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Real Wages, Amenities and the Adjustment of Working Hours Across Regional Labour Markets

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Abstract

This article establishes a link between the traditional labour economics and the urban economics literature by analyzing differences in working hours across regional labour market areas in the UK. Using a real wage index reflecting skill adjusted earnings net of quality adjusted house prices in Britain and panel data on working hours the effect of regional real wages on labour supply is assessed. The identification strategy relies on workers who move across 157 labour market areas in Britain and includes individual fixed effects. The main finding is that working hours are significantly higher in labour market areas that offer lower real wages. Decreasing real wages by £1000 results in an increase of working hours of 0.3 %. Real wage differentials can be seen as a proxy for the local amenity level. I can replicate my finding including a set of amenities instead of the real wage index. The effect is mainly due to labour supply decisions of low skilled workers who work significantly longer hours in low real wage areas than high skilled workers. This indicates that low skilled workers are willing to increase their labour supply in order to afford living in high amenity areas.

1 Introduction

Regional differences in working hours are substantial but they are largely undocumented and unexplained in the labour economics as well as in the regional economics literature. Looking for instance at the group of high skilled fulltime workers reveals that in 2010 a weekly average of 39.5 hours was worked in Plymouth, the tenth highest ranked city in this category whereas in Edinburgh the second lowest ranked working hours were 37.4 hours, more than two hours lower. For part time workers these differences are more pronounced. For instance high skilled part time workers in Oxford worked on average 18.16 hours in 2010, in Birmingham 23.06 were worked, a difference of five hours. These numbers suggest that differences in working hours between regions can be as pronounced as between countries[1].

Various explanations have been offered for explaining differences in working hours across countries. These include differences in labour market regulation, tax and welfare systems (Prescott, 2004) and cultural predilections for leisure (Alesina, Glaeser, & Sacerdote, 2005; Blanchard, 2004). All these factors are firmly grounded in the literature as explanatory variables for differences in working hours between countries. However, as these factors are determined on a national level,[2] they cannot serve to explain the remarkable differences in regional labour supply. Therefore local factors have to be considered.

Recent work that looks into labour supply adjustments on a within country scale mainly focuses on changes in working hours over time. Several studies assess the effect of newly introduced policies such as the minimum wage (Stewart, 2004; Stewart & Swaffield, 2008; Zavodny, 2000) or tax reforms (e.g. (Meghir & Phillips, 2010)). This literature ignores the spatial dimension of the phenomenon. As a result geographical differences in working hours within a country so far have received very limited attention.

This paper will focus on the link between area level real wages and labour supply. Wage levels differ substantially across regional labour markets. The average wage in London in 2011 was 38 % higher than the average wage in Liverpool. At the same time the rent for

[1]For instance in 2007 French workers worked on average 953 hours per year, UK Workers 1094 and US workers 1321 (Blundell, Bozio, & Laroque, 2011). Assuming workers work 46 weeks a year this translates into a weekly difference of three hours between France and the UK and five hours between the UK and US.

[2]Tax levels are determined on a national level and calculated on total income. In areas where costs of living are high and workers get a wage premium as compensation for the higher costs of living, taxes might actually be higher relative to areas with lower wage level and lower costs of living. This issue will be ignored in the subsequent analysis.

a two bedroom apartment in London is actually almost two and a half times the rent of a similar apartment in Liverpool[3]. These facts suggest that not only wages but also local price levels could be important factors in an individual's labour supply choice.

The following analysis is based on a regional real wage indicator which is defined as the difference of skill adjusted wages and quality adjusted house prices. Regional differences in real wages are interpreted in two different ways in the literature. Studies of the housing market usually interpret high house prices that are not offset by equally high incomes as an affordability problem (Kutty, 2005; Quigley & Raphael, 2004; Stone, 2006). This interpretation is especially relevant for moderate-income households. The regional and urban economics literature usually follows the equilibrium interpretation introduced by Rosen (1979) and Roback (1982). Their model predicts that regions characterized by low real wages must be more desirable places to live. Workers would move from low to high real wage areas if they were not compensated by a higher amenity level. Among others Gibbons et al. (2011) and Albouy (2008) provide empirical evidence for the capitalization of amenities into local wages and house prices.

This paper makes several contributions to the existing literature. First, it is the first paper that provides a detailed documentation of regional variation in working hours across Labour Market Areas in the UK. Second, it establishes a link between local real wages and working hours and provides evidence that this link can be attributed to regional differences in the amenity level. Finally, it looks at heterogeneous adjustments according to an individual's skill level to analyze possible affordability consideration.

The empirical analysis is based on a large panel data set as well as a detailed set of amenities. This allows estimating individual fixed effect models which controls for unobserved heterogeneity and therefore largely increases the quality of the results. To the best of my knowledge this paper is the first that looks into regional labour supply in Britain and which considers amenities as a driving factor of labour supply decisions.

So far only few papers in the economic literature focused on the analysis of regional labour supply. A brief documentation of regional differences for first level NUTS regions in individual working hours is provided by Dex et al. (1995) using the BHPS. Ward and Dale (1992) choose a functional unit of analysis by looking at differences in female labour supply across UK TTWAs. They find that for women spatial variation in full-time and

[3]Information for rents was taken from the website of the Valuation office Agency (http://www.voa.gov.uk).

part-time working status exist but as Kodz et al. (2003) notice there is no further analysis of these patterns in the existing literature. Commuting time is considered by Black et al. (2008) as an explanation for regional differences in labour supply in the US as it impacts labour force participation of women. Their approach contains some similarities to the one taken in this paper, however, their focus lies on the extensive margin and they explain regional differences in the employment rate whereas I focus on the intensive margin and explain differences in working hours. A notable study that provides an explanation for differences at the intensive margin is the work by Rosenthal and Strange (2008) on hours and agglomeration. They argue that highly qualified workers adjust their working hours in densely populated areas due to increased competition and present empirical evidence for this "urban rat race". For non-professional workers they find the opposite effect which is in accordance with the argument of labour sharing.

The remainder of the paper is structured as follows. Section 2 provides a detailed documentation of the spatial distribution of working hours. Descriptive evidence on working hours differentials is presented for 157 labour market areas in Britain. Section 3 describes the conceptual framework, by explaining the real wage measure and its interpretations and the mechanisms that underlie the empirical analysis. Section 4 presents the empirical strategy. The results and several robustness checks are discussed in section 5 and 6. The analysis is repeated in sections 7 which allows for worker heterogeneity. Section 8 concludes.

2 Working hours across labour market areas

Information on working hours is taken from the Annual Survey of Hours and Earnings. The data is sampled on 1 % of workers on the PAYE register and is considered as the most reliable dataset on working hours[4]. The ASHE contains information on basic working hours, overtime working hours and total working hours measured as hours per week. The results presented in this section are based on basic weekly hours rather than total working hours[5]. The ASHE contains data on paid overtime hours but not on unpaid overtime hours. As for low skilled workers it is much more common to be paid for overtime hours

[4]The responses to the survey are provided by employers who report contract hours and paid overtime working hours; employees are believed to overstate their hours worked in Labour Force surveys as time use data as well as hours reported by employers are generally lower (Blundell, et al., 2011).

[5]Total hours are calculated as basic plus overtime hours.

whereas for high skilled workers overtime tends to be unpaid (Kodz et al. 2003) basing the analysis on total working hours is likely to result in skill related bias. The empirical analysis uses data for workers aged 25 to 60.

In a first step mean working hours are calculated for all 157 LMAs[6] using the pooled dataset. The complete list of LMAs ranked according to their average working hours is given in the appendix. Working hours in North West Devon, the lowest ranked LMA, amount to 31.04 whereas residents of Rugby, a small city in central England, work on average 35.00 hours per week. For urban areas the differences are less pronounced but still remarkable. For instance working hours in Northampton (34.43) and Southend-on-Sea (32.61), two medium sized cities in England, differ by two hours per week[7]. The left map in Figure 1 shows the spatial distribution of working hours across LMAs. The highest working hours are found in central England. They generally decrease when moving closer to the coast with the exception of Cardiff and Newport. In a next step the sample is split into full and part time workers[8] as it is interesting to know whether the likelihood of being in part time employment differs across space. The right map in Figure 1 shows the share of part time workers[9] for different LMAs. Spatial differences are large, the share of part time workers ranges from 23.4 % in Newbury to 44.7 % in North West Devon. The two maps exhibit that the spatial pattern found for working hours is reversed when comparing differences in the share of part-time workers. This finding indicates that the decision to work part time largely contributes to differences in aggregate working hours. To get a more detailed picture the ASHE data is further stratified according to gender and skill levels[10]. Gender differences in the labour market are prevalent due to a variety of reasons. Skill related differences have increasingly gained attention in the urban and regional economic literature (Combes, Duranton, & Gobillon, 2008; Lee, 2010). The results for the stratified sample are presented in Table 1 which shows different percentiles of mean working hours across LMAs in Britain as well as the minimum and maximum

[6]LMAs are derived from the 2001 definition of TTWAs by the University of Newcastle. As in Gibbons et al. (2011) TTWAs with sample sizes of less than 200 workers were grouped into contiguous units.

[7]I conduct a two sample t-test with equal variance. The differences of mean working hours are highly significant with a t-value of 13.94 for rural areas and 10.78 for urban areas.

[8]Throughout the paper full time workers are defined as those that work between 35 and 80 hours per week, part time workers as those who work less than 35 hours per week.

[9]The share is derived by dividing the total number of part time workers in each LMA by the sum of part time and full time workers in the same LMA.

[10]Following the classification proposed by Elias and McKnight (2001) the standard occupational classification 2001 (SOC03) is used to derive four skill categories. I subsume skill class 1 and 2 as low skilled workers and skill class 3 and 4 as high skilled workers.

value. Comparing the difference between hours worked in the highest and lowest LMA for the different strata reveals that regional variation for full time workers amounts to two to three hours. The variation is quite similar across the different categories. Women work on average one hour less than men. Higher skilled male workers tend to work one hour less than lower male skilled workers while for female workers there is no such difference across skill classes.

Table 2 shows the results for part time workers. The first noteworthy fact in Table 2 is the much larger regional variation in working hours by part time workers in comparison to full time workers. Looking for instance at the group of high skilled female workers in urban areas gives a difference of 5.5 hours between the area where the longest and shortest hours are worked. Some of the patterns for full time workers are reversed. Working hours of high skilled workers vary much stronger than those of low skilled workers and they work on average longer hours.

3 Conceptual framework

In the traditional labour economics view two effects are at play that determine the outcome of a change in wages with respect to labour supply. An increase in the wage rate induces workers to increase their leisure time as leisure is a normal good. The income effect of the wage increase therefore reduces working hours. At the same time opportunity costs of leisure increase when workers get a higher hourly wage. This induces workers to substitute away from leisure and work longer hours. As the two effects work in opposite directions the total effect of a wage increase on working hours is unclear. The empirical analysis of labour supply demonstrated the dominance of the substitution effect for low wage rates whereas the income effect is stronger for high wage rates. This leads to a backward bending labour supply curve as seen in Figure 2. This pattern of labour supply has been widely discussed in the labour supply literature in a national context (see Blundell & MaCurdy, 1999 for a survey).

Barzel and McDonald (1973) introduced a novel argument into the discussion of labour supply decisions that focuses on working hours of low wage workers. Those who earn a very low wage and who have no other source of income than the remuneration of their labour might not be able to earn a subsistence income defined as an income just enough to secure a minimum acceptable standard of living. Starting from a wage of zero an increase in the wage rate constitutes a point where the worker is able to earn the subsistence income when he supplies the highest possible amount of labour. Given that the maximal possible amount of labour is supplied at this point a further increase of the wage rate can only decrease the workers labour supply. For very low wage rates the labour supply curve is therefore predicted to be negatively sloped. This alternative shape of the labour supply curve is depicted in Figure 2. The dashed lines s_1 and s_2 show the combination of hours and wages that are needed to reach the local subsistence level where s_2 corresponds to an area with higher costs of living.

These considerations are important for the analysis of regional labour supply. Wages as well as costs of living differ substantially across space which in the housing literature is generally seen as an affordability problem. Differences in the costs of living translate into a higher subsistence level, which is equivalent to a shift of the subsistence line to the right from s_1 to s_2 as shown in Figure 2. At each given wage rate workers have to work longer hours to meet the subsistence level up to a point where the wage rate reaches a level that makes subsistence considerations irrelevant. As a result those workers who are at the bottom of the wage distribution have to increase their working hours if regional differences in prices are not exactly offset by higher wage rates.

An alternative view on regional wage and price differentials exists in the urban and regional economic literature. Since the theoretical work by Rosen and Roback (1980) differences in real wages across space are frequently interpreted as the price of local amenities. Workers are willing to accept lower wages and pay higher rents in order to live in nice areas. This literature assumes that each worker supplies a single unit of labour and therefore rules out possible labour supply adjustments.

Amenities make an area more attractive and additionally facilitate a wide range of enjoyable leisure activities. Nice weather, scenic views, proximity to the sea or natural parks are examples of attributes that increase the livability of an area. The list can be extended by cultural and historical amenities such as museums, theatres, art galleries or historical sites and buildings and consumption amenities such as cafes, bars and restaurants, cinemas, leisure centres etc. Public goods as for example good schools and low crime rates can equally be considered as an additional category of amenities as they are largely appreciated by workers and residents.

Many of these amenities increase an individual's leisure options such as visiting a theatre performance, going to the restaurant or undertaking outdoor activities such as swimming or hiking. Living in a high amenity area guarantees a large choice of leisure activities which in turn increases an individual's utility. Therefore holding everything else equal, an individual is expected to consume more leisure in an area that offers a higher amenity level. If amenities were independent of differences in real wages they should reduce working hours in a given area.

However, in theory two identical regions that offer the same real wage but differ in their amenity level cannot exist because migration takes place from the low to the high amenity area to offset utility differentials.[11] The direct effect of amenities on working hours is therefore not separable from the average effect through differences in real wages. But if amenities and real wage differentials are in reality two sides of the same coin, as predicted by the Rosen-Roback model, they should affect working hours in the same way. To address these considerations I will in a first step regress working hours on the real wage index, which depending on the literature represents local amenities or local differences in affordability. The results will then be compared with a similar regression of working hours on amenities. The finding that the amenity and real wage coefficients bear the same sign would lend support to the spatial equilibrium model. In a second step I will look for heterogeneous affects according to a worker's skill level to separate out the affordability effect. An affordability effect should only be detected for low skilled workers as wages of high skilled workers are sufficiently high to make subsistence considerations irrelevant.

3.1 Real Earnings measure

The real earnings measure that I base my analysis on was calculated by Gibbons, Overman and Resende (2011). Using the Annual Survey of Hours and Earnings and housing transactions data from the Nationwide Building Society they calculate real earnings differentials as earnings minus housing costs. To account for differences in skill levels earnings

[11] The extent of the migration flows depends on the elasticity of housing supply. In the case of completely inelastic housing supply a positive amenity shock will be absorbed in higher house prices until equilibrium is reached across space. In the case of completely elastic housing supply more people will move to the area, which increases regional labour supply and exerts downward pressure on wages until spatial equilibrium is reached. An area with a higher amenity level would therefore have higher costs of living, lower wages or most likely a mix of both.

are regressed on an individual fixed effect and an area fixed effect. The estimates are then used to predict earnings for an individual with the mean national characteristics across 157 LMAs in Britain. A similar procedure is used to account for differences in housing characteristics. The housing transaction price is regressed on a set of housing characteristics and an area fixed effect and the estimates are used to predict the prices across areas for a house with national mean characteristics. The (demeaned) index calculated in this way varies between -2.16 and 3.26 suggesting that the average worker who lives in a house with the average national characteristics could increase his real wage by up to £5420 per year by moving from the lowest to the highest real wage labour market area[12]. Under the spatial equilibrium assumption differences in real wages must be offset by local amenity levels otherwise workers would move to areas that offer a higher utility level. In this view the index reflects the willingness to pay for local amenities. The maximum value of 3.26 means that in comparison to the average LMA a worker is willing to pay £3260 in form of higher rents and lower wages to live in the particular area. Similarly the minimum value of -2.16 means that a worker has to receive £2160 in form of lower rents and higher wages to be indifferent between living in the least attractive rather than the average LMA.

4 Empirical Strategy

The cleaned dataset includes more than 1.8 million observations for 284,221 individuals. Between 1997 and 2011 I count 186,688 moves and 104,600 movers. In a first step a regression of type (1) is estimated using OLS.

$$ln(h_{ir}) = \beta_1 I_r^{re} + x'_{ir}\gamma + y'_{ir}\delta + \epsilon_{ir} \tag{1}$$

The log of working hours h of individual i in region r is explained by the region's real wage index I^{re}, a vector of personal characteristics x_{ir} such as age, age^2, gender and occupation and a vector of structural characteristics of the industry y_{ir} the worker works in such as industry type, a public sector dummy, firm size and a collective agreement dummy. γ and δ are vectors containing the marginal effects of the personal and industry

[12] Gibbons et al. (2011) present several real earnings measures that rely on slightly different assumptions. The measures are strongly correlated with each other. In my paper I rely on the measure they chose as their most preferred estimate

characteristics and ϵ_{ir} denotes the error term.

The estimation of this equation has several problems. First, results are likely to be biased due to unobserved heterogeneity. Workers differ in their propensity to work long hours as well as in many other factors that influence their labour supply decisions. Bias might arise from the endogeneity of working hours and wages. Unobserved preferences for working hours might well be correlated with unobserved factors that determine productivity. The second problem emerges from the canonical labour supply model which assumes that workers are free to choose their desired working hours. An alternative view which is common in the labour economics literature is that jobs consist of fixed hours-wage packages (Manning, 2001; Sousa-Poza & Ziegler, 2003). This captures the idea that in reality workers face constraints in the choice of their working hours. External shocks to the labour market are therefore unlikely to trigger immediate adjustments in working hours. In this setting actual hours of work do not correspond to desired hours of work leading to inconsistencies in the estimation.

To address these problems I include an individual fixed effect as well as time dummies in the regression. In the FE model the error term is decomposed into a time invariant individual fixed effect μ_i and a time varying error term ϵ_{irt}.

$$ln(h_{irt}) = \beta_1 I_r^{re} + x'_{irt}\gamma + y'_{irt}\delta + \mu_i + \tau_t + \epsilon_{irt} \tag{2}$$

The individual fixed effect captures all permanent unobserved heterogeneity of workers such as for example differences in general attitudes or tastes towards working long hours. The fixed effects also capture variables that are not in the data set such as being married or the number of children if they do not change during the period of observation. The inclusion of time dummies τ_t reduces further bias as it controls for general macro-economic shocks that can influence working hours such as for example a change in the tax system or national welfare program.

This empirical specification addresses the problem of fixed hours wage packages as it relies on individuals that move across LMAs and therefore on job changers. Prior research has shown that most adjustments in working hours after an economic shock occur through job changes (Altonji & Paxson, 1990; Blundell, Brewer, & Francesconi, 2008) as opposed to adjustments within the same job. Workers changing their job can choose a wage hour package that reflects their preferences on working hours. In this setting it is quite likely that actual hours correspond to desired working hours. The problem of endogeneity between hours and wages arises in all labour supply studies. I follow the approach taken in Rosenthal and Strange (2008) who adopt a reduced form approach to control for wage rates. Wage rates are not directly included as an explanatory variable to avoid reversed causality bias. Instead individual fixed effects as well as the set of personal characteristics are used as a proxy for market wage[13]. Fixed effects capture the time invariant part of an individual's wage such as different unobserved abilities and job preferences. However, they do not capture the part of the wage that varies when individuals move across LMAs. A mover faces a different wage level in his destination as well as a different price level. These level differences are reflected in the real wage index. The time invariant part of wages is thus captured in the fixed effect and the time variant part is captured by the real wage index. This holds for sure for the representative individual that is used to calculate the index. Under the assumption that movers who come from the same origin and move to the same destination undergo the same change in real wages it equally holds for all other individuals.

$$ln(h_{irt}) = a'\beta + x'_{irt}\gamma + y'_{irt}\delta + \mu_i + \tau_t + \epsilon_{irt} \tag{3}$$

Finally, in equation (3) the real wage index I^{re} is replaced by a set of amenities denoted as vector a; β denotes a vector of the amenity coefficients. I use a set of physical amenities, namely sunshine duration, rainfall, wind speed, coastal length and the difference in the lowest and highest elevation within a LMA as a proxy for mountains.

Measuring all attributes people value about an area is difficult. The beauty of a landscape or a public place in the city is very difficult to quantify and the list of amenities that impact the attractiveness of an area is arbitrarily long. As a consequence estimates might be biased due to omitted variables or measurement error. Furthermore, many of the amenities are highly correlated with each other which raises concerns about multicollinearity.

Using only natural amenities reduces these concerns. First physical variables are objectively measurable and therefore less prone to measurement error than for example a scenic view. Second, they are exogenous to working hours contrarily to cultural and con-

[13]Rosenthal and Strange rely on education dummies and personal characteristics to proxy for wages. Due to the panel structure of my data I am able to include individual fixed effects which further reduce possible bias.

sumption amenities which are quite likely to be endogenous. If for instance employees in the cultural sector tend to work long hours an area offering a high level of cultural amenities would have longer working hours. This would bias the estimated coefficients upwards. Multicollinearity concerns remain even when using natural amenities, as for instance rain fall is much higher in mountainous regions.

As a novel variable I introduce wind speed in the analysis which is not usually included in the literature. For Britain's geographic position wind is expected to be a disamenity. Coastal regions in Britain are exposed to strong winds from the Atlantic sea and especially in high latitudes and on the westerly facing coast these winds can reach very high speeds. A wind chill factor is therefore likely to be important in the case of Britain.

5 Results

Equations (1) and (2) are implemented using the real wage index I^{re} as explanatory variable of interest and controlling for standard labour supply variables such as age, age^2, gender and occupation as well as structural characteristics of the industry namely a public sector dummy, firm size and a collective agreement dummy. Additionally, 60 two digit industry fixed effects are included. Working hours in sectors such as construction and transport tend to be particularly high (Dex, et al., 1995; Kodz, et al., 2003). As industries are not equally distributed across LMAs not controlling for these differences would bias the estimated results.

Table 3 shows the estimation results. The first two columns are estimated via OLS regression, columns (3), (4) and (5) include individual fixed effects. The upper rows of the table show results for the whole sample. The simple OLS without controls in column (1) estimates a coefficient of 0.0424 for the real wage index. The inclusion of the set of control variables in column (2) reduces the coefficient; both coefficients are insignificant. The inclusion of individual fixed in column (3) estimates a coefficient of 0.0305 which is highly significant and remains stable when the control set is included in column (4) and industry fixed effects are added in column (5). This suggests that OLS results are biased downwards due to unobserved heterogeneity. The coefficient of 0.00329 in column (4) means that a worker who moves from the LMA with the highest real earnings to the LMA with the lowest real earnings increases his working hours by 1.8 %. Assuming the worker works 40 hours per week this translates into a difference of 43 minutes per week. In a next step I allow for the possibility that full time workers adjust their hours in a different manner to a change in real wages than part time workers. The middle rows show regression results where a part time dummy and an interaction of the part time dummy with the real wage index are included as control variables. The middle rows indicate that the overall positive effect of real wages on working hours comes through the working time adjustments of part time workers. The coefficient for full time workers remains positive but is insignificant. The coefficient for part time workers on the other hand is highly significant and around twice as high as the coefficient without allowing for interaction. This result can be interpreted in two ways. Either part time workers increase their working time while remaining on a part time basis or they change into a full time position when moving across LMAs. Results presented in the lower rows of the table show that the latter is the case. When a part time indicator is used as dependent variable instead of working hours the real wage coefficient becomes negative in all five specifications. Taking the average LMA where 33 % of workers are in a part time position the coefficient of 0.00303 means that this share would increase by 1 % if real wages increased by £1000 in this area.

The results from the fixed effect regressions imply that in total workers tend to work longer hours in low real wage LMAs. If differences in the amenity level were the driving factor of the relation between real wages and working hours it should be possible to replicate the result by directly including a set of amenities. In such a regression it is expected that amenities are signed in the same way at the real wage index, so they are expected to increase working hours whereas disamenities are expected to reduce working hours.

Column (1) and (2) in Table 4 show the results of regression (3) where the real earnings index is substituted with the amenity set. Column (1) includes the full set of control variables, column (2) includes all controls apart from industry fixed effects. Sunshine, presence of mountains and coastal length which are important natural amenities are positively signed whereas rainfall and wind speed which are disamenities are negatively signed[14]. All coefficients apart from the coast length coefficient are highly significant. Proximity to the coast is an important factor in hedonic wage regression when US data is

[14]The importance of wind speed as a disamenity is confirmed by the fact that the coastal length becomes negative and highly significant when wind speed is omitted in the amenity regression.

used. However, the distance between east and west coast in the US is c. 4500 km, whereas in Britain the sea can be reached in less than 100 km from any given point. Direct access to the sea or coastal length of a LMA might therefore be less important in the case of Britain. The exclusion of industry fixed effects makes little difference, sunshine and wind speed remain significant to a level of 1 %, rainfall and elevation are significant to a level of 5 %. The results show a significant correlation between natural amenities and working hours. Amenities are signed in the same way as the real wage index whereas disamenities are signed in the opposite way. This suggests that amenities influence working hours by lowering regional real wages.

6 Robustness checks

I estimate several alternative specifications to assess the robustness of the positive relation between the real wage index and working hours as well as between amenities and working hours. Table 5 presents amended regressions of working hours on the real wage index. The first row presents results when a distance variable is included that measures the distance between home and work post code of each individual. In theoretical papers it is often assumed that commuting distance reduces working hours, though Gutiérrez-i-Puigarnau and Van Ommeren (2010) cannot empirically confirm this result. Controlling for commuting considerably reduces the sample size as the home postcode is only provided after 2001 in the ASHE. I derive a proxy for commuting distance by calculating the geographical distance between the two postcodes. Additionally, the distance variable is interacted with gender. Black et al. (2010) found that female workers are more sensitive to commuting time as male workers when making labour participation decision. The results in column 3 show that living far away from work actually increases overall working hours. The coefficient is highly significant, though very small in absolute terms. The interaction term for gender and commuting distance is not significant. The results contradict the findings of Black et al. (2010) but are in line with those of Gutiérrez-i-Puigarnau and Van Ommeren (2010) who found that high commuting costs can induce longer working hours. The inclusion of commuting distance makes little difference to the magnitude of the effect of the real wage index which remains highly significant and increases slightly to 0.0042.

Column (2) shows the regression results where a dummy for those individuals that move to lower real wage areas and its interaction with the real wage index are included as further controls. Again the real wage coefficient changes only little to 0.00535 and remains highly significant. The interaction term is not significant, which indicates that individuals that move to higher real wage areas do not alter their working hours in a different way than those moving to lower real wage areas. Those individuals who move to lower real wage areas work significantly less in the original area as shown by the negative coefficient of the dummy. This is intuitive given that working hours were found to be lower in high real wage areas.

Column (3) looks at heterogeneous effects for rural and urban areas. The positive and significant effect between the real wage index and working hours is due to adjustments by workers moving from rural to urban or among urban areas. For workers moving to rural areas or between rural areas the effect of real wages on working hours is insignificant. A possible reason might be that empirically real wages in rural areas tend to be lowest in those areas that offer the lowest wage rates whereas real wages in urban areas are lowest in those areas that offer the highest wage rates[15].

Rosenthal and Strange (2008) found evidence for longer working hours in dense urban areas because of increased competition between high skilled workers. I therefore control for population density and an interaction of population density and skill level in column (4). As in Rosenthal and Strange (2008) I find a positive relation between working hours and population density. Contrarily to their finding, however, this effect is stronger for low skilled workers than for high skilled workers. In the US high skilled workers tend to work longer hours than low skilled workers whereas it is the other way around in the UK (Blundell, et al., 2011). The different result is therefore likely to be due to cross country differences in working hour patterns. The inclusion of these controls decreases the overall magnitude of the real wage coefficient but it remains highly significant.

As a final check workers moving from and to London are excluded from the sample which account for 10.7 % of the total number of moves. Regression results are presented in column (5). London moves seem to play an important role when considering the absolute effect of the real wage index on working hours. Without workers moving from and to

[15]Gibbons, Overman and Resende (2011) find a negative relation between house prices and wages for rural areas and a positive relation for urban areas. This might indicate that rural amenities benefit residents rather than firms as they offer no productivity advantage whereas urban amenities benefit both, residents and firms

London the real wage coefficient is very close to zero.

Robustness checks for the direct inclusion of a set of amenities follow a similar pattern. Column (3) in Table 4 shows that several of the amenities lose their significance when London moves are excluded. For better readability the sample is split into urban and rural areas instead of including an interaction term. Amenities are highly significant for urban areas as shown in column (4) whereas none of the amenities is significant in the rural sample regression in column (5). Column (6) shows results where commuting time is considered as an explanatory variable. This decreases the number of significant amenities which is probably due to the decreased sample size as the formerly significant coefficients are signed in the same way and remain of similar magnitude.

7 Effects for different skill levels

The results presented in Table 3 and Table 4 showed that working hours are higher in low real wage areas. This result could be replicated by including a set of physical amenities which indicates that differences in real wages reflect differences in the regional amenity level. Given that amenities increase the number of leisure options this result is rather surprising. The fact that amenities underlie the observed differences in real earnings does, however, not rule out possible affordability implications. The next question is whether high wage workers react in a similar way to differences in the real wage indicator as low wages workers. Instead of classifying the sample according to different wage levels I proxy for these differences by using different skill categories to avoid endogeneity issues between wages and working hours. As shown in Figure 2 high costs of living increase the regional subsistence level, i.e. for each given wage level workers have to work longer hours in order to meet the minimum acceptable living standard. If the regional wage level is low a relatively larger share of workers is in proximity to the subsistence threshold. These considerations only matter for low paid workers. The identified positive effect of the real wage index on working hours is therefore expected to be stronger for low skilled workers. Equation 4 is augmented by an interaction term of the real earnings index with different skill categories[16]. Interactions with age, age squared, gender, sector type (public/private) and an urban dummy are included as additional controls. The additional interactions rule

[16]The skill groups where derive from the occupation classification using the method proposed by (Elias & McKnight, 2001).

out the possibility that the skill interaction term captures an effect that is related to one of the other control variables.

$$ln(h_{irt}) = \beta_1 I_r^{re} + I_r^{re} * z'_{irt}\alpha + x'_{irt}\gamma + y'_{irt}\delta + \mu_i + \tau_t + \epsilon_{irt} \quad (4)$$

Table 6 shows the FE regression results of equation 4 as well as several robustness checks where interaction terms and the full set of control variables are included as explanatory variables. Column (1) shows the results without the inclusion of occupation fixed effects as the SOC was used to derive the skill categories. The comparison with column (2) reveals that no important information is lost through the aggregation of the 60 occupation fixed effects to two skill levels as the coefficients are similar in column (1) and (2).

The interpretation of the real wage coefficient differs when interaction terms are included. The coefficient of -0.00269 in column one means that a male high skilled worker who works in the private sector lives in a rural LMA and is of mean national age works 0.27 % less when the real wage index increases by one. The interaction term is positive and highly significant which means that high and low skilled workers react differently to regional variation in the real wage index. Low skilled workers work significantly longer hours in low real wage areas than high skilled workers. This result is robust to the exclusion of workers moving from and to London. The interaction term in column (3) remains positive and highly significant and increases slightly to 0.00452 for workers outside London. The inclusion of controls for commuting distance in column (4) leads to an estimated coefficient of 0.00478.

The sum of the real wage and interaction coefficient shows the absolute size of the effect of a change in real wages on working hours of low skilled workers. The absolute effect is positive in all four specifications, though for rural workers it only significant in some cases. For high skilled workers the absolute size of the real wage coefficient varies according to the specific subgroups. In column (1) and (2) the overall effect is negative for rural private sector workers and close to zero for urban private sector workers. Public sector workers tend to work longer hours in high amenity places, though the effect vanishes once London observations are excluded. A possible reason is the large share of public sector workers working for the national government in London. Table 6 provides evidence that the overall positive effect of the real wage index on working hours is due to labour supply adjustments of low skilled workers.

The findings indicate that affordability considerations play a role when low skilled workers decide to locate in low real wage areas. As the empirical analysis is based on movers mobility frictions cannot account as a possible explanation for this result. The spatial equilibrium assumption is most likely to hold for those workers that move across different labour market areas. This article found evidence that low real wages reflect a high local level of amenities. The fact that high and low skilled workers react differently to a change in their real wage levels might therefore indicate an amenity preference bias between high and low skilled workers. Low skilled workers are willing to work longer hours in order to live in high amenity areas.

8 Conclusion

This paper documents and explains labour supply decisions in a regional context. Using data on working hours from the Annual Survey of Hours and Earnings between 1997 and 2011 it provides first descriptive evidence for differences in working hours across labour market areas in Britain. The paper is one of very few that proposes mechanism to explain these patterns. In particular it is the first to establish a link between working hours, the regional real wage level measured as wages minus housing costs and the regional amenity level.

The results show that the overall effect of real wages on working hours is positive. This effect is mostly due to labour supply decisions by low skilled workers. In a spatial equilibrium framework the real wage index can be interpreted as an indicator for the regional amenity level. When I include a set of amenities in the regression I find that amenities have a positive effect on working hours whereas disamenities reduce working hours. Amenities and real earnings affect working hours in the same way which is in line with the interpretation of the real wage index as an index for the regional amenity level.

High skilled and low skilled workers show significant difference in their labour supply adjustments when moving across Labour Market Areas. The estimate for this difference ranges from 0.3 % to 0.5 % which means that low skilled workers increase their working hours by 0.3 - 0.5 percentage points more than high skilled workers when the real wage level decreases by £ 1000.

As the analysis is based on movers differences in mobility frictions cannot explain this result. An alternative explanation is a skill related preference bias for amenities. Whereas high skilled workers pay for amenities in monetary terms only, low skilled workers who have generally lower incomes also pay by reducing their leisure time. It could be the case that high skilled workers put greater emphasis on amenities that increase their leisure choice whereas low skilled workers have stronger preferences for amenities such as employment accessibility or low crime rates[17]. The availability of stated preference data would help to get a closer insight into skill related amenity preferences and further analyses of differences in the willingness to pay for amenities for different skill groups would equally be insightful. As different skill types compete in different labour markets the analysis of their amenity preferences is an interesting research venue.

[17] Albouy 2011 for instance finds that high-school educated households have a greater aversion to property crime than the college educated who in turn have a higher evaluation of cultural amenities

9 Literature

Albouy, D. (2008). Are Big cities really Bad Places to live? Improving quality of life estimates across cities. Ann Arbor, 1001, 48109-41220.

Alesina, A., Glaeser, E., & Sacerdote, B. (2005). Why do Americans work so hard? Public Policy Research, 12(3), 148-157.

Altonji, J. G., & Paxson, C. H. (1990). Labor supply, hours constraints and job mobility: National Bureau of Economic Research.

Barzel, Y., & McDonald, R. J. (1973). Assets, subsistence, and the supply curve of labor. The American economic review, 63(4), 621-633.

Black, D., Kolesnikova, N., & Taylor, L. (2008). Why do so few women work in New York (and so many in Minneapolis)? Labor supply of married women across US cities. FRB of St. Louis Working Paper No.

Blanchard, O. (2004). The Economic Future of Europe. Journal of Economic Perspectives, 18(4), 3-26.

Blundell, R., Bozio, A., & Laroque, G. (2011). Extensive and intensive margins of labour supply: working hours in the US, UK and France. Available at SSRN 1951342(6051).

Blundell, Richard and Thomas MaCurdy. 1999. Labor supply: A review of alternative approaches. In: Orley C. Aschenfelter and David Card, eds. Handbook of Labor Economics Vol 3C: 1563-1572.

Blundell, R., Brewer, M., & Francesconi, M. (2008). Job changes and hours changes: understanding the path of labor supply adjustment. Journal of Labor Economics, 26(3), 421-453.

Combes, P. P., Duranton, G., & Gobillon, L. (2008). Spatial wage disparities: Sorting matters! Journal of Urban Economics, 63(2), 723-742.

Dessing, M. (2002). Labor supply, the family and poverty: the S-shaped labor supply curve. Journal of Economic Behavior & Organization, 49(4), 433-458.

Dex, S., Clark, A., Taylor, M., & Britain, G. (1995). Household labour supply: Employment Department.

Elias, P., & McKnight, A. (2001). Skill measurement in official statistics: recent developments in the UK and the rest of Europe. Oxford Economic Papers, 53(3), 508-540.

Gibbons, S., Overman, H. G., & Resende, G. M. (2011). Real Earnings Disparities in Britain: Spatial Economics Research Centre, LSE.

Gutiérrez-i-Puigarnau, E., & Van Ommeren, J. N. (2010). Labour supply and commuting. Journal of Urban Economics, 68(1), 82-89.

Kodz, J., Davis, S., Lain, D., Strebler, M., Rick, J., Bates, P., et al. (2003). Working long hours: a review of the evidence. Volume 1 - Main report. Employment Relations Research Series(16).

Kutty, N. K. (2005). A new measure of housing affordability: Estimates and analytical results. Housing policy debate, 16(1), 113-142.

Lee, S. (2010). Ability sorting and consumer city. Journal of Urban Economics, 68(1), 20-33.

Manning, A. (2001). Labour supply, search and taxes. Journal of Public Economics, 80(3), 409-434.

Meghir, C., & Phillips, D. (2010). Labour supply and taxes in J. Mirrlees (Chair) Dimensions of tax design. The Mirrlees Review: Oxford: Oxford University Press.

Prescott, E. C. (2004). Why do Americans work so much more than Europeans? National Bureau of Economic Research.

Quigley, J. M., & Raphael, S. (2004). Is housing unaffordable? Why isn't it more affordable? The Journal of Economic Perspectives, 18(1), 191-214.

Roback, J. (1982). Wages, rents, and the quality of life. The Journal of Political Economy, 1257-1278.

Rosen, S. (1979). Wage-based indexes of urban quality of life. Current issues in urban economics, 3.

Rosenthal, S. S., & Strange, W. C. (2008). Agglomeration and hours worked. The Review of Economics and Statistics, 90(1), 105-118.

Sousa-Poza, A., & Ziegler, A. (2003). Asymmetric information about workers' productivity as a cause for inefficient long working hours. Labour Economics, 10(6), 727-747.

Stewart, M. B. (2004). The employment effects of the national minimum wage. The Economic Journal, 114(494), C110-C116.

Stewart, M. B., & Swaffield, J. K. (2008). The Other Margin: Do Minimum Wages Cause Working Hours Adjustments for Low-Wage Workers? Economica, 75(297), 148-167.

Stone, M. E. (2006). What is housing affordability? The case for the residual income approach. Housing policy debate, 17(1), 151-184.

Ward, C., & Dale, A. (1992). Geographical Variation in Female Labour Force Participation: An Application of Multilevel Modelling. Regional Studies, 26(3), 243-255.

Zavodny, M. (2000). The effect of the minimum wage on employment and hours. Labour Economics, 7(6), 729-750.

Table 1: *Basic weekly working hours for full time workers*

female	urban		rural		male	urban		rural	
	high	low	high	low		high	low	high	low
min	36.25	36.96	36.76	37.18		37.74	38.50	38.01	38.55
10 %	37.38	37.42	37.21	37.60		38.25	39.00	38.36	39.24
25 %	37.59	37.63	37.62	37.78		38.39	39.34	38.74	39.43
50 %	37.70	37.83	37.90	37.98		38.68	39.69	39.07	39.75
75 %	37.83	37.97	38.13	38.20		38.84	39.93	39.33	40.25
90 %	37.96	38.09	38.41	38.39		39.17	40.32	39.62	40.52
max	38.21	38.24	38.78	38.61		39.98	41.32	39.93	41.62

Table 2: *Basic weekly working hours for part time workers*

female	urban		rural		male	urban		rural	
	high	low	high	low		high	low	high	low
min	21.28	19.24	20.97	18.63		21.68	21.83	20.78	19.99
10 %	23.14	19.92	22.59	19.82		25.12	22.68	23.64	21.29
25 %	23.81	20.34	23.53	20.27		26.36	23.48	24.64	22.71
50 %	24.59	20.77	24.30	20.80		27.33	24.13	26.43	23.62
75 %	25.15	21.28	25.24	21.25		27.95	24.83	27.59	24.91
90 %	25.81	20.08	25.74	21.86		29.03	25.77	28.61	25.72
max	26.74	22.96	27.38	23.03		30.05	27.08	30.86	26.82

Table 3: *Regressions of working hours and part time indicator on the real wage Index*

	(1) OLS I ln(h)	(2) OLS II ln(h)	(3) FE I ln(h)	(4) FE II ln(h)	(5) With sic dummies ln(h)
			All workers		
I^{re}	0.00424	0.000919	0.00305***	0.00287***	0.00329***
	(0.00336)	(0.00257)	(0.000456)	(0.000452)	(0.000451)
Obs.	1,851,758	1,835,588	1,851,758	1,835,951	1,835,588
R-squared	0	0.236	0.692	0.703	0.705
			Full time / part time interaction		
I^{re}	-0.00181**	-0.00114	-0.000655*	0.000452	0.000572
	(0.000837)	(0.00108)	(0.000351)	(0.000354)	(0.000354)
pt*I^{re}	0.00137	-0.00226	0.00644***	0.00563***	0.00548***
	(0.00877)	(0.00814)	(0.0006)	(0.000591)	(0.000589)
Obs.	1,851,758	1,835,588	1,851,758	1,835,951	1,835,588
R-squared	0.483	0.515	0.776	0.782	0.782
			Part time dummy as independent variable		
I^{re}	-0.00904***	-0.00476**	-0.00463***	-0.00228***	-0.00303***
	(0.00275)	(0.00207)	(0.000495)	(0.000483)	(0.000482)
Obs.	1,851,758	1,835,588	1,851,758	1,835,951	1,835,588
R-squared	0.001	0.322	0.685	0.699	0.7
Controls	NO	YES	NO	YES	YES

Robust standard errors in parentheses. Significance levels *: 10% **: 5% ***: 1%

Table 4: *Regressions of working hours on natural amenities*

VARIABLES	(1) FE II ln(h)	(2) no sic ln(h)	(3) no London ln(h)	(4) urban ln(h)	(5) rural ln(h)	(6) commuting ln(h)
sunshine	0.00397***	0.00354***	0.00176	0.00372***	0.00315	0.00322
	(0.00119)	(0.00119)	(0.00138)	(0.00141)	(0.00511)	(0.00234)
rain	-0.00304***	-0.00269**	-0.000279	-0.00326***	0.00359	-0.00166
	(0.00107)	(0.00108)	(0.00119)	(0.00126)	(0.00436)	(0.00189)
elevation	0.00377***	0.00340**	0.000183	0.00767***	-0.00223	0.00159
	(0.00137)	(0.00137)	(0.00148)	(0.00181)	(0.00527)	(0.00231)
coast length	0.000558	0.000196	-0.000249	0.00192	-0.00252	-0.000496
	(0.000994)	(0.000999)	(0.0011)	(0.00123)	(0.00392)	(0.00157)
wind speed	-0.00536***	-0.00505***	-0.00384***	-0.00547***	-0.00519	-0.00538***
	(0.00113)	(0.00114)	(0.00121)	(0.00144)	(0.00421)	(0.00186)
dist						7.01e-08***
						(2.42E-08)
female*dist						3.16E-08
						(5.11E-08)
Observations	1,835,588	1,835,951	1,545,122	1,467,862	368,089	1,166,932
R-squared	0.705	0.703	0.709	0.713	0.751	0.76
Controls	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses. All amenity variables are standardized around their mean. Significance levels *: 10% **: 5% ***: 1%

Table 5: *Robustness checks for the real wage index*

VARIABLES	(1) commuting ln(h)	(2) Move down ln(h)	(3) urban-rural ln(h)	(4) density ln(h)	(5) no London ln(h)
I^{re}	0.00420***	0.00535***	-0.000652	0.00127**	-6.25E-05
	(0.000872)	(0.000481)	(0.00123)	(0.000495)	(0.000705)
dist	7.25e-08***				
	(2.40E-08)				
female*dist	1.00E-08				
	(5.09E-08)				
$move_{down}$*I^{re}		-0.000281			
		(0.000733)			
$move_{down}$		-0.0162***			
		(0.00141)			
urban*I^{re}			0.00440***		
			(0.00125)		
lowskill*popden				0.00222***	
				(0.000835)	
popden				0.00656***	
				(0.000787)	
Observations	1166575	1835588	1835588	1835588	1544812
R-squared	0.761	0.705	0.705	0.705	0.711
Controls	YES	YES	YES	YES	YES

Robust standard errors in parentheses. Significance levels *: 10% **: 5% ***: 1%

Table 6: *Regressions of working hours on real wage Index with interaction terms*

VARIABLES	(1) FE II ln(h)	(2) with occ ln(h)	(3) no London ln(h)	(4) commuting ln(h)
I^{re}	-0.00269*	-0.00261*	-0.00148	-0.000670
	(0.00151)	(0.00149)	(0.00163)	(0.00242)
low skill*I^{re}	0.00319***	0.00533***	0.00452**	0.00478**
	(0.00119)	(0.00119)	(0.00190)	(0.00230)
dist				4.26e-08
				(2.73e-08)
female*dist				-1.11e-07*
				(6.32e-08)
I^{re}*age	-0.00249***	-0.00236***	-0.00212***	-0.00218***
	(0.000233)	(0.000231)	(0.000391)	(0.000369)
$I^{re}*age^2$	2.51e-05***	2.37e-05***	2.02e-05***	2.38e-05***
	(2.74e-06)	(2.72e-06)	(4.54e-06)	(4.32e-06)
pubsec*I^{re}	0.00471***	0.00395***	0.00119	0.00366**
	(0.00117)	(0.00114)	(0.00195)	(0.00175)
female*I^{re}	-0.00126	-0.00164	-0.00211	0.00622***
	(0.00120)	(0.00120)	(0.00202)	(0.00225)
urban*I^{re}	0.00342**	0.00320**	0.000841	-0.000517
	(0.00150)	(0.00148)	(0.00168)	(0.00231)
Observations	1,365,126	1,365,126	1,144,889	857,42
R-squared	0.738	0.744	0.743	0.787
Controls	YES	YES	YES	YES

Robust standard errors in parentheses. age and age^2 are demeaned variables. Significance levels *: 10% **: 5% ***: 1%

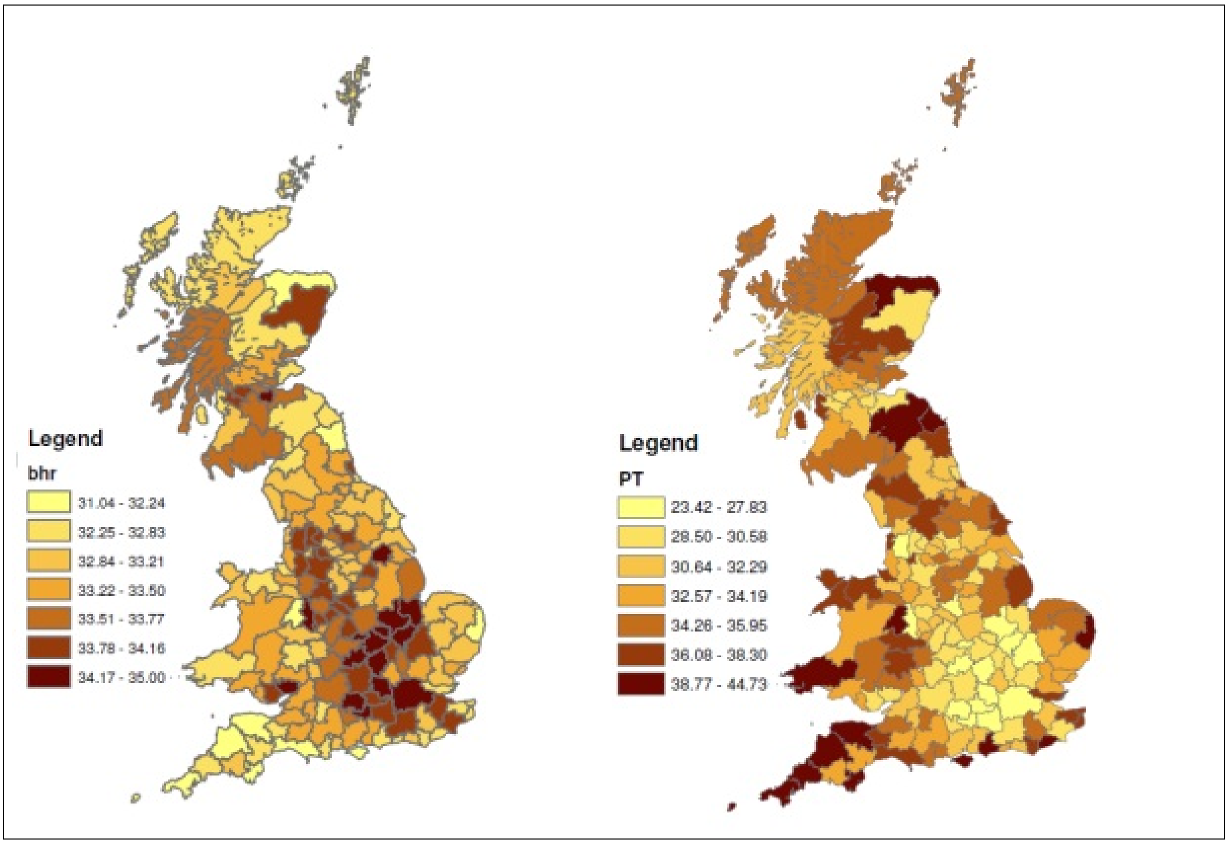

Figure 1: *Basic weekly working hours and share of part time workers in percentage points for 157 LMAs.*

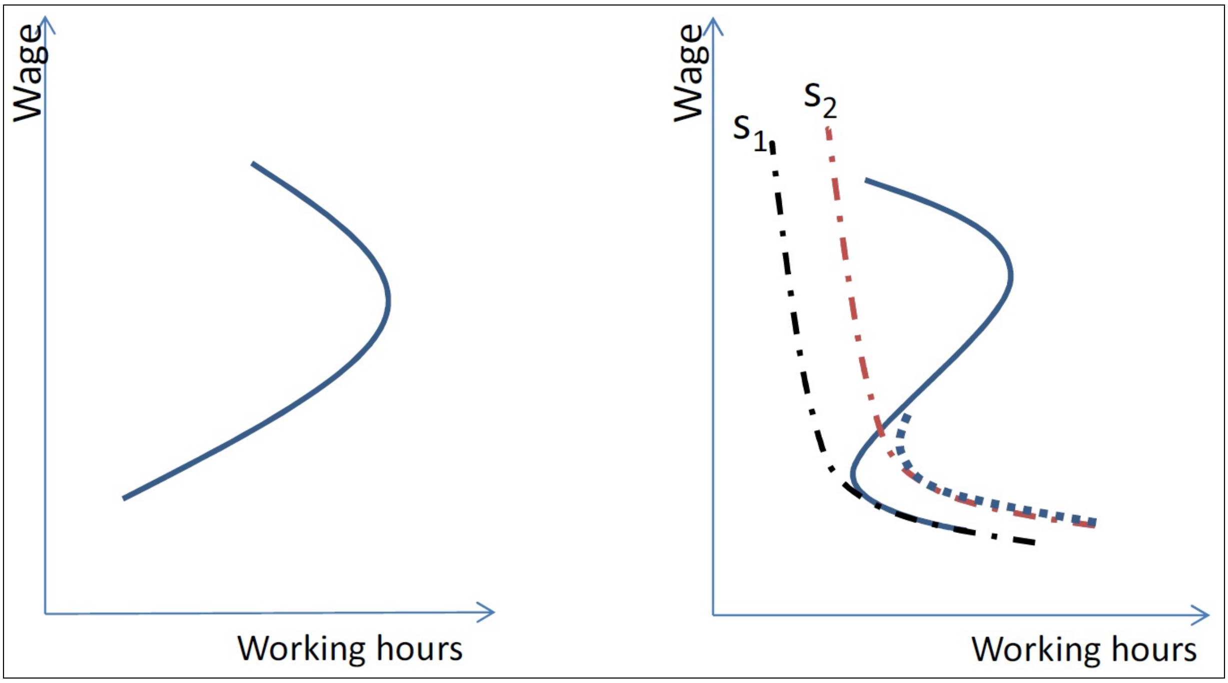

Figure 2: *Backward bending and S - shaped labour supply curve.*

Table 7: *Mean working hours in 157 Labour Market areas.*

Rank	Labour Market Area	ln(h)	N
1	Rugby	35	2782
2	Newbury	34.81	4821
3	Huntingdon	34.47	5214
4	Wycombe & Slough	34.44	16775
5	Northampton & Wellingbrgh	34.42	14632
6	Scunthorpe	34.38	4536
7	Kettering & Corby	34.36	5078
8	Basingstoke	34.34	5632
9	Norfolk, Linolnshire Fens	34.33	4146
10	London	34.3	297800
11	Milton Keynes & Aylesbury	34.29	15736
12	Telford & Bridgnorth	34.29	7554
13	Banbury	34.25	3435
14	Livingston & Bathgate	34.23	5597
15	Peterborough	34.21	11210
16	Newport & Cwmbran	34.19	10391
17	Worksop & Retford	34.16	3509
18	Preston	34.14	14309
19	Derby	34.12	13879
20	Blackburn	34.08	8067
21	Crawley	34.08	17832
22	Stoke-on-Trent	34.07	15418
23	Coventry	33.98	18840
24	Wolverhampton	33.97	11221
25	Sunderland	33.97	11298
26	Warrington & Wigan	33.97	24681
27	Maidstone & North Kent	33.96	16152
28	Cambridge	33.95	14991
29	Walsall & Cannock	33.93	10068
30	Burnley, Nelson & Colne	33.9	4555
31	Reading & Bracknell	33.89	18786
32	Leeds	33.89	34838
33	Manchester	33.88	64402
34	Guildford & Aldershot	33.87	24255
35	Glasgow	33.87	40916
36	Aberdeen	33.86	14243
37	Cardiff	33.85	23633
38	Bedford	33.85	6803
39	Oxford	33.85	16450
40	W. Kent, Ashford & Folkstn	33.84	5628
41	Burton upon Trent	33.81	5131
42	Rochdale & Oldham	33.81	10860
43	Birmingham	33.77	53672
44	Stafford	33.75	4535
45	Andover	33.74	2493
46	Stevenage	33.74	11921
47	Edinburgh	33.71	26424
48	Warwick & Stratford	33.71	8463
49	Dundee	33.68	7265
50	Lanarkshire	33.68	14307
51	Crewe & Northwich	33.67	8156
52	Cheltenham & Evesham	33.65	7584
53	Mansfield	33.64	9405
54	Wakefield & Castleford	33.63	11327
55	Leicester	33.61	27276
56	Swindon	33.6	16579
57	West Lincolnshire	33.59	4678
58	Bradford	33.58	15821
59	North Solway Firth	33.56	3758
60	Western Highlands	33.56	3765
61	Falkirk	33.55	4497
62	Dunfermline	33.52	3535
63	Chester & Flint	33.5	9638
64	Darlington	33.49	3688
65	Doncaster	33.48	7946
66	Harlow & Bishop's Stortford	33.47	9498
67	Salis-, Shaftesbury, Blndfrd	33.46	5699
68	Bristol	33.45	34009
69	Luton & Watford	33.45	21411
70	York	33.44	10207
71	Swansea Bay	33.43	12811
72	E. Somerset, Bridgwtr, Wells	33.43	4606
73	Mid North East England	33.43	5298
74	Perth & Blairgowrie	33.41	4153
75	Newcastle & Durham	33.4	38089
76	Clacton & Colchester	33.4	7555
77	Bridgend	33.39	4593
78	Lancaster & Morecambe	33.39	3669
79	Kendal	33.36	2517
80	Mid Wales	33.36	4425
81	Stirling & Alloa	33.33	3744
82	East Lincolnshire	33.32	11879
83	Yeovil & Chard	33.32	5395
84	Southampton	33.32	22202
85	Dudley & Sandwell	33.3	17532
86	East North Yorkshire	33.3	2380
87	Grimsby	33.28	5752
88	South Wales Border	33.28	4590
89	Liverpool	33.26	29581
90	Portsmouth	33.26	16300
91	Bath	33.25	6662
92	Brecon, South Mid Wales	33.22	3731
93	Nottingham	33.21	25194

94	South Cumbria	33.2	4940
95	Brighton	33.2	10699
96	Barnsley	33.2	6145
97	Calderdale	33.19	7469
98	Norwich	33.19	14193
99	WPD, Matlock & Buxton	33.16	3408
100	Plymouth	33.15	10865
101	EAW Bury and Thetford	33.14	6111
102	Chesterfield	33.14	5419
103	Huddersfield	33.13	6713
104	West North Yorkshire	33.12	4063
105	Bournemouth	33.08	9193
106	Ipswich	33.08	12991
107	North Norfolk	33.07	5028
108	Ayr & Kilmarnock	33.06	6098
109	Hull	33.06	15268
110	Gloucester	33.05	6552
111	Mid Wales Border	33.04	3401
112	Wrexham & Whitchurch	33.01	4608
113	Middlesbrough & Stockton	33.01	14064
114	North Cumbria	33	3295
115	Worcester & Malvern	32.98	8592
116	Bolton	32.98	7776
117	Tunbridge Wells	32.96	7013
118	Sheffield & Rotherham	32.94	26957
119	Chelmsford & Braintree	32.93	9443
120	Inverness	32.9	3922
121	North West Wales	32.89	4558
122	Blackpool	32.87	6838
123	Harrogate	32.86	4247
124	North Firth of Forth	32.83	6819
125	Scottish Borders	32.83	3911
126	Scarbrgh, Brdlngton & Driffld	32.82	3847
127	Worthing	32.82	4823
128	Carlisle	32.78	4973
129	East Highlands	32.76	2231
130	East Cornwall	32.75	4383
131	Exeter & Newton Abbot	32.75	11631
132	Canterbury	32.74	4824
133	Hereford & Leominster	32.74	4028
134	Eastbourne	32.73	3780
135	North Scotland	32.7	3884
136	Trowbridge & Warminster	32.68	4691
137	Chichester & Bognor Regis	32.63	5577
138	Wirral & Ellesmere Port	32.62	9266
139	East Kent, Dover & Margate	32.61	5008
140	Southend & Brentwood	32.61	14426
141	Poole	32.6	5965
142	North Wales Coast	32.56	5012
143	South West Wales	32.47	5199
144	Hartlepool	32.44	2588
145	Taunton	32.43	4327
146	Greenock, Arran and and Irvine	32.35	5465
147	Hastings	32.32	3317
148	Morpeth, Ashington & Alnwick	32.24	4577
149	Dorset-Devon Coast	32.21	5458
150	EAC., Gt Yarmth & Lowest.	32.17	5780
151	West Cornwall	32.14	6374
152	North Devon	32.07	4363
153	Moray Firth	31.97	4576
154	South Devon	31.91	3922
155	Shrewsbury	31.81	4299
156	Isle of Wight	31.58	3690
157	North West Devon	31.04	2571
		33.34	**1871773**

Department for Business Innovation & Skills

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