UNEMPLOYMENT AND TIME USE: EVIDENCE FROM THE SPANISH TIME USE SURVEY[*]

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Abstract

In this paper we use a time use approach to analyze the average effect of aggregate unemployment on the daily life of individuals, focusing on the relationship between reduced market work and additional household production of unemployed individuals. Using the Spanish Time Use Survey 2002-2003, we find that, in general, the unemployed devote most of the reduced market time to additional leisure, and only a small proportion of time is devoted to household production activities. However, we find that the relationship between market work and household production with unemployment of individuals depends on regional unemployment rates, since in areas with high unemployment rates reduced market work is made up by additional time spent in household production. Our paper sheds light on the relationship between individuals' time allocation decisions and aggregate macroeconomic variables.

JEL Codes: D13, J16, J22
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UNEMPLOYMENT AND TIME USE: EVIDENCE FROM THE SPANISH TIME USE SURVEY[1]

Unemployment has been considered to be one of the strongest correlates of individual well-being, and economists have long debated the causes and consequences of unemployment (see Clark, Knabe and Rätzel [2010] for a review of the relationship between unemployment and well-being). Losing a job is associated with a significant drop in income and with a loss of social status. Unemployment is also associated with a weaker time structure, given that the unemployed have reduced market time to devote to non-market activities, including household production, personal care and leisure activities. However, research in macroeconomics has only focused on the dichotomy between market and non-market time, without considering that non-market time has different components (e.g., leisure and household production). As argued by Burda and Hamermesh [2010], "if household production is substitutable for market production, the welfare costs of cyclical reductions in the latter will be small, regardless of the shape or functional form of the utility function." Likewise, in terms of unemployment policy, analyzing to what extent market work and household production are substitutable is important.

Furthermore, previous research has studied the relationship between individual well-being and others' unemployment (Di Tella, MacCulloch and Oswald 2001; Blanchflower 2007), with a number of papers distinguishing between the effect of aggregate unemployment on the employed and the unemployed (Platt and Kreitman 1990; Clark 2003; Powdthavee 2007; Shields, Wheatley Price and Wooden 2009).[2] However, previous studies on the effects of aggregate macroeconomic variables have been focused on individual's well-being, without considering other dimensions of individuals' behavior, such as time allocation decisions. We should expect that aggregate unemployment (others' unemployment) affect the time allocation decisions of

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[2] See Clark, Knabe and Rätzel [2010] for a review of the effect of aggregate unemployment on the employed and the unemployed.

individuals, especially for unemployed individuals who have reduced market time to be devoted to unstructured non-market time, consistent with previous research finding that an individual's time use choices may be contingent on the time use choices of others (e.g., Hamermesh 2000; Halberg 2003; Jenkins and Osberg 2005).[3]

Only Burda and Hamermesh [2010] have directly analyzed the relationship between time allocation of individuals and regional unemployment rates, finding that differences between the employed and the unemployed represent additional leisure, although in areas where unemployment is cyclically high reduced market work is offset by additional home production.[4] The main reason for the lack of previous research is the lack of adequate data. Surveys such as the European Community Household Panel (ECHP), the German Socio-Economic Panel (SOEP), the British Household Panel Survey (BHPS) or the Panel Study of Income Dynamics (PSID) contain "stylized" questions about the hours per week devoted to housework activities. But such questions do not allow researchers to know how much time individuals devote to cooking, shopping or watching TV, among others.[5] The development of time use surveys has allowed for a more in-depth study of the time devoted to non-market activities, including housework (e.g., Bianchi et al. 2000; Aguiar and Hurst 2007; Connelly and Kimmel 2008), childcare (e.g., Bianchi 2000; Gauthier, Smeeding and Furnstenberg 2004; Guryan, Hurst and Kearney 2008), and leisure (e.g., Bittman and Wajcman 2000, Aguiar and Hurst 2007, Gimenez-Nadal and Sevilla-Sanz 2010).

Thus, in this paper we first analyze the differences between the employed and the unemployed regarding their time allocation decisions, with a focus on the effects of regional unemployment rates on such time allocation decisions. Using the Spanish Time Use Survey (STUS) 2002-2003, we find that, in general, the unemployed devote their reduced market time to additional leisure and personal care, and only a small

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[3] For instance, Hamermesh [2000] finds evidence for the US that couples arrange their work schedules to allow time for leisure that they consume jointly and Halberg [2003] finds a positive effect of coordination on synchronous leisure, with market work and leisure timing being very intra-household dependent.

[4] Indeed, only few papers have directly analyzed the relationship between unemployment and the time devoted to the different non-market activities (e.g., Ahn, Ugidos and Gimeno 2005; Burda and Hamermesh 2010; Krueger and Mueller 2010).

[5] Stylised estimates contain certain recall biases because it is difficult for a respondent to remember and report exactly the amount of time used (Juster and Stafford 1985). They also tend to produce total time greater than 168 h for a week (Gershuny and Robinson 1994), which makes that diary-based estimates of time use are more reliable and accurate than estimates derived from direct questions (Robinson 1985; Plewis, Creeser and Mooney 1990; Yee-Kan 2008).

proportion of time is devoted to household production activities. However, we find that the relationship between reduced market work and additional household production with unemployment of individuals depends on regional unemployment rates, since in areas with high unemployment rates reduced market work is made up by additional time spent in household production. Thus, we find evidence on the effects of aggregate unemployment on individuals' time allocation decisions, especially for the case of the unemployed. Our results are consistent with those found in Burda and Hamermesh [2010].

Second, as a validation exercise, we analyze differences between the employed and the unemployed in the enjoyment of their daily activities, also with a focus on the effects of aggregate unemployment. Krueger and Mueller [2008] compare the emotional well-being of employed and unemployed individuals during similar activities, and they find that the unemployed report feeling more sadness, stress and pain than the employed. Also, Knabe et al. [2010] find that, although the unemployed feel sadder when engaged in similar activities, they can compensate for by using the time the employed are at work in more enjoyable ways, leading to no differences in the average "experienced utility" between the employed and the unemployed. However, none of the two studies have focused on the effect of aggregate unemployment on the daily enjoyment of individuals. We find that, while the unemployed obtain lower enjoyment from their daily activities compared to the employed, the difference between the two groups is larger the higher the regional unemployment rates. This result is consistent with the fact that in areas with high unemployment rates, reduced market work is made up by additional household production, while in areas with low unemployment rates reduced market work is made up by additional leisure and personal care.

By analyzing the substitution between market work and household production, on the one hand, and regional unemployment rates, on the other hand, we suggest that others' unemployment has a variety of effects on time allocation decisions of individuals. First, others' unemployment lead to an increase in the substitution between reduced market time and additional household production for the unemployed, implying that the welfare costs of fluctuations in unemployment rates could be smaller than expected. Second, others' unemployment affects the well being of the existing unemployed, since higher unemployment rates leads to lower enjoyment of daily activities of the unemployed.

Thus, in this paper we shed light on the relationship between individuals' time allocation decisions and aggregate macroeconomic variables.

The paper is organized as follows. Section 1 presents the data and variables. Section 2 describes the empirical strategy and results. Section 3 presents the validation exercise for the experienced utility of the unemployed, and Section 4 sets out our main conclusions.

1.   The Spanish Time Use Survey 2002-2003 (STUS)

1.1.   Sample

We use the harmonized version of the Spanish Time Use Survey-STUS (2002-2003) included in the Multinational Time Use Study (MTUS). The MTUS is an ex post harmonized cross-time, cross-national comparative time-use database, and is coordinated by the Center for Time Use Research at the University of Oxford. It is constructed from national random-sampled time-diary studies, with common series of background variables and total time spent in 69 activities (Gershuny 2009). The MTUS has been widely used across the social sciences. Examples of papers using the MTUS for the analysis of time-use include Gershuny [2000], Gershuny and Sullivan [2003], Gauthier et al. [2004], Guryan et al. [2008] and Gershuny [2009].[6]

In the STUS, each household member over 9 years old fills in a time sheet, covering the 24 hours of a day, from 6 a.m. to 6 a.m. the following day. This dataset allows us to accurately compute the total hours devoted to different activities throughout the day. Although it contains time use information for all family members older than 9 years of age, we cannot account for unobserved heterogeneity in preferences for household production or leisure, since the STUS does not have a panel data structure. Examples of papers using the STUS are Gimenez-Nadal and Ortega [2010], Gimenez-Nadal, Marcen and Ortega [2010], and Sevilla-Sanz, Fernandez and Gimenez-Nadal [2010].

For the sake of comparison with previous studies, and to minimize the role of time allocation decisions that have a strong inter-temporal component over the life cycle, such as education and retirement, we restrict the samples to non-retired/non-student employed (full-time or part-time) and unemployed individuals between the ages of 21

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[6] Information on the variables, and on how to access the data, is available on the MTUS website: //www.timeuse.org/mtus/. We use the version W53.

and 65. Our results can thus be interpreted as being "per working-age adult" (e.g., Aguiar and Hurst 2007). Thus, the final sample consists of 27,216 individuals between 21 and 65, and with the 8.19% of the sample (2,230 individuals) being unemployed.

1.2. Time Use Variables

Since there are a large number of different activities (68 activities), we need to devise some way to aggregate these activities into useful economic categories. We have chosen the 4 main categories: *Market Work*, *Household Production*, *Personal Care* and *Leisure*. These activities are computed using the total time devoted to the 68 harmonized time use variables in the MTUS version of the STUS.[7]

Market Work refers to time spent for pay, although we also include the time devoted to education and job seeking (both activities, especially the latter, are done in order to get a new job in the case of the unemployed, or to get another job in the case of the employed). Thus, we can observe unemployed individuals devoting time to *Market Work*, since they are studying in order to increase their probabilities to find a job, or they may also be devoting time to job seeking. *Household Production* refers to activities in which we engage at home, using our own time and some purchased goods, and have the common characteristic that we could pay someone to perform them for us, while we are not paid for performing them. They have the characteristic that satisfy the third-party rule (Reid 1934), with some examples of such activities being shopping, cooking, and ironing.

The third group is *Personal Care*, which refers to things that we cannot pay other people to do for us, but that we must do for ourselves, at least to some extent. Examples of these activities include sleeping and eating, activities that are necessary for survival. Finally, *Leisure* includes all activities that we cannot pay someone else to do for us, and that we do not really have to do at all if we do not wish to. What distinguishes *Leisure* from other types of home activities is that one can function perfectly well, albeit not necessarily happily, with no leisure whatsoever (e.g., *Leisure* is not necessary for

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[7] All these activities are measured as primary activities. Väisänen [2006] shows that the amount of time reported as secondary activity in the STUS is 82 minutes (out of 1440 minutes per day), the lowest among the UK, Finland, France, Germany, Italy, Norway and Sweden, which makes the inclusion of secondary activities in the analysis not relevant. All in all, the four main activities used in the analysis (*Market Work*, *Household Production*, *Personal Care* and *Leisure*) sum the 24 hours of the day. See Table A1 in appendix A1 for a description of the harmonized time-use variables that have been included in each analyzed time-use variable (e.g., Market Work, Household Production...).

survival). Examples of these activities include watching TV, sports, walking, and visiting friends.

1.3.   Unemployment Status and Unemployment Rates

We explain the time devoted to the different time use categories by a set of explanatory variables, including the respondent's own unemployment status and the regional unemployment rate.[8]

For the unemployment status of individuals, we use a dummy variable to indicate whether the individual is unemployed (1) or not (0) at the time of the interview. To that end, we use the harmonized variable in the MTUS that gathers information about the unemployment status of the individuals. As has been found in other studies, the unemployed devote fewer hours per week to *Market Work*, while they devote more time to *Household Production*, *Personal Care* and *Leisure*, compared to the employed (e.g., Ahn et al. 2005; Burda and Hamermesh 2010; Krueger and Muller 2010).[9] Thus, while the employed devote 4.59, 3.51, 10.96 and 4.96 hours per day to *Market Work*, *Household Production*, *Personal Care* and *Leisure*, respectively, unemployed individuals devote 0.44, 4.51, 7.01 and 0.69 more hours per day to these activities, with such differences being statistically significant at the 5% level. The larger difference is found in Leisure, where we find a two-hour difference between the employed and the unemployed, while we find a difference of one hour in the time devoted to *Household Production*. Thus, considering the 4-hour difference in the time devoted to *Market Work* between the employed and the unemployed, half of the difference in time is devoted to additional *Leisure*, while the other half is shared out between *Household Production* (60%) and *Personal Care* (40%)

Regarding regional unemployment rates, we use the unemployment rates provided by the Spanish Statistical Office ("Instituto Nacional de Estadística"). For each individual, we link the corresponding regional unemployment using the year of the survey (2002 or 2003), the region of residence (Aragon, Madrid, Catalonia...) and the term of the survey. Thus, for an individual living in Catalonia and answering the survey in May of 2003, we

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[8] See Appendix A1 for a description of the explanatory variables.

[9] Table A2 in Appendix A shows summary statistics of the variables used in the paper for all the sample, the employed only, and the unemployed only.

use the regional unemployment of Catalonia in the second term of the year 2003. Given that there are 18 regions in Spain, and the survey covers the period between October 2002 and September 2003, we have 76 different values for unemployment rates. The maximum and minimum values of the variable is 29.07% and 2.81% respectively, that gives enough variation to analyze how aggregate unemployment affects individuals' time allocation decisions.

Regarding our variable of aggregate unemployment, it measures current unemployment rates. Burda and Hammermesh [2010] use two measures of aggregate unemployment: long-term (six years) average unemployment rates and current unemployment rates (for the year 2006). While they find that current unemployment rates have statistically significant effects on the time devoted to *Market Work* and *Household Production*, they find no statistically significant effects of long-term unemployment rates on the time devoted to these time use categories. In the same spirit, we focus on the effect of current (short-run) unemployment rates on the time devoted to the different time categories.

Table 1 shows the relationship between aggregate unemployment in the different Spanish regions and the time devoted to the 4 main time use categories. We estimate an OLS regression for each time use category without constant term, where we regress the time devoted to each time use category on regional unemployment rates. We find a positive correlation between unemployment rates and the time devoted to both *Household Production* and *Personal Care*, and a positive correlation between unemployment rates and the time devoted to both *Market Work* and *Leisure*. Thus, a one-percent increase in the unemployment rate of the region is associated with an increase of 0.21 and 0.01 hours per day in the time devoted to *Household Production* and *Personal Care*, while it is associated with a decrease of 0.19 and 0.03 hours per day in *Market Work* and *Leisure*, respectively. Thus, comparing the regions with the highest and lowest values of unemployment rate (2.81 and 29.07, respectively), individuals living in the region with the highest value devote 5.51 and 0.50 fewer hours per day to *Market Work* and *Leisure*, while they devote 5.45 more hours per day to *Household Production*. Likewise, we find that differences in unemployment rates between regions affect individuals' time allocation decisions, which sheds light of the effects of aggregate unemployment on time allocation decisions.

2. Empirical Specification and Results

2.1. Empirical Specification

We use Ordinary Least Squares regression analysis to investigate time spent in the different time use categories by respondents who are either employed or unemployed. In order to estimate the effect of own unemployment on time allocation decisions, we first estimate the following specification:

$$T_i = \alpha + \beta_1 Unemp_i + \beta_2 X_i + \lambda_1 Day_i + \lambda_2 Region_i + \lambda_3 IMR_i + \varepsilon_i \qquad (1)$$

where T_i is the time devoted to the corresponding time use category by respondent 'i', β_1 is the parameter associated with a dummy variable controlling for whether individual 'i' is unemployed (1) or not (0), β_2 is a vector of parameters associated with respondent's demographic and household characteristics, λ_1 is the parameter associated with day dummy variables (ref.: Friday), λ_2 is the parameter associated with dummies to control for region of residence (ref.: Ceuta and Melilla), and λ_3 is the parameter associated with the inverse of mill's ratio to control for selection into unemployment. We include as demographic and household characteristics the following ones: age (and its square), secondary education (ref.: primary education), university education (ref.: primary education), number of children under 18 in the household, household has a housekeeper, health status (ref.: fair health), and household income (ref.: household income >5000 €).[10]

We have seen in Section 1 that there are positive and negative raw correlations between unemployment rates and the time devoted to the different time use categories. In order to see whether such relationships are still valid after controlling for demographic and household characteristics, we estimate the following specification:

$$T_i = \alpha + \beta_1 Unemp_i + \beta_2 Unemp\_Rates_i + \beta_2 X_i + \lambda_1 Day_i + \lambda_2 Region_i + \varepsilon_i \quad (2)$$

where T_i is the time devoted to the corresponding time use category by respondent 'i', β_1 is the parameter associated with a dummy variable controlling for whether individual 'i' is unemployed (1) or not (0), β_2 is the parameter associated with a variable controlling for regional unemployment rates, and the rest of parameters are as in Equation (1).

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[10] See Table B1 in Appendix B for results on employment equation.

Finally, we estimate OLS models where we take into account both individuals' unemployment status and aggregate unemployment rates. In this sense, since unemployed individuals have reduced market work time to devote to other activities, it could be the case that aggregate unemployment affects only to the unemployed, and it does not have any effect on the employed since the employed have structured time in market time. Thus, we estimate the following specification:

$$T_i = \alpha + \beta_1 Unemp_i + \beta_2 Unemp\_Rates_i + \beta_3 Unemp_i * Unemp\_Rates_i +$$
$$+ \beta_4 X_i + \lambda_1 Day_i + \lambda_2 Region_i + \lambda_3 IMR_i + \varepsilon_i \tag{3}$$

where T_i is the time devoted to the corresponding time use category by respondent 'i', β_1 is the parameter associated with a dummy variable controlling for whether individual 'i' is unemployed (1) or not (0), β_2 is the parameter associated with a variable controlling for regional unemployment rates, β_3 is the parameter associated with the interaction between individual's unemployment status and regional unemployment rates, and the rest of parameters are as in Equation (1).

2.2. Results

Column (1), (2) and (2) in Table 2 show the results of estimating Equation (1), (2) and (3) on the time devoted to *Market Work* (Panel A), *Household Production* (Panel B), *Personal Care* (Panel C) and *Leisure* (Panel D), respectively.[11] According to Column (1), after controlling for other personal and household characteristics, own unemployment has a negative association with the time devoted to *Market Work*, and positive associations with the time devoted to *Household Production*, *Leisure* and *Personal Care*, with this associations being statistically significant at the 1% level. Likewise, compared to employed individuals, while the unemployed devote 3.64 fewer hours per day to *Market Work*, the unemployed devote 0.88, 1.89 and 0.57 more hours per day to *Household Production*, *Leisure* and *Personal Care*, respectively. We also observe that the increase in the time devoted to *Leisure* with unemployed more than doubles the increase in the time devoted to *Household Production* and *Personal Care*. Hence, we find that, in general, the unemployed devote most of the reduced market time

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[11] See Table B2 in Appendix B for a description of the coefficients for the rest of controls included in Equations (1), (2) and (3).

to additional leisure, and only a small proportion of time is devoted to household production activities.

Furthermore, after controlling for other personal and household characteristics, aggregate unemployment also affects the time devoted to *Market Work*, *Household Production*, and *Leisure*. As shown in Column (2), aggregate unemployment has negative associations with the time devoted to *Market Work* and *Leisure*, and a positive association with the time devoted to *Household Production*, with this associations being statistically significant at the 1% level. Likewise, a one-percent increase in aggregate unemployment is associated with a decrease in *Market Work* and *Leisure* of 0.04 hours per day, while it is associated with an increase of 0.9 hours per day in *Household Production*. However, such mean effects vary depending on individuals' unemployment status, as shown in Column (3).

According to the third column in Table 2, we observe that aggregate unemployment has different effects depending on the employment status of individuals. Regarding the time devoted to *Market Work* (Panel A), we observe that, *ceteris paribus*, the unemployed devote 5.64 fewer hours per day to *Market Work*, while the effect of aggregate unemployment is negative for the employed and positive for the unemployed. Thus, while a one-percent increase in aggregate unemployment is associated with a decrease of 0.06 hours per week for the employed, a one-percent increase in aggregate unemployment is associated with an increase of 0.07 hours per week for the unemployed.

Likewise, we find differences in the time devoted to *Market Work* by the unemployed depending on the regional unemployment rates. Considering the maximum (29.07) and minimum (2.81) values of aggregate unemployment in our sample, while the unemployed reduce the time devoted to *Market Work* by 5.45 hours per day if they live in the area with the lowest aggregate unemployment, their counterparts reduce the time devoted to *Market Work* by 3.66 hours per day if they live in the area with the highest aggregate unemployment. The reason for such difference could be that in areas with high unemployment rates, the unemployed are less likely to find a job since they have more competitors, on the one hand, and less job demanders, on the other hand, so the unemployed devote more time to job seeking and studying than the unemployed in areas

with lower unemployment rates, since both activities (job seeking and human capital formation) may increase the probability of finding a job.

For the case of *Household Production*, we observe that, *ceteris paribus*, the unemployed devote 1.12 more hours per day to *Household Production*, with the effect of aggregate unemployment being positive for both the employed and the unemployed. Thus, while a one-percent increase in aggregate unemployment is associated with an increase of 0.10 hours per week for the employed, a one-percent increase in aggregate unemployment is associated with an increase of 0.08 hours per week for the unemployed. Considering the maximum (29.07) and minimum (2.81) values of aggregate unemployment in our sample, while the unemployed increase the time devoted to *Household Production* by 1.35 hours per day if they live in the area with the lowest aggregate unemployment, their counterparts increase the time devoted to *Household Production* by 3.47 hours per day if they live in the area with the highest aggregate unemployment.

For the case of *Leisure*, we observe that, *ceteris paribus*, the unemployed devote 3.33 more hours per day to *Leisure*, with the effect of aggregate unemployment being negative for both the employed and the unemployed. Thus, while a one-percent increase in aggregate unemployment is associated with a decrease of 0.03 hours per week for the employed, a one-percent increase in aggregate unemployment is associated with a decrease of 0.12 hours per week for the unemployed. Considering the maximum (29.07) and minimum (2.81) values of aggregate unemployment in our sample, while the unemployed increase the time devoted to *Leisure* by 2.98 hours per day if they live in the area with the lowest aggregate unemployment, their counterparts reduce the time devoted to *Leisure* by 0.28 hours per day if they live in the area with the highest aggregate unemployment.

Thus, in this Section we have shed light on the effects of aggregate macroeconomic variables (e.g., unemployment rates) on individuals' time allocation decisions, with a focus on the unemployed. We first find that, if we do not consider the effect of regional unemployment rates on individuals' time allocation decisions, the unemployed devote 3.64 fewer hours per day to *Market Work*, and 0.88, 1.89 and 0.57 more hours per day to *Household Production*, *Leisure* and *Personal Care*, respectively, compared to the employed. However, if we include aggregate unemployment (others' unemployment) in

the analysis, conclusions are completely different. When aggregate unemployment is included in the analysis, we find that, in areas where aggregate unemployment is high, the unemployed experience a smaller decrease in the time devoted to *Market Work* (due to education and job seeking activities mainly), a larger increase in the time devoted to *Household Production*, and a smaller increase in the time devoted to *Leisure,* compared to the unemployed living in areas with low unemployment rates. Our results are consistent with Burda and Hamermesh [2010], who find that differences in market time between the unemployed and employed represent additional leisure, not increased household production, although in areas where unemployment is cyclically high, however, reduced market work is offset by additional home production.

3.   Validation Exercise: Enjoyment of Daily Activities

3.1.   Motivation

In Section 2 we have seen that, considering own unemployment, while in areas with high aggregate unemployment reduced *Market Work* is offset by additional *Household Production*, in areas with low aggregate unemployment reduced *Market Work* is offset by additional *Leisure*. Thus, the behaviour of the unemployed depends on others' unemployment, including the activities the unemployed do throughout the day.

Furthermore, previous research has developed self-reported measures of how enjoyable activities are, in the spirit of the 'process benefits' and 'experienced utility' literature. Juster and Stafford [1985] define 'process benefits' as the "direct subjective consequences from engaging in some activities to the exclusion of others", whereas Kahneman et al. [2004] define 'experienced utility' as a 'continuous hedonic flow of pleasure or pain'. Both lines of research use time-use diaries, together with information on enjoyment, to assess individual subjective well-being. The *process benefits* approach uses *Activity Enjoyment Ratings*, where respondents rate on a scale from 0 to 10 how much they generally enjoyed a particular activity (Juster and Stafford 1985). The *experienced utility* literature, using the *Day Reconstruction Method* (Kahneman et al. 2004), collects information on how the respondent experienced all or some of the activities he or she engaged in during the previous day, as described by a time-use diary.

Although both lines of research have advantages and disadvantages, recent studies have applied the *Day Reconstruction Method* (Kahneman et al. 2004) in order to measure how enjoyable are the activities individuals are engaged in throughout the day (e.g., Kahneman et al. 2004; Kahneman and Krueger 2006; Krueger 2007; Krueger et al. 2009; Knabe et al. 2010). These studies have found that, considering the enjoyment individuals obtain from their daily activities, individuals obtain much lower enjoyment from activities such as housework and shopping compared to leisure activities. Thus, such previous literature has found that leisure activities are more enjoyable than housework activities.

Thus, on the one hand we have found that while in areas with high aggregate unemployment reduced *Market Work* is offset by additional *Household Production*, in areas with low aggregate unemployment reduced *Market Work* is offset by additional *Leisure*. On the other hand, previous research has found that leisure activities are more enjoyable than housework and market work activities. For this reason, we should expect that, in areas with high aggregate unemployment, the unemployed obtain lower 'experienced utility' from their daily activities than the unemployed living in areas with low aggregate unemployment. The reason is that, while the unemployed living in areas with low aggregate unemployment offset *Market Work* by *Leisure*, the unemployed living in areas with high aggregate unemployment offset *Market Work* by *Household Production*, and that leisure is more enjoyable than housework activities.

3.2. Data

On the one hand, Krueger and Muller [2008], and Knabe et al. [2010] have found that, when engaged in the same activities, the unemployed obtain lower enjoyment, and report more sadness, stress and pain, compared to the employed (e.g., what is called "saddening effect" by Knabe et al. 2010). Thus, in order to compare employed and unemployed individuals, we need to consider that the 'experienced utility' from the daily activities is different between the employed and the unemployed. On the other hand, the STUS does not contain information on the enjoyment or feelings individuals obtain from their activity. Thus, we need to rely on information included in other surveys to obtain the enjoyment in the different activities.

Krueger et al. [2009] use enjoyment data from the US and France to make a cross-country comparison of the enjoyment individuals obtain from their daily activities. They

use a 'Synthetic U-index' that 'indicates how the average French woman, say, would feel if she spent her time in the usual way, but experienced activities in the same way as the average American woman'. That is to say, they define the 'Synthetic U-index' using country j's proportion of time in activity 'i' and country k's U-index for activity 'i', where the U-index is defined as the proportion of time individuals spent in an unpleasant state when engaged in the reference activity. They find that cross-country differences between 'Synthetic U-index' are not statistically significant, meaning that counterfactual calculations based country j's proportion of time in activity 'i' and country k's U-index for activity 'i' would lead to similar results than using country k's proportion of time and U-index for activity 'i'.

Likewise, in this section we use the 'Synthetic U-index' based on Spain's proportion of time spent in the reference activity and Germany's U-index (Knabe et al. 2010) for the reference activity. The reason to use German enjoyment data is that it contains enjoyment indicators for both the employed and the unemployed, and we need to have separate measures of enjoyment for the employed and the unemployed since it has been found that the unemployed obtain lower enjoyment, and report more sadness, stress and pain, compared to the employed (e.g., Krueger and Muller 2008; Knabe et al. 2010).

Columns (1) and (2) in Table 3 show the time devoted to the different activities by employed and unemployed individuals throughout the day, using the sample from the Spanish Time Use Survey.[12] Columns (3) and (4) in Table 3 show the U-Index at the activity level, for both the employed and the unemployed. As shown in Table 3, comparing the employed and the unemployed, and excluding activities related to market work, the unemployed devote more time to all the activities, consistent with the fact that they have reduced market time to devote to other non-market activities, including housework and leisure. Additionally, we find that the unemployed report larger values of the U-index for most activities than the employed, consistent with the fact that the unemployed obtain lower enjoyment, and report more sadness, stress and pain, compared to the employed (e.g., Krueger and Muller 2008; Knabe et al. 2010).

[12] The 68 main activities included in the MTUS version of the STUS have been redefined according to the activities shown in Table 2 of Knabe et al. [2010]. See Table A3 in Appendix A for a description of the time use variables included in each time use activities. Sleeping time is excluded from the analysis (e.g., Kahneman et al. 2004; Kahneman and Krueger 2006; Krueger 2007; Krueger et al. 2009).

3.3. Empirical Strategy and Results

For the study of the enjoyment of daily activities we compute, at the individual level, the 'Weighted Synthetic U-index', defined as the fraction of a person's waking time that is spent in an unpleasant state.[13] In this sense, we calculate the following index:

$$U_i = \sum_j h_{ij} U_j \qquad (4)$$

where U_i is the 'Weighted Synthetic U-index' for individual 'i', h_{ij} is the fraction of time the individual 'i' was engaged in activity 'j', and U_j is the U-index for activity 'j' (e.g., the fraction of the time individuals spend on activity 'j' that is experienced as unpleasant). Thus, the larger the value of the 'Weighted Synthetic U-index', the larger the proportion of time individual 'i' spends in an unpleasant state.

Table 4 show results of estimating Equations (1), (2) and (3), where the dependent variable is the 'Weighted Synthetic U-index'.[14] According to Column (1), we find that, compared to the employed, the unemployed spend a higher proportion of time in an unpleasant state. Thus, although the unemployed reduce the time devoted to market work and increase the time devoted to leisure and/or household production, in comparison with the employed, they obtain lower 'experienced utility'. This result sheds light on the negative effects of unemployment, and it is consistent with previous literature showing that unemployment has negative effects for the well-being of individuals. Such negative effects are related to the social norm of employment (e.g., see Burda and Hamermesh [2010] and Clark et al. [2010] for an explanation of the effects of employment as a social norm). However, we must be cautious with this claim, since the fact that we do a counterfactual calculation may bias the results (Knabe et al. [2010] find no differences in the 'experienced utility' between the employed and the unemployed for a German sample).

What we are really interested on is in the effects of aggregate unemployment rates (other's unemployment) on the unemployed (own unemployment). According to

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[13] 'Synthetic U-Index' because it is calculated using the U-index, at the activity level, from Knabe et al. [2010], and 'Weighted' because the U-index for each activity is multiplied by the proportion of the time that such activity represents in the total awake time of the day in the Spanish sample.

[14] The 'Weighted Synthetic U-index' has been multiplied by 100 in order to have the proportion of time that individuals spend in an unpleasant time in a 0-to-100 scale (e.g., percentage points).

Column (2), regional unemployment has a non-statistically significant association with the 'experienced utility' of the individuals in general. However, considering results in Column (3), we find that while aggregate unemployment has a non-statistically significant association with the 'experienced utility' of the employed, it has a positive and statistically significant association with the 'experienced utility' of the unemployed. Thus, a one-percent increase in aggregate unemployment is associated with an increase of 0.09 percentage points of the time the unemployed spend in an unpleasant state. Considering the maximum (29.07) and minimum (2.81) values of aggregate unemployment in our sample, while the unemployed living in the area with the lowest aggregate unemployment, compared to the employed, experience an increase of 2.19 percentage points in the time they spend in an unpleasant state, the unemployed living in the area with the highest aggregate unemployment experience an increase of 4.42 percentage points in the time they spend in an unpleasant state, also compared to the employed.

Thus, we find that unemployed individuals living in areas with high unemployment rates spend a larger proportion of their time in an unpleasant state compared to unemployed individuals living in areas with low unemployment rates. Although our results are based on counterfactual calculations, they are consistent with results of Section 2. In Section 2 we found that in areas where aggregate unemployment is high, the unemployed experience a smaller decrease in the time devoted to *Market Work* (due to education and job seeking activities mainly), a larger increase in the time devoted to *Household Production*, and a smaller increase in the time devoted to *Leisure,* compared to the unemployed living in areas with low unemployment rates. Given that leisure activities are more enjoyable that market work and housework activities, the unemployed living in areas with low unemployment rates may reduce the negative effects of unemployment (e.g., 'saddening effect', Knabe et al. 2010) by increasing the time devoted to leisure activities (e.g., 'composition effect', Knabe et al. 2010), while the unemployed living in areas with high unemployment rates cannot reduce the negative effects of unemployment since the increase in the time devoted to leisure activities is much smaller. As a result, the decrease in 'experienced utility' with unemployment is smaller in areas with low unemployment rates.

4.   Conclusions

Despite previous studies focusing on the effects of unemployment of individuals' well-being, almost none of such studies have considered that the unemployed have reduced market time to devote to non-market activities, including household production, leisure and personal care, and research in macroeconomics has only focused on the dichotomy between market and non-market time. If household production is substitutable for market, it is important for unemployment policy, it is important to analyze to what extent market work, household production and leisure are substitutable.

In this paper we argue that the degree of substitution between market work and household production with unemployment depends on others' unemployment (aggregate unemployment). Despite previous studies on the effects of aggregate macroeconomic variables on individuals' behaviour, they have been focused on individual's well-being, without considering other dimensions of individuals' behavior, such as time allocation decisions. Thus, in this paper we shed light on the effects of aggregate unemployment (aggregate macroeconomic variable) on own unemployment, complementing the previous analysis based on individuals' well-being.

Using the Spanish Time Use Survey (STUS) 2002-2003, we find that, in general, the unemployed devote their reduced market time to additional leisure and personal care, and only a small proportion of time is devoted to household production activities. However, when aggregate unemployment (others' unemployment) is considered, we find that in areas with high unemployment rates reduced market work is made up by additional time spent in household production. Thus, we find evidence on the effects of aggregate unemployment on individuals' time allocation decisions, especially for the case of the unemployed. Our results are consistent with those found in Burda and Hamermesh [2010], in the sense that the welfare costs of fluctuations in unemployment rates could be smaller than expected.

Second, as a validation exercise, we analyze differences between the employed and the unemployed in the enjoyment of their daily activities, also with a focus on the effects of aggregate unemployment. We find that, while the unemployed obtain lower enjoyment from their daily activities compared to the employed, the difference between the two groups is larger the higher the regional unemployment rates. This result is consistent with the fact that in areas with high unemployment rates, reduced market work is made

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up by additional household production, while in areas with low unemployment rates reduced market work is made up by additional leisure and personal care, and also with the fact that leisure activities are more enjoyable that household production activities.

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Table 1. Effect of Unemployment Status on Time Use[1,2,3,4]

Time Use	(1) Market Work[5]	(2) Household Production[5]	(3) Leisure[5]	(4) Personal Care[5]
Unemploment Rates	-0.189	0.207	-0.031	0.011
	(0.024)	(0.029)	(0.010)	(0.003)
R Squared	0.03	0.12	0.01	0.01

Notes: [1] Sample consist of employed/unemployed respondents between 21 and 65 years of age [2] Standard errors in parentheses [3] All observations are weighted to account for sampling distributions across days of the week [4] Unemployment rates come from the Spanish Statistical Office (INE), and are linked to each respondent by region (Aragon, Madrid, Catalonia…), term and year [5] *Market Work*, *Household Production*, *Personal Care* and *Leisure* are measured in hours per day.

Table 2. Effect of Unemployment Status and Unemployment Rates on Time Use[1,2,3,4]

	(1)	(2)	(3)
Panel A: Market Work[5]			
Unemployed	-3.643***	-3.642***	-5.642***
	(0.071)	(0.071)	(0.147)
Unemployment Rate	-	-0.043***	-0.065***
	-	(0.013)	(0.013)
Unemployed*Unemployment Rate	-	-	0.133***
	-	-	(0.008)
Panel B: Household Production[5]			
Unemployed	0.883***	0.882***	1.118***
	(0.068)	(0.068)	(0.141)
Unemployment Rate	-	0.094***	0.097***
	-	(0.009)	(0.009)
Unemployed*Unemployment Rate	-	-	-0.016*
	-	-	(0.009)
Panel C: Leisure[5]			
Unemployed	1.887***	1.887***	3.326***
	(0.073)	(0.073)	(0.158)
Unemployment Rate	-	-0.044***	-0.028***
	-	(0.009)	(0.010)
Unemployed*Unemployment Rate	-	-	-0.096***
	-	-	(0.009)
Panel D: Personal Care[5]			
Unemployed	0.565***	0.565***	0.882***
	(0.049)	(0.049)	(0.107)
Unemployment Rate	-	-0.008	-0.004
	-	(0.007)	(0.007)
Unemployed*Unemployment Rate	-	-	-0.021***
	-	-	(0.006)

Notes: [1] Sample consist of employed/unemployed respondents between 21 and 65 years of age [2] Standard errors in parentheses [3] * Significant at the 90% level; ** Significant at the 95% level; *** Significant at the 99% level [4] We estimate OLS models for the 4 time use categories controlling for whether individuals are unemployed (1) or not (0), regional unemployment rates, interaction terms between individuals' unemployment status and regional unemployment rates, respondent's demographic and household characteristics (age (and its square), secondary education (ref.: primary education), university education (ref.: primary education), number of children under 18 in the household, household has a housekeeper, health status (ref.: fair health), and household income (ref.: household income >5000 €), day dummy variables (ref.: Friday), region of residence dummy variables (ref.: Ceuta and Melilla), and the inverse of mill's ratio (where it applies) [5] *Market Work*, *Household Production*, *Personal Care* and *Leisure* are measured in hours per day.

Table 3. Well-Being and Time-Use by Activity and Employment Status [1,2,3]

	(1)	(2)	(3)	(4)
	Time Use (STUS)		U-Index (Knabe et al 2010)	
	Employed	**Unemployed**	**Employed**	**Unemployed**
Break during Work	0.08	-	0.05	-
Childcare	0.41	0.50	0.21	0.18
Commuting	0.51	-	0.26	0.00
Eating	1.62	1.69	0.04	0.10
Entertainment/Cultural Activity	0.39	0.46	0.03	0.03
Further Education	0.11	0.46	0.00	0.18
Hobby/Sport	0.32	0.44	0.05	0.10
Housework	2.45	3.05	0.15	0.23
Job Seeking	0.00	0.23	0.45	0.44
Other	0.62	0.73	0.18	0.19
Parlor/ Computer Game	0.09	0.23	0.02	0.10
Reading/Radio/Music	0.26	0.39	0.04	0.10
Relaxing/Walk	0.53	0.81	0.09	0.18
Shopping	0.38	0.50	0.26	0.24
Socializing	0.49	0.80	0.05	0.07
Travel	0.70	0.97	0.18	0.26
Voluntary Work	0.21	0.32	0.30	0.14
Watching TV	1.66	2.35	0.09	0.17
Working	4.00	-	0.21	-
N Observations	2,230	24,986		

Notes: [1] Source for time use activities is the MTUS version of the Spanish Time Use Survey 2002-2003; Source for U-Index by activity is Knabe et al. [2010] [2] See Table A3 in Appendix A for a description of the MTUS variables included in each time use category.

Table 4. Effect of Unemployment Status and Unemployment Rates on Time Use [1,2,3,4]

	(1)	(2)	(3)
Synthetic U-Index [5]			
Unemployed	3.221***	3.221***	1.951***
	(0.073)	(0.073)	(0.168)
Unemployment Rate	-	0.010	-0.004
	-	(0.010)	(0.010)
Unemployed*Unemployment Rate	-	-	0.085***
	-	-	(0.009)

Notes: [1] Sample consist of employed/unemployed respondents between 21 and 65 years of age [2] Standard errors in parentheses [3] * Significant at the 90% level; ** Significant at the 95% level; *** Significant at the 99% level [4] We estimate OLS models for the Weighted Synthetic U-Index controlling for whether individuals are unemployed (1) or not (0), regional unemployment rates, interaction terms between individuals' unemployment status and regional unemployment rates, respondent's demographic and household characteristics (age (and its square), secondary education (ref.: primary education), university education (ref.: primary education), number of children under 18 in the household, household has a housekeeper, health status (ref.: fair health), and household income (ref.: household income >5000 €)), day dummy variables (ref.: Friday), region of residence dummy variables (ref.: Ceuta and Melilla), and the inverse of mill's ratio (where it applies) [5] Synthetic U-Index is multiplied by 100 in order to have the percentage of the day each individual is in an unpleasant state.

APPENDIX A: Description of Variables (Not For Publication)

Male: Previous studies has found that there are gender differences in the time devoted to household production (e.g., Bianchi et al 2000; Gauthier, Smeeding and Furstenberg 2004, Aguiar and Hurst 2007, Sevilla-Sanz, Fernandez and Gimenez-Nadal 2010) and leisure (e.g. Bittman and Wajcman 2000, Gershuny 2000; Aguiar and Hurst 2007, Gimenez-Nadal and Sevill-Sanz forthcoming). Thus, we control for the gender of the respondent (1=male;0=female).

Age: We control for *Age* (e.g., Apps and Rees 2005; Kalenkoski, Ribar and Stratton 2005; Aguiar and Hurst 2007), and age squared divided by 100 (*Age Squared*), to control for the allocation of time over the life-cycle. For instance, women have their children in their mid-20s and their 30s, which requires them to increase the time devoted to childcare during these years. Obviously, the time required for childcare decreases as children grow older.

Education: As in Kalenkoski et al. [2005] and Aguiar and Hurst [2007], we control for the educational level of the individual. Aguiar and Hurst [2007] find differences in the amount of leisure time between the low and highly-educated individuals, and Kalenkoski et al. [2005] find that highly-educated women devote more time to *Market Work* and *Childcare*. We use two dummy variables to control for the university (*University Education*) and secondary (*Secondary Education*) levels of education (the reference category is primary education).

Number of children under 18 in the household: As in Kalenkoski et al. [2005], Gimenez-Nadal and Sevilla-Sanz (forthcoming), we control for the number of children under 18 in the household. Children are public goods in the household, and parents must normally devote time to care for their children. Thus, we need to control for the number of children, since the more and/or the younger the children, the more time must be devoted to childcare activities.

Household heterogeneity: We also control for household heterogeneity in the production of household services. In particular, we control for whether the household has paid housekeeper or not. In households where all the members are employed,

Health Status: We include the health status of individuals in both time use and time stress analyses (e.g., Kalenkoski et al [2005]; Böckerman and Ilmakunnas 2009). The

Health variable takes decreasing values to indicate a better health status (1=very good, … 5=very bad).

Income: We include the income of the household. Household monthly income is defined on a 1-to-3 scale, with "1" meaning from 0 to €1000, "2" meaning from €1000 to €2500, and "3" meaning €3000 or more.

Table A1. Activities Included in Each Time-Use Category [1]

Category in MTUS	Time Use Category	Category in MTUS	Time Use Category
food preparation, cooking	Household Production	general indoor leisure	Leisure
set table, wash/put away dishes	Household Production	artistic or musical activity	Leisure
Cleaning	Household Production	written correspondence	Leisure
laundry, ironing, clothing repair	Household Production	knit, crafts or hobbies	Leisure
home/vehicle maintenance/improvement	Household Production	relax, think, do nothing	Leisure
other domestic work	Household Production	read	Leisure
purchase godos	Household Production	listen to music, ipod, CD, audio book	Leisure
consume other services	Household Production	listen to radio	Leisure
pet care (other than walk dog)	Household Production	watch TV, DVD, video	Leisure
physical, medical child care	Household Production	play computer games	Leisure
teach, help with homework	Household Production	send e-mail, surf internet, computing	Leisure
read to, talk or play with child	Household Production	no activity but mode of recorded travel	Leisure
supervise, accompany, other child care	Household Production	travel for voluntary/civic/religious activity	Leisure
adult care	Household Production	travelling for other purposes	Leisure
child/adult care-related travel	Household Production	meals at work or school	Market Work
travel for shopping, personal or household care	Household Production	paid work - main job (not at home)	Market Work
voluntary work, civic, organisation activity	Leisure	paid work at home	Market Work
worship and religious activity	Leisure	second or other job not at home	Market Work
general out-of-home leisure	Leisure	unpaid work to generate household income	Market Work
attend sporting event	Leisure	travel as a part of work	Market Work
cinema, theatre, opera, concert	Leisure	work breaks	Market Work
other public event, venue	Leisure	other time at workplace	Market Work
restaurant, café, bar, pub	Leisure	look for work	Market Work
party, reception, social event, gambling	Leisure	regular schooling, education	Market Work
imputed time away from home	Leisure	homework	Market Work
general sport or exercise	Leisure	leisure/other education or training	Market Work
Walking	Leisure	travel to or from work	Market Work
Cycling	Leisure	education-related travel	Market Work
other out-of-doors recreation	Leisure	imputed personal or household care	Personal Care
gardening/forage (eg pick mushrooms), hunt/fish	Leisure	sleep and naps	Personal Care
walk dogs	Leisure	imputed sleep	Personal Care
receive or visit friends	Leisure	wash, dress, care for self	Personal Care
conversation (in person, phone)	Leisure	other meals or snacks	Personal Care
other in-home social, games	Leisure	consume personal care services	Personal Care

Notes: [1] Source: Multinational Time Use Study. Information about how the harmonization process is done can be found in the MTUS User's guide and documentation available at the following website: http://www.timeuse.org/mtus/guide

Table A2. Sum Stats, General Sample and by Employment Status [1,2,3,4,5]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	General Sample		Employed		Unemployed		Difference Emp-Unemp	p-value Difference
	Mean	S.D.	Mean	S.D.	Mean	S.D.		
Market Work[6]	4.25	(0.03)	4.59	(0.03)	0.44	(0.04)	4.15	(<0.01)
Home Production[6]	3.59	(0.02)	3.51	(0.02)	4.51	(0.08)	-1.00	(<0.01)
Personal Care[6]	10.88	(0.01)	10.82	(0.01)	11.51	(0.05)	-0.69	(<0.01)
Leisure[6]	5.13	(0.02)	4.96	(0.02)	7.01	(0.07)	-2.05	(<0.01)
Unemployed	0.08	(0.00)	-	-	-	-	-	-
Unemployment Rate	13.17	(0.04)	12.99	(0.04)	15.25	(0.16)	-2.26	(<0.01)
Male	0.46	(0.00)	0.47	(0.00)	0.41	(0.01)	0.06	(<0.01)
Age	42.34	(0.07)	42.72	(0.07)	38.09	(0.25)	4.63	(<0.01)
Secondary Education	0.52	(0.00)	0.52	(0.00)	0.53	(0.01)	-0.01	(0.19)
University Education	0.25	(0.00)	0.25	(0.00)	0.24	(0.01)	0.02	(0.11)
Number of Children <18	0.70	(0.01)	0.70	(0.01)	0.63	(0.02)	0.08	(<0.01)
Housekeeper	0.10	(0.00)	0.11	(0.00)	0.03	(0.00)	0.08	(<0.01)
Very Good Health	0.25	(0.00)	0.24	(0.00)	0.26	(0.01)	-0.02	(0.11)
Good Health	0.51	(0.00)	0.52	(0.00)	0.49	(0.01)	0.03	(0.02)
Poor Health	0.05	(0.00)	0.05	(0.00)	0.06	(0.01)	-0.01	(0.30)
Very Poor Health	0.01	(0.00)	0.01	(0.00)	0.01	(0.00)	0.00	(0.05)
Household Income <500 €	0.05	(0.00)	0.04	(0.00)	0.15	(0.01)	-0.11	(<0.01)
Household Income <500 €	0.16	(0.00)	0.15	(0.00)	0.29	(0.01)	-0.14	(<0.01)
Household Income 500-1000 €	0.25	(0.00)	0.25	(0.00)	0.28	(0.01)	-0.03	(<0.01)
Household Income 1000-1500 €	0.20	(0.00)	0.20	(0.00)	0.15	(0.01)	0.05	(<0.01)
Household Income 1500-2000 €	0.14	(0.00)	0.15	(0.00)	0.08	(0.01)	0.07	(<0.01)
Household Income 2000-2500 €	0.09	(0.00)	0.09	(0.00)	0.03	(0.00)	0.06	(<0.01)
Household Income 2500-3000 €	0.10	(0.00)	0.11	(0.00)	0.03	(0.00)	0.08	(<0.01)
Household Income 3000-5000 €	0.02	(0.00)	0.02	(0.00)	0.01	(0.00)	0.01	(<0.01)
N. Observations	27,216		24,986		2,230			

Notes: [1] Sample consist of employed/unemployed respondents between 21 and 65 years of age [2] Standard deviations in parentheses in Columns (2), (4) and (6) [3] All observations are weighted to account for sampling distributions across days of the week [4] Unemployment rates come from the Spanish Statistical Office (INE), and are linked to each respondent by region (Aragon, Madrid, Catalonia…), term and year [5] Column (7) shows the difference in mean values between the employed and the unemployed (Diff=Emp-Unemp); Column (8) shows, in parenthesis, whether we can accept that both differences are statistically equal (H_0) or not: a p-value lower than .05 means that both means are statistically different at the 5% level [6] *Market Work*, *Household Production*, *Personal Care* and *Leisure* are measured in hours per day.

Table A3. Activities Included in Each Time Use Activity [1]

Category in MTUS	Activity in Knabe et al. [2010]	Category in MTUS	Activity in Knabe et al. [2010]
work breaks	Break During Work	general indoor leisure	Other
physical, medical child care	Childcare	general out-of-home leisure	Other
read to, talk or play with child	Childcare	imputed time away from home	Other
supervise, accompany, other child care	Childcare	other in-home social, games	Other
teach, help with homework	Childcare	other out-of-doors recreation	Other
education-related travel	Commuting	written correspondence	Other
travel to or from work	Commuting	play computer games	Parlor/Computer Game
meals at work or school	Eating	send e-mail, surf internet, computing	Parlor/Computer Game
other meals or snacks	Eating	listen to music, ipod, CD, audio book	Reading/Radio/Music
cinema, theatre, opera, concert	Entertainment/Cultural Activity	listen to radio	Reading/Radio/Music
restaurant, café, bar, pub	Entertainment/Cultural Activity	read	Reading/Radio/Music
worship and religious activity	Entertainment/Cultural Activity	relax, think, do nothing	Relaxing/Walk
homework	Further Education	walking	Relaxing/Walk
leisure/other education or training	Further Education	purchase goods	Shopping
regular schooling, education	Further Education	conversation (in person, phone)	Socializing
artistic or musical activity	Hobby/Sport	other public event, venue	Socializing
attend sporting event	Hobby/Sport	party, reception, social event, gambling	Socializing
cycling	Hobby/Sport	receive or visit friends	Socializing
gardening/forage (eg pick mushrooms), hunt/fish	Hobby/Sport	child/adult care-related travel	Travel
general sport or exercise	Hobby/Sport	no activity but mode of recorded travel	Travel
knit, crafts or hobbies	Hobby/Sport	travel for shopping, personal or household care	Travel
walk dogs	Hobby/Sport	travel for voluntary/civic/religious activity	Travel
adult care	Housework	travelling for other purposes	Travel
cleaning	Housework	voluntary work, civic, organisation activity	Voluntary Work
consume other services	Housework	watch TV, DVD, video	Watching TV
food preparation, cooking	Housework	other time at workplace	Working
home/vehicle maintenance/improvement	Housework	paid work - main job (not at home)	Working
laundry, ironing, clothing repair	Housework	paid work at home	Working
other domestic work	Housework	second or other job not at home	Working
pet care (other than walk dog)	Housework	travel as a part of work	Working
set table, wash/put away dishes	Housework	unpaid work to generate household income	Working
look for work	Job Seeking		

Notes: [1] Source: Multinational Time Use Study. Information about how the harmonization process is done can be found in the MTUS User's guide and documentation available at the following website: http://www.timeuse.org/mtus/guide

APPENDIX B: Regression Results (Not for Publication)

Table B1. Employment Equation [1,2,3,4]

Time Use	Employment Equation
Male	0.033
	(0.028)
Job Seeking in last Month	1.358***
	(0.095)
Available to work	0.333***
	(0.093)
Active Measures to find a job	0.348***
	(0.052)
Age	-0.037***
	(0.009)
Age Squared	0.040***
	(0.011)
Secondary Education	-0.033
	(0.036)
University Education	-0.129***
	(0.043)
Children <18 in the Household	-0.064***
	(0.017)
Constant	-1.080***
	(0.192)
Observations	27,216

Notes: [1] Sample consist of employed/unemployed respondents between 21 and 65 years of age [2] Standard errors in parentheses [3] * Significant at the 90% level; ** Significant at the 95% level; *** Significant at the 99% level [4] We estimate a probit models for individuals' unemployment status (1=yes;0=no) controlling for whether the individual ahs been searching for a job or not, whether the individual would be available to work if the individual was oafferd a job, whether the individual has taken active measures to find a job, age (and its square), secondary education (ref.: primary education), university education (ref.: primary education), number of children under 18 in the household, and region of residence dummy variables (ref.: Ceuta and Melilla).

Table B2. Effect of Unemployment Status and Unemployment Rates on Time Use[1,2,3,4]

Time Use	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Market Work			Household Production			Leisure			Personal Care		
Male	2.938***	2.579***	2.497***	-3.684***	-2.899***	-2.890***	0.768***	0.402***	0.460***	0.003	-0.063	-0.050
	(0.049)	(0.117)	(0.117)	(0.032)	(0.078)	(0.078)	(0.036)	(0.086)	(0.086)	(0.024)	(0.059)	(0.059)
Age	0.030*	0.030*	0.027	0.187***	0.188***	0.188***	-0.113***	-0.113***	-0.111***	-0.074***	-0.074***	-0.074***
	(0.017)	(0.017)	(0.017)	(0.012)	(0.012)	(0.012)	(0.013)	(0.013)	(0.013)	(0.009)	(0.009)	(0.009)
Age Squared	-0.087***	-0.086***	-0.082***	-0.171***	-0.171***	-0.172***	0.146***	0.146***	0.143***	0.088***	0.088***	0.087***
	(0.021)	(0.021)	(0.021)	(0.014)	(0.014)	(0.014)	(0.016)	(0.016)	(0.016)	(0.011)	(0.011)	(0.011)
Secondary Education	0.008	0.009	-0.015	-0.017	-0.019	-0.016	0.145***	0.146***	0.164***	-0.221***	-0.221***	-0.217***
	(0.072)	(0.072)	(0.072)	(0.050)	(0.050)	(0.050)	(0.054)	(0.053)	(0.053)	(0.037)	(0.037)	(0.037)
University Education	0.149*	0.150*	0.133	-0.328***	-0.330***	-0.328***	0.226***	0.227***	0.239***	-0.341***	-0.341***	-0.338***
	(0.088)	(0.088)	(0.088)	(0.059)	(0.059)	(0.059)	(0.064)	(0.064)	(0.064)	(0.044)	(0.044)	(0.044)
Children <18 in the Hosuehold	-0.207***	-0.208***	-0.209***	0.744***	0.746***	0.746***	-0.404***	-0.404***	-0.404***	-0.081***	-0.081***	-0.081***
	(0.030)	(0.030)	(0.030)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.015)	(0.015)	(0.015)
Housekeeper	0.058	0.058	0.068	-0.271***	-0.272***	-0.273***	0.184***	0.184***	0.177***	0.043	0.043	0.042
	(0.087)	(0.087)	(0.087)	(0.058)	(0.057)	(0.057)	(0.063)	(0.063)	(0.063)	(0.044)	(0.044)	(0.044)
Very Good Health	0.623***	0.619***	0.600***	-0.186***	-0.178***	-0.176***	-0.199***	-0.202***	-0.189***	-0.218***	-0.218***	-0.215***
	(0.079)	(0.079)	(0.079)	(0.053)	(0.053)	(0.053)	(0.057)	(0.057)	(0.057)	(0.039)	(0.039)	(0.039)
Good Health	0.577***	0.576***	0.559***	-0.103**	-0.100**	-0.098**	-0.270***	-0.271***	-0.259***	-0.182***	-0.182***	-0.179***
	(0.068)	(0.068)	(0.068)	(0.045)	(0.045)	(0.045)	(0.050)	(0.050)	(0.049)	(0.033)	(0.033)	(0.033)
Poor Health	-1.256***	-1.258***	-1.270***	-0.011	-0.005	-0.004	0.584***	0.582***	0.590***	0.692***	0.691***	0.693***
	(0.119)	(0.119)	(0.119)	(0.083)	(0.083)	(0.083)	(0.096)	(0.095)	(0.095)	(0.074)	(0.073)	(0.074)
Very Poor Helaht	-2.347***	-2.356***	-2.375***	-0.885***	-0.867***	-0.864***	1.232***	1.223***	1.237***	1.950***	1.948***	1.951***
	(0.211)	(0.211)	(0.213)	(0.175)	(0.175)	(0.175)	(0.218)	(0.218)	(0.218)	(0.206)	(0.206)	(0.206)
Mills Ratio	-2.050***	-2.025***	-2.092***	0.945***	0.890***	0.898***	0.634**	0.660***	0.708***	-0.053	-0.049	-0.038
	(0.317)	(0.317)	(0.315)	(0.246)	(0.246)	(0.246)	(0.247)	(0.247)	(0.245)	(0.170)	(0.170)	(0.170)
Constant	6.140***	6.606***	7.000***	-1.332***	-2.350***	-2.397***	6.107***	6.582***	6.298***	12.639***	12.725***	12.663***
	(0.546)	(0.562)	(0.560)	(0.387)	(0.399)	(0.400)	(0.417)	(0.427)	(0.425)	(0.296)	(0.304)	(0.304)
Observations	27,216	27,216	27,216	27,216	27,216	27,216	27,216	27,216	27,216	27,216	27,216	27,216
R-squared	0.35	0.35	0.35	0.41	0.41	0.41	0.23	0.23	0.23	0.16	0.16	0.16

Notes: [1] Sample consist of employed/unemployed respondents between 21 and 65 years of age [2] Standard errors in parentheses [3] * Significant at the 90% level; ** Significant at the 95% level; *** Significant at the 99% level [4] We estimate OLS models for the 4 time use categories controlling for whether individuals are unemployed (1) or not (0), regional unemployment rates, interaction terms between individuals' unemployment status and regional unemployment rates, respondent's demographic and household characteristics (age (and its square), secondary education (ref.: primary education), university education (ref.: primary education), number of children under 18 in the household, household has a housekeeper, health status (ref.: fair health), and household income (ref.: household income >5000 €), day dummy variables (ref.: Friday), region of residence dummy variables (ref.: Ceuta and Melilla), and the inverse of mill's ratio (where it applies).

Table B3. Effect of Unemployment Status and Unemployment Rates on Time Use[1,2,3,4]

	(1)	(2)	(3)
Synthetic U-Index			
Male	0.171***	0.257***	0.205**
	(0.038)	(0.090)	(0.090)
Age	0.137***	0.137***	0.135***
	(0.014)	(0.014)	(0.014)
Age Squared	-0.170***	-0.170***	-0.167***
	(0.017)	(0.017)	(0.017)
Secondary Education	-0.066	-0.067	-0.082
	(0.056)	(0.056)	(0.056)
University Education	-0.171**	-0.172**	-0.182***
	(0.068)	(0.068)	(0.068)
Children <18 in the Hosuehold	0.310***	0.310***	0.310***
	(0.022)	(0.022)	(0.022)
Housekeeper	-0.067	-0.067	-0.061
	(0.067)	(0.067)	(0.067)
Very Good Health	0.369***	0.370***	0.357***
	(0.061)	(0.061)	(0.061)
Good Health	0.426***	0.427***	0.416***
	(0.052)	(0.052)	(0.052)
Poor Health	-0.810***	-0.810***	-0.817***
	(0.102)	(0.102)	(0.102)
Very Poor Helaht	-1.884***	-1.882***	-1.895***
	(0.221)	(0.221)	(0.221)
Mills Ratio	-0.903***	-0.910***	-0.952***
	(0.260)	(0.260)	(0.259)
Constant	12.103***	11.991***	12.241***
	(0.442)	(0.454)	(0.454)
Observations	27,216	27,216	27,216
R-squared	0.26	0.26	0.26

Notes: [1] Sample consist of employed/unemployed respondents between 21 and 65 years of age [2] Standard errors in parentheses [3] * Significant at the 90% level; ** Significant at the 95% level; *** Significant at the 99% level [4] We estimate OLS models for the Weighted Synthetic U-Index controlling for whether individuals are unemployed (1) or not (0), regional unemployment rates, interaction terms between individuals' unemployment status and regional unemployment rates, respondent's demographic and household characteristics (age (and its square), secondary education (ref.: primary education), university education (ref.: primary education), number of children under 18 in the household, household has a housekeeper, health status (ref.: fair health), and household income (ref.: household income >5000 €), day dummy variables (ref.: Friday), region of residence dummy variables (ref.: Ceuta and Melilla), and the inverse of mill's ratio (where it applies) [5] Synthetic U-Index is multiplied by 100 in order to have the percentage of the day each individual is in an unpleasant state.

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