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Do Windfall Gains Affect Labour Supply? Evidence from the European Household Panel

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Abstract: We investigate whether workers adjust hours worked in response to windfall gains using data from the European Household Panel. The results suggest that unexpected variation in income has a negative (although small) effect on working hours. In particular, after receiving an unanticipated windfall gain, individuals are more likely to drop out of the labour force and the effects become larger as the size of windfall increases. Furthermore, the empirical findings show that the impact of windfall gains on labour supply: (i) is more important for young and old individuals, (ii) is mostly negative for married individuals with young children, (iii) but can be positive for single individuals at the age of around 40 years.

Keywords: windfall gains, working hours.
JEL classification: D12, J22.

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1. Introduction

What is the effect of windfall gains on economic behaviour? A popular belief presumes that the majority of people would quit work if they won a lottery. But do windfall gains have an impact on individuals' working hours? According to the life-cycle model, a relaxation or tightening of the consumer's intertemporal budget constraint can lead both to changes in consumption and to changes in labour supply. Windfall gains represent an unanticipated increase in non-earned income and by reducing an agent's marginal utility of wealth they therefore reduce her incentive to work.

In this paper, we analyze the linkages between windfall gains and working hours using data from the European Community Household Panel Longitudinal Users' Database. We show that an unanticipated rise in wealth reduces working hours in accordance with the life-cycle model, although the effect is, in general, small. The impact of windfall gains is stronger at the external margin, that is, individuals adjust their labour supply primarily by dropping out of the labour force, rather than by reducing their work hours conditional on working.

We also look whether "size matters" with respect to the effects of windfall gains on working hours. We assess how households respond to small, medium or large windfall gains. We find that the effects become stronger as the size of windfall increases. In particular, men receiving a windfall of 50,000 EUR or more, on average reduce labour supply by 1.3 hours per week, which is equivalent to a 3.4% reduction in working hours.

Finally, analysing the effects of windfall gains along various personal characteristics, we find that: (i) at younger and older ages, the effect of windfall gains on labour supply is the most negative; (ii) for married people and people with young children, the windfall gain leads to a stronger decrease in working hours and (iii) for single individuals at the age of around 40, the effect can be positive. A potential explanation for the latter empirical finding is in the effect of windfall gains on reducing liquidity constraints in capital markets. By doing so, windfall gains may encourage people to set up their own business, become self-employed and increase their working hours.

This paper contributes to the literature in following ways. This is the first paper that analyses effects of windfall gains on working hours using data for a set of European countries. Furthermore, because we include 15 countries in our analysis, the sample of people for which we observe windfall gains is large, offering a further empirical advantage to our approach. With the panel data set, we observe a rich set of personal characteristics of individuals. This gives us an opportunity to better understand the ways that participation and working-hours decisions differ between individuals.

The remainder of the paper is structured as follows. Section 2 reviews the existing literature on the effects of unexpected variation in income. Section 3 describes the data. Section 4 presents the theoretical and the econometric approach and Section 5 discusses the empirical results. Section 6 concludes.

2. A brief review of the literature

The launch of the pan-European lottery, Euromillions, in 2004 induced many people to fantasize about what they would do if they actually won. Notable wins include prizes of around 180 Million EUR which, therefore, reveals the extraordinary importance that a lottery may play in people's life and behaviour.

A vast literature has explored the reaction of consumption and savings to exogenous changes in income. An early example is Bodkin (1959), who used an unexpected National Service Life Insurance dividend paid to veterans of the World War II in 1950. Similarly, Brickman et al. (1978) focused on how the income effect affects consumption. More recent examples include Imbens et al. (2001), who look at the differences among major-prize winners of the Megabucks Lottery in Massachusetts between 1984 and 1988, and Kuhn et al. (2008), who analyze the differences in winnings in the Dutch postcode lottery.[1]

Unexpected variation in income may also affect the level of happiness of individuals.[2] Whereas some surveys suggest that money indeed makes people happy (Gardner and Oswald, 2001), others find only a weak link between unexpected wealth variation and happiness (Myers, 1992; Argyle, 2001; Nettle, 2005; Layard, 2005).[3]

Another dimension of the effects of exogenous changes in income refers to fiscal policy and, in particular, the effectiveness of temporary fiscal measures.[4] In fact, understanding the effect of unearned income on labour supply is also of great importance for policy makers, as it is at least part of what is needed to evaluate such programs (Joshi et al., 1996; Kuhn et al., 2008). For instance, Petrongolo and Pissarides (2008) find that strict employment protection legislation characterizes well the dynamics of unemployment in France, while fixed-term contracts contribute significantly to the dynamics of unemployment in Spain. Manning (2009) shows that changes in the welfare support for the unemployed can impact on the labour market, by reducing their search activity.

[1] Some recent studies have also used exogenous variation to analyze neighbourhood and peer effects on individuals (Sacerdote, 2001; Katz et al., 2001; Kling et al., 2005; Ludwig et al., 2001; Kuhn et al., 2008).
[2] For discussions of this question, see, for example, Easterlin (1974) and Martin (1995).
[3] Lindahl (2005) shows that higher income from a monetary lottery prize generates good health.
[4] For a revision of the major developments in labour market theory and their policy implications, see, for instance, Manning (1995).

In addition to the potential effects of income shocks on consumption and savings or on the level of happiness, a popular belief presumes that the majority of people would quit work if they won a lottery. But do individuals who win continue to work, and if so, why? While the literature on the empirical and theoretical inter-temporal substitution effects in labour supply is well established (Heckman and MaCurdy, 1980; Altonji, 1986), the research on the effects of capital gains is still somewhat insipient (Henley, 2004), despite the fact that lottery winnings are a source of exogenous variation in income (Altonji, 1986).

In the US, Kaplan (1988) show that the level of education and the type of profession can help explain the percentages of winners who choose to continue to work.[5] Holtz-Eakin et al. (1993) and Imbens et al. (2001) find that windfall gains lead to a reduction in working hours or even a withdrawal from the labour force. In contrast, Joulfaian and Wilhelm (1994) suggest at most a small (although significant) effect for married women and men. Hirschfeld and Field (2000) use the proposition of work centrality, that is, the degree of importance that working has in one's life at any given time to explain why lotteries may have a limited impact.

In Europe, Blanchflower and Oswald (1998), Taylor (2001), using UK data, and Lindh and Ohlsson (1996), based on evidence for Sweden, report a positive effect of windfall gains (inheritance and lottery wins) on the probability of entering self-employment. Henley (2004) analyzes the impact of both windfall financial gains and house price shocks on hours worked, and suggests that there are significant substitution effects, in particular, in response to house price shocks.

3. Data and descriptive statistics

3.1 Data

The data is obtained from the European Community Household Panel Longitudinal Users' Database (ECHP henceforth). This is a large panel data set that contains household-level and person-level information over time, covering eight survey years from 1994 to 2001.[6] The data includes 15 EU countries: Germany, Denmark, The Netherlands, Belgium, Luxembourg, France, United Kingdom, Ireland, Italy, Greece, Spain, Portugal, Austria,

[5] Note that the education level can also be a proxy for a worker's skill. In this context, Portela (2001) proposes an index of skill that takes into account different dimensions, namely, schooling, labor market experience and unobservable ability.

[6] Azmat et al. (2006) also use the European Community Household Panel Survey, but in the context of analyzing the large gender gap in unemployment rates. Notably, the authors show that interactions between the differences in human capital accumulation by gender and labor market institutions play a major role. In a similar context, Joshi et al. (2007) argue that women's education and experience rather than a movement towards equal treatment play a special role in gender pay differences. Mumford and Smith (2007, 2009) find that the gender earnings gap can also be largely explained by the workplace in which the employee works.

Finland and Sweden. It is an unbalanced panel with a maximum length of 8 years for each individual.

In what follows, the analysis is done at the individual level, rather than at the level of households, with age restricted to 25-60 years. This age band is chosen to avoid complications that arise due to education and retirement choices. The data on incomes and wages are converted using PPP in order to allow for comparisons across countries and over time.

The question of interest relates to the effects of unanticipated windfall gains on labour supply. Working hours are described by the ECHP variable PE005: Total number of hours working per week (in main + additional jobs). In the data, this variable is only available for employed workers. However, we set hours worked to zero for all unemployed individuals and those out of the labour force.

The variable that measures windfall gains is the ECHP variable HF017: Inherit, receive gift or lottery winnings worth 2000 EURO or more. It is the response to a following survey question: *"During (... year prior to the survey ...), did anyone in the household inherit* any prop*erty or capital, or receive a gift or lottery winnings, worth 2000 EURO or more?"*. Observations for which the information on the windfall receipt is missing are discarded.

One major drawback of this variable is that it does not provide information about the exact amount of the windfall gain. However, it can be complemented by the variable HF018: Amount of the inheritance, gift or lottery winnings. This variable offers three brackets for the windfall gains: less than 10,000 EURO, more than 10,000 EURO but less than 50,000 EURO and 50,000 EURO or more. We label the three brackets for windfall gains as "small", "medium" and "large", respectively.

These two variables hence give information on the size of windfall gains received by individuals. Nevertheless, given that they are reported in categorical terms, one cannot convert them into PPP terms. As a result, they are not perfectly comparable across countries and over time. Another weakness is that both variables are reported at the household level. Consequently, there is no way to identify which household member was the actual recipient of the windfall gain.[7]

[7] It should be noted, however, that an indicator for a windfall gain is, to some degree, a personal characteristic. For example, in cases where individuals change households (i.e. get married) and they receive windfall gains only after they have moved to a new household, they are recorded as recipients of windfall gains together with their partner. Naturally, individuals from the initial household have not received any windfall gains. Should the individual move households again with a new partner, for example, then he would still be recorded as a recipient of windfall gains, but his new partner would not.

It is important to emphasise that the variable measuring windfall gains is recorded for the "year prior to the survey".[8] Notwithstanding this, we did not decide to adjust the timing of the variable. First, a substantial fraction of the data (that is, 19% of person-year observations) would be lost by lagging the windfall gains variable by one period. Second, leaving the variable as it is, we can be sure that at the time of the interview in the time period t, an individual knows whether she has received windfall gains or not. On the contrary, if we lagged windfall gains variable by one period, to t-1, we would not know for sure whether at the time of the interview at t-1 the individual had already received the windfall gains or not.[9] Furthermore, in practice individuals take a bit of time before they react to new economic information. Therefore, it seems more appropriate not to lag the windfall gains variable back by one period.

In Table 1, we report the number of individuals in the sample and the number of times they received windfall gains. Only those individuals who were observed at least twice are included. To ease discussion, we label people that have received windfall gains as "winners" and the rest as "non-winners". There are 100,289 individuals in the sample, and most of them (88.4%) never received any inheritance, gift or lottery winnings of more than 2000 EUR. In addition, 8,824 individuals (or a fraction of 8.8%) received windfall gains only once, and about 2% of individuals received windfall gains twice.

[PLACE TABLE 1 HERE.]

For the purpose of the analysis, the most important group is the one with 8,824 individuals who received windfall gains only once, as in the regression analysis it is not straightforward to deal with individuals who received windfall gains more than once. Most of the empirical analysis will therefore be based on that group. Compared to similar research done by other authors, this is quite a large sample and represents one of the advantages of using the ECHP dataset.[10]

[8] Similarly, income variables are also recorded for "year prior to the survey". On the other hand, net monthly wage and other variables are recorded for "the time of the interview".

[9] How much information the individual possesses at the time of the interview of course depends on the relative timings of windfall gains and survey interview, but on average there is a 50% chance that the individual had already received the windfall gains.

[10] For instance, Imbens et al. (2001) have about 237 winners, Joulfaian and Wilhelm (1994) have 439 heirs in their sample, Holtz-Eakin (1993) have 2,700 married couples and 1632 individuals in their sample, and Henley (2004) has around 5,400 men and women included.

In Table 2, we report the number of individuals by size of windfall gains received. There are 4,172 (48.8%) observed individuals with small windfall gains, 3,353 (39.2%) with medium windfall gains, and 1,023 (12.0%) individuals with large windfall gains.

[PLACE TABLE 2 HERE.]

3.2 Descriptive statistics

In this sub-section, we analyse differences in personal characteristics between winners and non-winners prior to the receipt of windfall gains, and differences among winners of windfall gains of different sizes (i.e. small versus large winners). We also compare the means of variables before and after the receipt of windfall gains.

Table 3 reports the means and number of observations for selected variables, comparing winners, (columns (1) and (2)) and non-winners (columns (3) and (4)). Column (5) reports the p-value of the test for differences in means between winners and non-winners. The reported statistics refer to one year before the receipt of windfall, which, on average, corresponds to a third year in the sample for winners. Therefore, for non-winners we report the means of the variables in the third year in the sample.

Among the 18 variables reported, only three (the number of children in the household, the percentage of women and the percentage of those who are married) have differences that are not statistically significant.[11] Otherwise, winners tend to be older and they live in slightly smaller households, but for these two variable differences are small. For the rest of the variables, the differences are large and important.

Winners are more educated; the share of individuals with post secondary education is 29% for winners and 18% for non-winners; winners are 7 percentage points more likely to be employed than non-winners. According to income variables, winners have higher incomes and wages even before windfall gains. By all measures of income (total income, income from working and non-work income), winners are better off than non-winners: the personal total income of winners is about 29% higher and hourly wage[12] is 13% higher. Higher income is

[11] Interestingly, Joshi et al. (1996) show that the presence of children reduces full-time emplyment among women. Similarly, Joshi (1998) highlights the impact of child-rearing on women's time use.

[12] Hourly wage is a measure of offered wages in the labour market. Reported data is in purchasing power parity units in order to be comparable across countries. Hourly wage is calculated from net monthly wage given in the data, divided by weekly working hours times 4.33 to correct for the average number of weeks in one month. All hourly wages lower than 1 euro or higher than 100 euros are put to missing. Wages of people who do not work or wages otherwise missing are then imputed. For those individuals of which wage information is available in some periods but not in others, the average wage of the individual is imputed in other periods. Other wages are

partly a consequence of the fact that winners, on average, work more hours per week and they are more likely to be employed. They are also more educated and thus have higher hourly wage. However, another potential reason for the difference in incomes lays also in the fact that our measure of windfall gains includes gifts and inheritances. It can then be the case that people from better family backgrounds are more likely to receive (large) gifts or inheritances, which is reflected in our data. Family background is of course a fixed effect and will eventually drop out of the analysis when data will be analysed using our econometric methodology.

The observed differences between winners and non-winners from Table 3 could of course reflect simply differences across countries. If there was a country with above average number of winners, and also with above average incomes, this would make winners, in a spurious fashion, appear to have higher incomes in the full sample. Data show that in most countries, between 87% and 96% of the sample is comprised of non-winners. However, four countries (Denmark, the Netherlands, Finland and Belgium) have a lower percentage of non-winners, but when we checked differences in means after excluding these four countries, the magnitudes and conclusions were similar. Therefore, we conclude that the differences reported in Table 3 reflect genuine differences between winners and non-winners.

[PLACE TABLE 3 HERE.]

In Table 4, we turn to comparisons of personal characteristics among winners of small, medium and large windfall gains. We report means and number of observations one period prior to the receipt of windfall. Columns (7) – (9) report p-values from testing the null hypothesis of no differences in means between groups.

No statistically significant differences between winners of windfall gains of different sizes are found for household size, number of adults, number of children in household, percentage of females, marital status, and employment status. On the other hand, there are statistically significant differences in age and education: the group with small windfall gains is significantly younger than the other two groups (i.e. 41.4 years compared to 42.5 and 42.8 years for medium and large windfall gains groups, respectively); the group of large winners is also more educated (37% of large winners have education beyond the secondary level, while only 27% of small winners and 28% of medium winners have education of such level).

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imputed using a regression equation separately for men and women using age, age squared, married dummy, two education dummies and wave and country dummies as regressors.

There are also large and highly significant differences in incomes between the three groups; the larger the windfall gains, the higher the income. Such differences in incomes and education can again be explained with family characteristics. If people with higher education and household incomes tend to be from families of better background, then this may be reflected in higher inheritances or gifts. However, this will be controlled for by fixed effects in our estimation.

[PLACE TABLE 4 HERE.]

Finally, in Table 5, we compare the means of personal characteristics before and after the receipt of windfall gains. "Before" stands for one period prior to windfall and "after" stands for one period after the windfall. Intuitively, we would expect non-work income to increase from the period before to the period after the receipt of windfall gains. However, this is not necessarily the case, because, strictly speaking, windfall gains bring a one-off increase in non-work income that lasts only for one period. Nevertheless, it is possible that individuals save or invest part of their unanticipated gains and start earning interest, which may increase their non-work income also in subsequent periods. According to the life-cycle theory of labour supply, the receipt of an unexpected windfall should also reduce working hours and employment of the winners.

Consider first the top panel of Table 5, where differences for the whole sample are reported. Only two variables are (marginally) significantly different between the two periods: total household income is slightly higher after the receipt of windfall gains at a 10% significance level and household non-work income is higher at a 6% significance level and personal hourly wage is higher at 7% significance. Weekly hours worked show no difference in the two periods. Looking at the group with small windfall gains, changes in none of the variables are statistically significant from one period to another, except for the hourly wage, which tends to be higher after the receipt of windfall gains. The percentage of employed people and weekly working hours both slightly decrease, but the differences are not significantly different from zero. In the case of individuals who received medium windfall gains, there is a statistically significant rise in the household income from working, in the unearned household income and in the personal unearned income. Interestingly, the share of employed people and weekly working hours show a slight increase, although the differences are not significant. Finally, for the group with large windfall gains, household total income (at a 1% significance level), household income from working (at a 9% significance level) and

personal total income (at a 9% significance level) all rise from one period to another. Employment and working hours slightly decrease, but the differences are not statistically significant.

[PLACE TABLE 5 HERE.]

3.3 Non-work income and working hours over time

In this sub-section, we show the evolution of unearned income and working hours over time. From the previous analysis, windfall gains do not seem to have strong effects on income or on labour supply, since differences over time, before and after the windfall gains, are mostly not statistically significant. Hence, one could ask whether the windfall gains variable is a correct measure. For this reason, Figure 1 depicts the average (household and personal) non-work income over time. The time period "0" refers to a time of windfall gains receipt. Since the maximum number of periods for an individual in the sample is eight, the graph is plotted only for five years prior and five years after the receipt of windfall gains. Moving further away from the point of receipt would make the sample size become very small. From Figure 1, it can be seen that the variable windfall gains is meaningful and informative. Indeed there is a positive blip in both household and personal non-work income at the time of receipt. After that, non-work income returns to its upward trend.

[PLACE FIGURE 1 HERE.]

Figure 2 displays household income over time by size of windfall gains. Due to limitations in the sample size, we put the large windfall gains and the medium windfall gains groups into a single category. Non-work household income of the medium/large group is, in general, higher than for the small group. The discrete jump in income in the period the windfall gains are received is still visible for both groups, and, as expected, is larger for the group that receives medium/large gains.

[PLACE FIGURE 2 HERE.]

Next, we turn to the evolution of weekly working hours (Figure 3 and Figure 4). Figure 3 shows that the positive trend in average weekly working hours is reversed after the receipt of windfall gains. Similar information is conveyed by Figure 4, where we split the

sample between those who receive small windfall gains and those who receive either medium or large windfall gains. Whereas the evolution of working hours for the small group seems to be more or less unchanged, the downward trend after windfall gains for medium/large group is more apparent. This is consistent with the hypothesis that, after receiving windfall gains, individuals adjust their labour supply downwards. Of course, this is a very crude method of relating working hours to windfall gains and in the analysis that follows we will proceed with the regression analysis.

[PLACE FIGURE 3 HERE.]

[PLACE FIGURE 4 HERE.]

4. Theory and econometric approach

4.1 The impact of windfalls on working hours: A theoretical illustration

Consider a representative consumer who chooses consumption, C_t, and leisure hours, L_t, in order to maximize lifetime utility

$$\sum_{i=0}^{T}(1+\rho)^{-t}U(C_t, L_t) \tag{1}$$

subject to the intertemporal budget constraint

$$A_0 + \sum_{i=0}^{T} R_t N_t W_t = \sum_{i=0}^{T} R_t C_t \tag{2}$$

where U represents the utility function in time period t that is separable in consumption and leisure, N_t denotes hours worked equal to L^* (a fixed time endowment) minus L_t, A_0 refers to initial assets, W_t is the hourly wage rate, R_t is the discount rate, $\prod_{i=1}^{t} 1/(1+r_i)$, where r is the real rate of interest, and ρ is the rate of time preference.

Following MaCurdy (1981), we assume that U has the following form for individual i at time t

$$U_i(C_{it}, L_{it}) = \alpha_{1it} C_{it}^{\omega_1} - \alpha_{2it} N_{it}^{\omega_2} \tag{3}$$

where α_1 and α_2 are 'taste-shifters' which depend on consumer i's preferences at t, $0 < \omega_1 < 1$ and $\omega_2 > 1$.

If we consider an interior optimum (that is, for $N_{it} > 0$), the logarithm of the labour supply function for a given marginal utility of wealth can be expressed as

$$\log N_{it} = (\omega_2 - 1)^{-1}(\log \lambda_{it} - \log \alpha_{2it} - \log \omega_2 + \log(R_t(1+\rho)^t) + \log W_{it}). \quad (4)$$

where λ denotes the marginal utility of wealth.

We assume that 'tastes' for work are randomly distributed according to the relationship $\log \alpha_{2it} = \gamma X_{it} + \sigma_i + u_{it}^*$ where X_{it} denotes the set of observable determinants of consumer's tastes, σ_i represents the unobserved permanent component of consumer's characteristics and u_{it}^* a time-varying random component with zero mean.

Assuming a constant real interest rate, replacing the distribution for 'tastes for work' in equation (4) and using approximation $\log(1+x) \approx x$, we can simplify the labour supply function as

$$\log N_{it} = -\delta(\sigma_i + \log \omega_2) + \delta(\rho - r)t + \delta \log \lambda_{it} + \delta \log W_{it} + \delta\gamma X_{it} + u_{it} \quad (5)$$

where $\delta = (\omega_2 - 1)^{-1}$, and $u_{it} = \delta u_{it}^*$.

Following Altonji (1986) and Joulfaian and Wilhelm (1994), we assume that the marginal utility of wealth evolves as

$$\log \lambda_{it} = \log \lambda_{it-1} + a + \phi_{it} \quad (6)$$

where ϕ_{it} represents the forecast error of the marginal utility for next period and a is a parameter determined by the discount factor, the interest rates, and the distribution of the forecast error. We approximate λ_{it-1} by

$$\log \lambda_{it-1} = \xi Z_i + \theta \log(E_{t-1}(G_i)) + \varepsilon_i \quad (7)$$

where Z represents the family background characteristics and the effect of the expected lifetime wage profile on the marginal utility, $E_{t-1}[G_i]$ denotes the expected present value of the capital gain (loss), including for example potential inheritance and other windfall gains, and ε_i captures any individual unobserved time invariant heterogeneity in marginal utility of wealth. Combining equations (6) and (7) and plugging into equation (5), we obtain the following labour supply representation:

$$\log N_{it} = \delta(\varepsilon_i - \sigma_i) + \delta\xi Z_i + \delta\theta \log(E_{t-1}(G_i)) - \delta(a + \log\omega_2) + \delta(\rho - r)t + \\ + \delta \log W_{it} + \delta\gamma X_{it} + \delta\phi_{it} + u_{it}. \quad (8)$$

It is clear from the first and the second term on the RHS of (8) that that labour supply response should be estimated using fixed effects estimation. Thus one eliminates the need to explicitly control for family background and also removes any potential biases due to ε_i.

When the capital gain is fully unanticipated (that is, $E_{t-1}[G_i]=0$), capital gains affect labour supply only via the forecast error, ϕ_{it}. Assuming that the forecast error is a proportion κ of the actual capital gain, that is, $\phi_{it} = \kappa G_{it}$, where $\kappa < 0$, then labour supply response will be $\delta\kappa$, which is negative.

However, when the capital gain is fully anticipated (that is, $E_{t-1}(G_i) = G_i$ and $\phi_{it} = 0$), then capital gains will exert their effects on labour supply by $\delta\theta$. Given that marginal utility would have lowered before the time period in question, there would be no further adjustment at the time of inheritance. Therefore, the unanticipated windfall gains reduce the marginal utility of wealth, and thus reduce labour supply.

4.2 The impact of windfalls on working hours: the econometric specification

Despite the large literature concerned with estimating the impact of unearned income on labour supply, the use of an exogenous measure of income variation is not consensual. As a result, different approaches have been considered, namely: (i) the capital income or spousal-labour earnings as variables measuring unearned income (Imbens et al., 2001); (ii) experimental data with exogenous components of unearned income (Rees, 1974; Pencavel, 1986); and (iii) natural experiments in which large amounts of money were allocated using distribution rules that were independent of preferences and other determinants of economic behaviour (Bodkin, 1959; Kreinin, 1961; Holtz-Eakin et al., 1993).

We start by looking at whether the windfall gain affects the probability of being employed, and estimate the following linear probability model

$$\text{Prob}(E_{it} = 1) = c_0 + c_{0i} + c_1 \text{Windfall}_{it} + c_2 W_{it} + c_3 X_{it} + \varepsilon_{it} \quad (9)$$

for *i = 1, ..., N, t = 1, ..., T*, where E_{it} is a dummy variable that takes the value of 1 if individual i is employed or 0 otherwise, Windfall_{it} is our variable of interest and takes the value of 1 if the household has received a windfall gain or 0 otherwise, W_{it} denotes the hourly wage, $\mathbf{X_{it}}$ represents a set of controls for age, civil status and family characteristics, c_{0i} is individual fixed effect and $\varepsilon_{\mathbf{it}}$ is an i.i.d. error term.

In order to assess the effect of unexpected capital gains on working hours, we estimate the empirical counter-part of Equation (8) as described by

$$H_{it} = c_0 + c_{0i} + c_1 \text{Windfall}_{it} + c_2 W_{it} + c_3 X_{it} + \varepsilon_{it} \quad (10)$$

for *i = 1, ..., N, t = 1, ..., T*, where H_{it} stands for weekly working hours of household i in year t.

Taking into account that the impact of windfalls on labour supply differs for different amounts of unanticipated gains, we also disaggregate the Windfall dummy into three different categories: (i) Small Windfall, in the case of capital gains between 2,000 and 10,000 EUR; (ii) Medium Windfall, for capital gains between 10,000 and 50,000 EUR; and (iii) Large Windfall, when the capital gain exceeds 50,000 EUR. Then, we consider the model:

$$\begin{aligned} H_{it} = {} & c_0 + c_{0i} + c_1^1 \text{Small Windfall}_{it} + c_1^2 \text{Medium Windfall}_{it} + c_1^3 \text{Large Windfall}_{it} + \\ & + c_2 W_{it} + c_3 X_{it} + \varepsilon_{it} \end{aligned} \quad (11)$$

for *i = 1, ..., N, t = 1, ..., T*.

Finally, we look at whether the effect of the windfall varies with different personal characteristics. Therefore, we interact the regressors with the Windfall dummy and estimate the following model:

$$H_{it} = c_0 + c_{0i} + c_1 \text{Windfall}_{it} + c_2 W_{it} \times (1 + \text{Windfall}_{it}) + c_3 X_{it} \times (1 + \text{Windfall}_{it}) + \varepsilon_{it} \quad (12)$$