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Does Greater Income Inequality cause Increased Work Hours?

New Evidence from High Income Economies

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Abstract

We explore the extent to which individual's allocation of time between labour and leisure is affected by the consumption standards of the rich. Utilizing a panel data methodology and panel Granger causality tests we investigate the relationship between income inequality and work hours for a cluster of 24 high-income OECD countries over the period 1990-2015. Four alternative measures of income inequality are considered. We find that greater income inequality is associated with longer work hours indicating stronger concern for conspicuous consumption rather than conspicuous leisure. Even though the resulting estimates lend support to the theoretical framework on consumption emulation, the generated evidence also appears to be in line with a Duesenberry's and Frank's expenditure cascading approach. The ambiguity however arising from the Granger Causality tests appears to lead - to a certain extent - to different conclusions about the direction of causality or whether a causal relationship does even exist. It is therefore imperative that caution should be exercised when interpreting the direction of the causal dimension.

Keywords: causality, income inequality, panel data, Veblen effect, work hours

JEL Classification: C2, D63, J2

1. Introduction

The notion that utility is a function of absolute living conditions and relative economic status has been previously explored by numerous academic scholars (see *inter alia,* Duesenberry, 1949; Leibenstein, 1950; Galbraith, 1958; Frank, 1985; Schor, 1998). Over the last four decades, income inequality across many OECD countries has increased considerably. As a result, a new body of research has emerged purporting to gain further insights into the causes and consequences of income and wage inequality. In this context, the bulk of the existing research explores the individual preferences over inequality (Autor, Katz and Krueger, 1998; Di Nardo, Fortin and Lemieux, 1996; Akerlof and Yellen, 1990; Fehr and Schmidt, 1999), whilst its behavioural aspects remain relatively unexplored.

Potentially, the two notable exceptions that attempt to factor in the behavioural implications come mainly from the economics and the psychology disciplines. In particular, Lazear and Rosen (1981) in developing the tournament theory argued that large salaries given to senior executives breed higher inequality which in turn provide an incentive to those who put in enough effort climb the wage ladder. In other words, workers as a group over-invest in total work effort since nobody has an incentive to recognize the negative externality of their increased individual work effort – when one person's probability of promotion increases, the promotion probability of everyone else decreases. Despite the fact that the existing empirical evidence generally supports this hypothesis, the population subgroups used to test the fundamental assertions of tournament theory, question the general applicability of the results (Prendergast, 1999).

Duesenberry (1949) argues that individual consumption is partly a function of the consumption of others whereas Veblen (1934) perceived consumption spending to be closely associated with a person's relative status considerations. In other words, the desire to be a particular type of person should be aligned with the desire to consume certain goods.

Despite the fact that a positive correlation between work hours and inequality is frequently established in the extant literature, the contribution of this paper rests in that it provides new empirical evidence for a large panel of countries using different measures at different distributional levels of income. In this context, we investigate the extent to which individual's allocation of time between labour and leisure is affected by the consumption standards of the wealthier population which in turn drives employees to work longer hours[1]. Our inability to unambiguously observe, consumption patterns that reflect social behaviour has entailed that income and hours worked are used as close proxies for such a behaviour. We tentatively argue that work hours increase in the degree of income inequality and we explore further this hypothesis by using four different measures of inequality. In this direction, utilizing panel data methodology we generate novel evidence suggesting that income inequality plays an instrumental role in driving work hours, across all countries in the data set. The Granger Causality tests however suggest that caution should be exercised when interpreting the direction of the causal dimension.

The rest of the paper is organized as follows: Section 2 provides the theoretical underpinnings as well as the framework upon which the empirical investigation is conducted. Section 3 touches on the empirical methodological framework whilst Section 4 presents and discusses the results. Finally, section 5 provides some concluding remarks.

2. Theoretical underpinnings

In behavioural sciences there is a rather tangible and established link between context and evaluation. In economic models of consumer behaviour however, this link is conspicuous by

[1] Veblen effects are derived from a class of social-comparison-based utility functions (see, Bagwell and Bernheim, 1996; Layard, 1980; Frey and Stutzer, 2002; van Praag, 1993; Sen, 1983).

its absence as each person's consumption spending is assumed to be independent of the spending behaviour of others.

The life-cycle and permanent income hypotheses suggest that increases in income inequality have no significant effects on individual spending decisions. In this context, the fact that a family - poor or rich - always spends a constant proportion of its permanent income, implies that the savings rates are independent of household income and remain relatively stable over time (Friedman, 1957). Duesenberry's (1949) relative income hypothesis was one of the first attempts to explicitly identify the link between context and evaluation which provided the platform for future studies to explore the relationship between context and spending patterns. As such, the relative income hypothesis predicts that spending patterns are highly responsive to changes in income inequality.

The observed variation in consumption expenditure which has been at odds with what traditional economic models predict provided the impetus for new body of research to emerge. More specifically, Frank, Levine and Oege (2014) by using the term *expenditure cascade* described a process whereby increased expenditure by some people is emulated by others below them on the income scale; the same behavioural spending pattern is also assumed to be exhibited by others just below the second group and so on. It is on this premise, the *cascade hypothesis* potentially explains the pervasive pattern of growing income inequality and declining savings rates observed over the last decades in many advanced capitalist economies. According to Veblen (1934, p.81) "the proximate ground for expenditure in excess of what is required for physical comfort is ... a desire to live up to the conventional standard of decency". In other words, consumption is directly affected by a desire for social standing as well as the satiation we draw from the goods and services we consume. It is in this sense, that the leisure class sets the standard for others to emulate.

Bell and Freeman (2001) report evidence that workers in the then European Community would prefer pay increases (given the current hours) to decreases in hours (at the current total earnings) hence indicating that the current work hours are very close to their ideal hours they would have chosen. Similar results were also established by Böheim and Taylor (2004) using the British Household Panel Survey.

Bowels (2004) maintain that even though individuals are likely to adopt the norms of those in their social group which are perceived to be happier, there is a tendency to conform towards norms shared by large numbers of their associates, irrespective of the utility levels that these norms encapsulate. The direct implication of the latter is that the typical work hour norm of a given group (other than the richest) is bound to be increasing as inequality increases but in the short-run, the Veblen effect might be weakened due to conformist effects.

Recently, incorporating inequality in a labor supply framework of analysis has been consistent with many theoretical we well as empirical studies in the respective area. In particular, within the efficiency wage/incentive contracts hypotheses the nature of the opportunities frontier facing workers as well as the distributional aspects associated with wages have spawned new research frameworks to emerge. Whilst these theoretical frameworks purport to establish potential channels through which contracts yield unequal rewards between desirable and undesirable acts, alternative approaches, such as the tournament pay schemes, link potential inequality in pay to work effort (Lazear and Rosen, 1981). In the same spirit, Landers, Rebitzer and Taylor (1996) sustain that the relationship between current effort and future promotion success is determined by an unequal outcome i.e. success or failure.

As far as the inequality–work hours hypothesis is concerned, the linking assumption between work hours and inequality lies is the notion that pay inequality provides a good indicator or measure of incentives in a labor supply equation. In this context, the wider the earnings distribution is, the greater the work hours/effort of a worker is envisaged to be, hence,

improving his/her position in the earnings distribution significantly. A fundamental assumption in linking inequality and effort/hours rests in the belief that there is earnings mobility, with workers constantly moving up or down the earnings distribution (OECD, 1997).

On the empirical front, the relationship between income inequality and work hours has received little attention. Empirical work derived from Lazear and Rosen's (1981) tournament model of the firm suggests that that wage inequality plays an instrumental role in determining how much an individual is prepared to work. In this context, inequality is perceived as an incentive to work hard when individuals pursue a promotion in the work environment. Further evidence based on Veblen's (1899) and Duesenberry's (1949) empirical studies suggest that an individual's consumption pattern is to some extent determined by the individual's consumption vis-à-vis the consumption of others. Thereby, the existing income inequality which derives directly from the individual's social reference group will largely affect the individual consumption and hence working patterns. In one of the few Veblen-inspired studies, Schor (1998) found that, when the financial status of a group of people was below that of a reference group of people, the former group tended to save significantly less than those who were better off. In other words, an increase in consumption by the rich causes an increase in working hours throughout the income distribution.

Bell and Freeman (2001), in a study of two economies (US and Germany), showed that hours worked in both countries is positively related to earnings inequality whilst at the same time hours worked can positively affect future wages and promotion prospects. In a different spirit however, Osberg (2003) showed that differences – between Germany and USA - in relation to average working hours largely arise from differences in workforce participation, primarily the participation of women and older men. Longer vacations and more paid holidays (both of which are collective decisions) also contribute. Except in the extreme lower tail of the hours distribution, the distribution of usual working hours of prime age males was essentially

identical and constant in Germany and the US. Furthermore, according to Osberg and Jenkins (2005) longer work hours of other workers reduce the chances for each individual of successful matches for the enjoyment of social leisure, thereby reducing the utility derived from any given level of working time and income.

In another study, Bowles and Park (2005) ascribed the desire of a person to emulate the consumption standards of the rich to the 'Veblen effect', i.e. decisions to work longer hours vis-à-vis leisure. Tanninen and Tuomala (2008) found that the income share of the top 1% of the population is positively correlated to annual hours worked whilst more recently, Oh, Park, and Bowles (2012) investigated the downward trend in working hours in 10 developed countries and using both inequality (measured by income share of the top 1%) and political representation (measured by representation "number of years from the start of general male suffrage" and "total vote shares of social democratic and leftist parties in each country") as independent variables they found that the top 1% income share is positively correlated with work hours but political representation is negatively correlated with work hours.

Additional studies on individual's allocation of time between labour and leisure, have also generated evidence suggesting that income is more positional than leisure (see for instance Frank 1985, 1997; and Frank and Sunstein, 2001). Alpizar, Carlsson and Johansson-Stenman, (2005), and Solnick and Hemenway (2005) in a study for Sweden and USA established evidence of relative leisure concerns despite the fact that leisure appeared to be less positional than income and many private goods whereas Maurer and Meier (2008) using a panel methodology on income dynamics for the US Economy observed a moderate peer effect on household consumption. Despite the fact that the implications of leisure positionality has been a focal point of many theoretical studies (see for instance, Aronsson and Johansson-Stenman, 2013; Arrow and Dasgupta, 2009), empirical evidence on leisure positionality is rather scant.

By and large, emulation of consumption or leisure of the 'Joneses' depends critically on social preferences and the relative visibility of consumption and leisure.

3. Empirical investigation

Following Bowles and Park (2005) framework of analysis we investigate the Veblen effect of consumption and leisure, premising our hypothesis on the notion that a desire to emulate the 'Joneses' may affect individuals' allocation of time between labour and leisure. We initially estimate an unbalanced panel for a cluster of 24 high-income OECD economies over the period 1990 to 2015[2]. When however, we introduce the income share of the top 1% in our models five countries were dropped due to data availability[3] (see definition of variables in the appendix).

For the empirical investigation a panel data methodology has been adopted. In this setting, the general linear model for observations $i = 1....N$ grouped into units $j = 1.....J$, is considered.

$$y_i = \alpha_{ji} + \beta x_i + \varepsilon_i, \qquad (1)$$

The effect of x on y which is given by β, is the primary parameter of interest; β is assumed to be the same within each unit; α_j captures the amount by which predictions of y in unit j must be adjusted given x; ε_i is the error term that satisfies the usual classical assumptions.

Having considered the inherent heterogeneity problems existing in the generalized pooled model estimators as well as the respective selection test (i.e. Wald based F-test and Hausman) between the pooled and Random effects models we have opted for a fixed effects methodology (for more on this see Hsiao, 2003)[4]. More specifically, the F-test contrasts the Fixed effects model with the pooled OLS. Rejecting the null hypothesis implies that there is a significant increase

[2] The dataset comprises the following countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Slovenia, Spain, Sweden, Switzerland, and the UK. It should be noted that our intention was to use a more up-to-date dataset, but data availability was the main constraint, hence, the time period 1990-2015.

[3] The countries that were dropped due to data availability in the second part of the estimation where the income share of the top 1% was used were: Austria, Belgium, Iceland, Luxemburg and the UK.

[4] The estimated equations of both pooled and random effects models are not reported in this paper for economy of space but are available upon request.

in the goodness-of-fit in the fixed effect model and hence the fixed effect model is preferred to the pooled OLS. In addition, the Hausman specification test compares fixed and random effect models respectively. If the null hypothesis i.e. that the individual effects are uncorrelated with any regressor in the model, is rejected then you can conclude that the individual effects u_i are significantly correlated with at least one regressors in the model, hence rendering the random effect model unsuitable – so the fixed effects model is preferred. The respective selection tests are provided in Table 1.

Equation (2) is the fixed effects model expressed in a linear form that adds to the specification a series of variables z_j.

$$y_i = \alpha_j z_{ji} + \beta x_i + \varepsilon_i, \qquad (2)$$

We employ a standard empirical specification encountered in the literature (see Bowles and Park (2005):

$$LWH_{it} = a + bg_{it} + \xi \boldsymbol{X}_{it} + \varepsilon_{it} \qquad (3)$$

where wh_{it} is the natural logarithm of work hours, used as a proxy for work effort (Ravallion, 2017), in country i at time t; g_{it} is a vector of proxies for income inequality, namely the Gini coefficient, the income share of the top 1%, the ratio between the 90th percentile and median income, and the ratio between the median and 10th percentile income; $\mathbf{X_{it}}$ is a vector of control variables, consisting of union density (UD), capturing possible time-varying institutional differences, real GDP per capita (LGDPpc), which reflects possible influences of income levels on consumption and leisure preferences, real industrial wages (IW) and real total wages (LW), which are used to capture labour supply effects, unemployment (UNE), which measures cyclicality in response to labour demand, and proportion of female population in employment (FEM), which accounts for changes in the gender composition of the workforce.

Despite the fact that the reference group for Veblen effects is the rich, we have opted for a measure of income inequality that is sensitive not only to upper incomes, namely the ratio of

the highest earnings in 90th percentile to the highest earnings in the median percentile, but also the ratio between the median and 10^{th} percentile income to potentially capture cascading effects suggested by the literature.

Before we proceed to the estimation of the baseline models it is imperative that we check our series for unit roots. In the existing literature, it is well documented that traditional unit root tests suffer from low power (see for instance Diebold and Nerlove, 1990). According to Canarella et al. (2012) panel unit root tests are superior to the standard time series unit roots as they encapsulate asymptotically standard normal distributions. In this paper we use both common root tests – Levin, Lin, Chu (LLC) and Harris and Tzavalis (HT) – and individual root tests – Im, Pesaran, Shin (IPS), Fisher – ADF, Fisher– PP. (The interested reader can also consult the respective studies by Levin et al. 2002; Harris and Tzavalis 1999; and Im, et al. 2003 for a more detailed exposition of how the generated processes).

Table A5 in the appendix reports the respective statistics of the panel unit root tests on the basis of which the majority of the tests reinforce our hypothesis that all variables are stationary processes. Only in the cases of LWH, LGDPpc and FEM the HT test points to an insignificant result.

Finally, given the scant evidence in the existing literature on the causal dimension between inequality and work hours we utilize pairwise Granger causality tests to provide more robust and insightful evidence on the underlying relationship (see Tables A3 and A4 in Appendix). In this setting we treat the panel data as one large stacked set of data, and then perform the standard Granger Causality test with all coefficients being the same across all cross-sections. In other words, we ensure that the data from one cross-section do not enter the lagged values of data from the next cross-section. In passing it should be mentioned that the standard panel Granger causality test is effective only when our series are stationary, which on the basis of the aforementioned panel unit root tests is the case.

4. Results

The results presented in Table 1 suggest that all measures of income inequality have a positive and highly significant impact on work hours hence, reinforcing the notion that an increase in inequality causes people to spend more time working.

INSERT TABLE 1

Union density is found to be positive and significant in models 1, 2, 3 and 4, suggesting that trade unions protect employees' work hours (Alexander, Haley-Lock and Ruan, 2015; Finnigan and Hale, 2018). In model 8 however – where a measure of inequality is the share of income at the top 1% - union density is found to be significant but this time bearing a negative sign. In the rest of the models, union density is insignificant suggesting potential mixed signalling that labour unions emanate when targeting both higher wage and lower workload. In Bowles and Park (2005) study, union density was found to be significant only when the 90/50 percentile ratio was used as an inequality measure.

As far as the two wage measures are concerned - total wage and industrial wages – they are found to be positive and significant in models 7 and 8 - i.e. in the income share of the top 1% specification. Real GDP per capita is significant, bearing expected sign in models 6, 7 and 8. Unemployment enters with a negative sign and is found to be significant in models 1, 2, and 7 whereas the proportion of female employees is found to be negative and significant in models 3, 4 and 5. In model 7 however, the respective variable is still significant but this time the sign turns to positive. The negative and significant coefficient of the proportion of female employees is thought to be consistent with the conventional preference of the female population and in line with the results documented in a study by Wilkins, Warren, Hahn and Houng (2011).

As far as the Granger causality tests are concerned, a more ambiguous picture emerges. In particular, the results presented in Table A3 (in the appendix) establish a bidirectional causality

between one of the measures of inequality (INQgini) and work hours (LWH) and a unidirectional causality that runs from work hours (LWH) to $INQ_{90/50}$. No causality can be established between the ratio between the median and 10^{th} percentile income ($INQ_{50/10}$) and work hours (LWH). For the rest of the variables, a unidirectional causality is found between GDP per capita (LGDPpc), real industrial wage (IW), real total wage (LW), unemployment (UNE) and work hours (LWH) whilst no causality can be established between union density (UD), the proportion of female population in employment (FEM) and work hours (LWH).

In table A4 (in the appendix), the Granger causality test in the reduced sample suggests that there is a unidirectional causality that runs from the income share of the top 1% ($INQ_{1\%}$), GDP per capita (LGDPpc), real total wage (LW), unemployment (UNE), union density (UD) to and work hours (LWH) whilst no causality can be established between the proportion of female population in employment (FEM), industrial wages (IW) and work hours (LWH). Overall, the results of the Granger causality tests appear to be to a certain extent aligned with the baseline specifications of our models. Caution should be exercised however in the interpretation of the direction of causalities as the channels though which these are transmitted are bound to be very complex.

4.1 Discussion

The fact that income inequality is a good predictor of work hours is in line with our research hypothesis. Bell and Freeman (2001) maintain that inequality induces longer work hours due to the high attainment in terms of percentile rank in the wage distribution hence implying that the greater wage gains the more unequal is the wage distribution. Convincing as they might be, discriminating empirically between this incentive-based account and the social comparisons interpretation offered is a crude generalization as both incentive and Veblen effects might exist at the same time. We would have to exercise caution as to how we can interpret the results as

in their study Bell and Freeman envisage long hours to be an indicator that potentially can result in promotion.

Ostensibly, such an assumption might be the case in some professions (see Landers et al., 1996) where hard work - in terms of effort and not necessarily in terms of more hours - might result in promotion. Furthermore, when considering black workers in the USA, Bell (1998) found that black employees appear to be using as a reference group only blacks, hence suggesting tentatively that the black-only distribution is a better indicator of the gains to working longer hours. In this sense, the Veblen effect manifests itself in the relevant reference group for black workers that other black workers are trying to emulate.

An alternative interpretation of the results in this study might relate to the impact of technological change and the acceleration of skill-intensive jobs which to a certain extent explain the relationship between inequality and hours of work. Kruger (1993) for instance suggested that the usage of computers has positively affected economic returns to schooling whilst Freeman (2002) in the US long working hours are closely associated with computers or Internet usage.

It can be further argued that given the worsening social mobility associated with increasing inequality in this cluster of high-income OECD economies (Cingano, 2014), as well as the palpable decline in people's confidence in meritocracy (OECD, 2018), workers may appear to be motivated to work harder in the presence of greater inequality. As a result, the increasing consumption at top incomes in these countries affects the conspicuous consumption of individuals in the lower positions of the income distribution. The 'Veblen effect', which generally manifests itself in the positive correlation between high levels of income inequality and working hours (Bowles and Park, 2005; Oh *et al.* 2012), appears to be present across all estimated models.

The fact that the Granger causality tests however point to a more ambiguous picture where causality between some of the measures of inequality and work hours cannot be established or it is hard to interpret suggests that we need to be cognizant of potentially more intricate factors that affect their direct causal relationships[5]. Recently, there is emerging evidence regarding the changing nature of work, in terms of skill-set required in the workplace as well as the rise of the freelance economy suggesting that the relationship between work hours and inequality might prove to be exhibiting more convoluted patterns than expected. More specifically, Cirillo (2018) by categorizing data in accordance with the skill level required and earnings - ranging from elementary school to post-tertiary education, as well as manual workers and craft workers, clerks and managers - found that "there has been upskilling in the manufacturing industry, whereby job growth was concentrated to those requiring higher skill level, and skill polarisation in services, whereby job growth came primarily from the highest and lowest skill-level jobs" (p.47). This suggests that rising income inequality is inextricably linked to the changing skill requirements for new jobs.

Regarding the freelance economy, a report by McKinsey (2016) highlights that "20 to 30 percent of the working-age population in the United States and the EU-15, or up to 162 million individuals, engage in independent work" (p. viii), whereby "independent workers have a high degree of control and flexibility in determining their workload and work portfolio" (p.2). 68% of such workers in the EU and 72% in the US took up independent work "by choice" (p.8). In addition, a survey of US employers found that 40% of organisations expect to increase their use of contingent workers in the next five years whilst the freelance workforce in the US has grown by 66% (EY, 2016). Recently, Bick et al. (2018, p.170) in a study on how hours worked vary with income found that "within countries, hours worked per worker are also decreasing

[5] It should be stressed that the application of Granger Causality test is subject to potential limitations arising from the specification of the estimated equation. If the underlying relationship is non-linear in nature, then the entire process might be brittle, and the results should be interpreted with caution.

in the individual wage for most countries, though in the richest countries, hours worked are flat or increasing in the wage". One implication of this new evidence is that differences in aggregate productivity and welfare across countries are more pronounced than what was initially thought. In light of the above, it is imperative that additional factors that relate to individual characteristics of employed people – for instance, skill distribution - the nature of employment, productivity or welfare differences should be taken into account so that we gain more insightful evidence on the key factors that drive people to work longer hours.

5. Conclusions

This paper by drawing on the seminal work of Thorstein Veblen explores the effects of income inequality on work hours. Even though the results to a certain extent confirm the positive relationship between work hours and inequality, there is also evidence consistent with other approaches such as the ones by Duesenberry (1949) or Frank, Levine and Oege (2014).

The notion that the rich set the consumption and then trickle down the ladder of economic success is analogous to the notion of 'spillover' effects like pollution. The conventional economic prescription for these negative spillovers is that they should be taxed, but to curb the downward cascade of conspicuous consumption a tax that targets the consumption of those who set the standards is required. Without a doubt, hefty pay rises is regarded as the most direct way for households to boost their incomes. Notwithstanding, having control over the number of hours one would like to work in order to get by, also matters greatly. Potentially, the uniform effect established by the panel estimations might be ascribed to the fact that people across all classes work harder in order to enhance their financially driven societal status. It can be further argued that the yielding evidence is consistent with the hypothesis that social status comparisons are made to a richer reference group rather than a

poorer reference group, hence implying that people's choices reflect their aversion to poorer reference group.

Overall, the implications of our panel estimates for policy makers can be of great significance in so far as potential market failures due to Veblen effects may require tailored policies to deal with distributional or other economic issues that we spare in this study. For instance, the notion that a flat-rate income tax would have a positive economic impact is challenged by this research in so far as work hours will increase as inequality rises. Theoretically speaking, Veblen's point suggests that egalitarian income distribution might cause the average propensity to save to even decline - as people always seek ways to outdo everyone else - whilst Duesenberry's point implies that changes in the distribution of income will affect the savings rate - as the average propensity to save is contingent on relative income, rather than absolute income. Ostensibly, the key factor in this dispute relates to the behavior of people as they need to decide whether consumption at the same level as everyone else is desirable or not.

In view of the Granger causality tests however the unfolding causal relationships especially between different measures of income inequality and work hours are rather ambiguous and only to a certain extent aligned with the baseline specifications of our models. It is therefore imperative that we need to be careful with the interpretation of the direction of causalities as the conduits though which the underlying relationships are transmitted are bound to be very complex. Trying to identify the 'why' factor behind this ambiguity can be a challenging task as one would have to look at additional factors that reflect different aspects of the individual characteristic of the labour force, such as for instance the skill distribution among employed people, differences in productivity and welfare patterns, or even the conditional distributions of the work hours, should more insightful evidence on the key variables that drive people to work longer hours emerge. Finally, the fact that preferences are inherently dynamic elements of what constitutes individual and cultural behaviour suggests that the perception of how

positional items are ranked within a consumer's utility function may change over time hence making it impossible to consistently gauge.

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Appendix

Table A1. Definition of variables

Variable	Measure	Source
Work hours	(LWH): natural logarithm of annual hours worked per person	OECD
Income inequality	(INQ_{gini}): Gini index of inequality in equivalized (square root scale) household disposable (post-tax, post-transfer)	Standardized World Income Inequality Database; Luxembourg Income Study (LIS)
	($INQ_{90/50}$): 90/50 percentile ratio	LIS; OECD
	($INQ_{50/10}$): 50/10 percentile ratio	LIS; OECD
	($INQ_{1\%}$): Pre-tax national income TOP 1%	World Inequality Database
Union density	(UD): percentage of trade union members	OECD
Real wages	(IW): wages as % Gross Value Added - industrial activity	OECD
	(LW): natural logarithm of average wages, 2016 USD, PPP	OECD
Real GDP per capita	(LGDPpc): natural logarithm of GDP per capita, 2010 USD, PPP	OECD
Unemployment	(UNE): unemployment rate	World Bank
Female employment	(FEM): proportion of female population in employment	OECD

Table A2. Summary statistics

Variables	Mean	Median	S.D.	Min	Max
LWH	7.443	7.451	0.1217	7.217	7.892
INQ_{gini}	29.24	29.20	4.046	20.20	38.00
$INQ_{90/50}$	1.879	1.900	0.1937	1.500	2.500
$INQ_{50/10}$	2.051	2.000	0.2568	1.600	2.800
$INQ_{1\%}$	0.09	0.089	0.023	0.040	0.164
LGDPpc	10.48	10.49	0.2895	9.362	11.42
IW	14.03	13.51	2.915	6.546	24.85
LW	10.60	10.61	0.2118	9.932	11.04
UNE	7.082	6.315	3.806	1.480	26.09
FEM	44.47	45.58	3.249	31.56	49.00

Table A3. Granger causality tests (entire sample – 24 countries)

Null Hypothesis:	F-Statistic	Prob.
UD does not Granger Cause LWH	1.024	0.360
LWH does not Granger Cause UD	0.667	0.513
INQgini does not Granger Cause LWH	9.556	0.000
LWH does not Granger Cause INQ_{gini}	5.807	0.005
LGDPpc does not Granger Cause LWH	4.243	0.014
LWH does not Granger Cause LGDPpc	0.804	0.447
IW does not Granger Cause LWH	3.701	0.025
LWH does not Granger Cause IW	0.818	0.441
LW does not Granger Cause LWH	10.95	0.000
LWH does not Granger Cause LW	1.727	0.084
FEM does not Granger Cause LWH	0.121	0.885
LWH does not Granger Cause FEM	3.395	0.034
UNE does not Granger Cause LWH	6.642	0.001
LWH does not Granger Cause UNE	0.317	0.728
$INQ_{50/10}$ does not Granger Cause LWH	0.152	0.858
LWH does not Granger Cause $INQ_{50/10}$	0.115	0.890
$INQ_{90/50}$ does not Granger Cause LWH	1.922	0.150
LWH does not Granger Cause $INQ_{90/50}$	7.209	0.001

Table A4. Granger causality tests (reduced sample -19 countries)

Null Hypothesis:	F-Statistic	Prob.
INQ1% does not Granger Cause LWH	2.080	0.056
LWH does not Granger Cause INQ1%	1.011	0.418
LGDPpc does not Granger Cause LWH	3.247	0.004
LWH does not Granger Cause LGDPpc	1.027	0.407
LW does not Granger Cause LWH	1.921	0.077
LWH does not Granger Cause LW	1.003	0.424
UNE does not Granger Cause LWH	2.333	0.032
LWH does not Granger Cause UNE	0.394	0.883
UD does not Granger Cause LWH	1.824	0.095
LWH does not Granger Cause UD	0.814	0.560
FEM does not Granger Cause LWH	1.158	0.329
LWH does not Granger FEM	1.691	0.123
IW does not Granger Cause LWH	1.416	0.209
LWH does not Granger Cause IW	1.001	0.425

Table A5: Panel Unit roots

	LLC	IPS	ADF-Fisher	PP-Fisher	HT	LLC	IPS	ADF-Fisher	PP-Fisher	HT
Variables	Constant only					Constant and trend				
LWH	-4.56**	-25.76*	-22.67*	-36.26*	-1.99**	-4.91*	-6.87*	-8.72*	-10.82*	-0.87
INQ_{gini}	-7.93*	-19.74*	-17.46*	-28.57*	-10.47*	-16.93*	-26.32*	-14.78*	-21.37	-9.72*
$INQ_{90/50}$	-11.72*	-16.73	-26.21	-38.91*	-19.82*	-26.71*	-31.82*	-25.91*	-18.99*	-13.32*
$INQ_{50/10}$	-7.81*	-15.63*	-21.11*	-27.09*	-15.35*	-21.26*	-32.37*	-17.73*	-27.82*	-9.01*
$INQ_{1\%}$	-9.19*	-27.28*	-36.19*	-32.18*	-2.04**	-7.91*	-5.99*	-19.38*	-16.37*	-4.91*
LGDPpc	-3.78**	-32.22*	-35.19*	-25.81*	-2.55**	-6.33*	-8.82*	-9.66*	-11.73*	-1.62
IW	-12.72*	-21.92*	-42.77*	-38.63*	-27.83*	-29.74*	-38.92*	-21.46*	-26.84*	-15.88*
LW	-4.89**	-16.82*	-18.91*	-28.56*	-15.73*	-27.47*	-41.78*	-14.32*	-31.28*	-7.46*
UNE	-16.47*	-25.93*	-48.22*	-37.99*	-26.28*	-42.88*	-31.13*	-18.45*	-28.17*	-15.12*
FEM	4.12**	-21.67*	-19.28*	-31.77*	-3.38*	-6.19*	5.27*	-7.43*	-11.47*	-1.28

Notes: The Null hypothesis for all tests is that of a unit root. (*) (**) denote significance at 1% and 5% respectively.

Table 1. Fixed effects (FE) estimates – (LWH) the dependent variable

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
INQ_{gini}	0.022***	0.023***						
	(0.006)	(0.008)						
$INQ_{90/50}$			0.375**	0.432**				
			(0.141)	(0.178)				
$INQ_{50/10}$					0.214**	0.212**		
					(0.085)	(0.091)		
$INQ_{1\%}$							0.106**	0.108**
							(0.053)*	(0.055)
UD	0.002*	0.002*	0.002*	0.003**	0.001	0.001	-0.0008	-0.001***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.0009)	(0.001)	(0.0004)	(0.0004)
LW	-0.032		-0.108		-0.045		0.072***	
	(0.143)		(0.189)		(1.982)		(0.023)	
IW		0.005		0.004		-0.006		0.004**
		(0.010)		(0.011)		(0.009)		(0.002)
LGDPpc	-0.161	-0.158	-0.073	-0.170	-0.188	-0.297**	-0.067***	-0.056**
	(0.115)	(0.099)	(0.219)	(0.151)	(0.215)	(0.130)	(0.025)	(0.025)
UNE	-0.014**	-0.014*	-0.006	-0.006	-0.0047	-0.005	-0.001**	0.0002
	(0.0067)	(0.007)	(0.005)	(0.006)	(0.006)	(0.006)	(0.005)	(0.0006)
FEM	-0.011	-0.012	-0.018*	-0.019*	-0.004*	-0.006	0.002**	0.0005
	(0.007)	(0.009)	(0.009)	(0.010)	(0.010)	(0.011)	(0.001)	(0.001)
Constant	9.372	8.835***	9.497***	9.180	9.629	10.49***	7.255***	8.012***
	(1.144)	(1.439)	(1.364)	(1.972)	(1.37)	(1.680)	(0.322)	(0.295)
R^2	0.60	0.62	0.56	0.59	0.55	0.58	0.70	0.71
F-Test	0.000	0.000	0.012	0.001	0.021	0.004	0.047	0.039
Hausman	0.000	0.000	0.001	0.000	0.011	0.001	0.000	0.000
Observations	456	407	179	155	179	155	304	255

Notes: (***), (**), (*) denotes the rejection zone at the 1%, 5% and 10% level of significance respectively; standard errors are given in parentheses; Time dummies have been used; P-values are given for both the F-test and the Hausman test; We have used standard errors that are robust to serial correlation (see Wooldridge, 2002).