0.031)	(0.027)	(0.030)
Constant	-0.511	-0.006	-0.104	-0.337
	(0.330)	(0.192)	(0.277)	(0.465)
Observations	1,958	1,804	1,936	1,541
R-squared	0.087	0.088	0.072	0.120
Log(1+shirking)				
Log(1+commuting)	-0.128***	-0.109***	-0.079***	-0.069**
	(0.023)	(0.031)	(0.028)	(0.028)
Constant	5.501***	5.631***	5.120***	5.530***
	(0.211)	(0.321)	(0.326)	(0.371)
Observations	1,958	1,804	1,936	1,541
R-squared	0.067	0.061	0.056	0.090
Monthly earnings				
Log(1+commuting)	0.077*	0.063	0.157***	0.069
	(0.046)	(0.051)	(0.044)	(0.051)
Observations	1,578	1,383	1,479	1,179

Note: Robust standard errors clustered at the occupation-regional level in parentheses. The samples (STUS 2009-2010, FTUS 2010) are restricted to employees who work the diary day. Estimates include sample weights. The dependent variables are the log of shirking time, the log of leisure time, and monthly earnings (in brackets). * Significant at the 90% level, ** significant at the 95% level, *** significant at the 99% level.

Table A7. Estimates for the Netherlands

VARIABLES	Log(1+shirking) (1)	Log(1+shirking) (2)	Log(1+leisure) (3)
Log(1+leisure)	-0.024**	-	-
	(0.010)		
Log(1+commuting)	-	0.087***	-0.059***
		(0.010)	(0.016)
Being male	-0.051	-0.048	-0.373***
	(0.042)	(0.041)	(0.061)
Potential experience	-0.029***	-0.027***	-0.005
	(0.007)	(0.007)	(0.010)
Potential experience sq.	0.078***	0.075***	0.019
	(0.017)	(0.017)	(0.022)
Educ.: Secondary	-0.185**	-0.188**	0.017
	(0.077)	(0.076)	(0.106)
Educ.: University	-0.296***	-0.325***	0.337***
	(0.076)	(0.076)	(0.107)
Being native	-0.003	0.006	0.102
	(0.070)	(0.070)	(0.097)
Living in couple	0.044	0.040	-0.251***
	(0.050)	(0.050)	(0.078)
Any children	-0.093	-0.085	-0.188**
	(0.068)	(0.067)	(0.093)
Family size	0.051**	0.054**	0.027
	(0.024)	(0.024)	(0.033)
Constant	0.972***	0.603***	3.644***
	(0.124)	(0.122)	(0.187)
Observations	4,852	4,852	4,852
R-squared	0.023	0.034	0.021

Note: Robust standard errors clustered at the occupation-regional level in parentheses. The sample (the Netherlands Time Use Survey from year 2005) is restricted to employees who work the diary day. Estimates include sample weights. The dependent variable is the log of shirking time in Columns (1) and (2), and the log of leisure time in Column (3). * Significant at the 90% level, ** significant at the 95% level, *** significant at the 99% level.

Table A8. Distribution of income by degree of urbanization, year 2009

		Cities	Towns and suburbs	Rural areas
Mean net annual income	**Spain**	19,623	16,310	15,371
	France	24,100	24,255	22,753
Median net annual income	**Spain**	17,441	14,407	13,784
	France	20,616	21,194	19,839
% of individuals with income:				
Greater than 130% of median	**Spain**	40.3	26.3	21.9
	France	30.8	28.3	20.8
Greater than 150% of median	**Spain**	30.3	18.1	14.2
	France	21.6	19.5	13.3
Greater than 130% of mean	**Spain**	30.1	17.9	14.0
	France	20.8	18.6	12.8
Greater than 150% of mean	**Spain**	21.2	12.3	8.9
	France	14.1	12.0	8.0

Source: Eurostat online data (ilc_di17, ilc_di23).