TIME CONSTRAINTS, DURABLE CONSUMER GOODS AND THE PREVALENCE OF OBESITY IN WESTERN EUROPE

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Preliminary version

Abstract

This paper contains an analysis of the determinants of the body mass index in ten Western European countries. It is shown that the weight is systematically correlated with the possession of durable consumer goods which has an impact on time use. The possession of a car in the household increases the weight of the man but not of the women. A microwave oven increases the weight of the household member in Northern Europe but not in Southern Europe. The possession of a dishwasher decreases the weight of the members of the household. The impact of the durable consumer goods on the weight of the household members varies over the weight distribution according to quantile analysis. A position in the upper part of the weight distribution might increase the propensity to posses a car, which has the potential to induce an endogeneity problem. Instrumental quantile analysis indicates that the possession of car actually appears to increase the weight in the upper part of the weight distribution.

Keywords: Body mass index, obesity, durable consumer goods, time use, public policy.
JEL Classification: ?

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1. Introduction

Obesity is widely recognized as a serious health problem. The share of obese people has shown a secular increase in many countries. Physicians apply the term “epidemic” for this development, analogous to other instances where a health threatening condition spreads in larger segments of a population.

The seriousness of the problem was emphasized in rather dramatic terms in a recent WHO report. The report stated that the magnitude of problem on a worldwide base was comparable to more traditional health problem, such as all contagious deceases combined and hunger. The main problem of obesity is the impact on death rates: the magnitude of excess death probability is about 50 percent according to the standard summary of the empirical evidence. When the population in a large country as the US has a very high share of obese, this makes obesity a sizeable factor when assessing the reasons for early death. Many other industrialized countries have high shares of obese and in addition the epidemic has spread rapidly to developing countries, especially in Latin America.

The contribution of the present paper is to demonstrate that *a part* of the problem can be analyzed applying a standard tool of economic analysis, the response of rational economic agents to various constraints in the environment. This major contribution of the paper is the demonstration that the weight of agents is systematically correlated with observable results of the choice of the agents, especially the possession of certain durable consumer goods. These correlations are systematic across several European countries, lending credibility to the results. As it might not be immediately obvious in all cases why one should expect these correlations to exist, a theoretical section is included in the paper. It contains an extension of Becker’s analysis of time use on various activities, where the implications of including preferences for weight in the objective functions of the agents are analyzed.

The present paper only claims to be a contribution to understanding the complex problem of obesity. The contributions from physicians include the discovery of a gene, where the possession of the gene implies a higher propensity to be obese. It also includes the discovery of obese to have a physical dependence on further food intake. This dependence is analogous to the physical dependence of drug addicts to drugs and of smokers to cigarettes.

The contributions of economists to the topic include Cutler et al. (2003), who analyze lack of self-control in the context of hyperbolic preferences. It also includes Lakdawalla and Philipson (2002), who discuss the contribution of technological change to on the prevalence of obesity. Anderson, Butcher and Levine (2004) and Wilson (2006) analyse overweight among children in the context of time use. Philipson (2001) contains a survey of the economic research in the area.

The point of departure in measuring overweight is the body mass index (BMI), which is the weight of a person in kilogram divided by the squared height, measured in meters. The conventional categorization is that persons with a BMI above 25 are categorized as being overweight while persons with a BMI above 30 are obese. In the other end of the scale, persons with at BMI below either 20 or 18 are categorized as underweight. However, death rate is a continuous function of weight. According to the evidence presented in for example Fogel (1994), a steep and increasing impact of the BMI on death probability begins as the body mass moves beyond overweight threshold to the obesity threshold. As there is an impact on death rates from moderate amounts of overweight, it is not only the determinants of weight in the extreme upper end of the weight distribution that is of interest.

The data for the study is the survey European Community Household Panel (ECHP). For the present purpose the survey contains applicable information for 10 Western European countries. The empirical analysis of the paper begins by presenting OLS results for the different countries. The impact of the various determinants appears to be largely similar across countries. This lends credibility to results obtained from pooled data. There are major differences between the impact of the covariates on the weight of men and women, and analysis is therefore conducted separately for the two genders. In order to trace the impact of the covariates on weight in different levels in the weight distribution, the results from quantile analysis is presented. It is the impact of covariates in the upper part of the weight distribution that is of interest when problems of overweight is analysed.

It is shown that the weight is systematically correlated with the possession of durable consumer goods which has an impact on time use. The possession of a car in the household increases the weight of the man but not of the women. A microwave oven increases the weight of the household member in Northern Europe but not in Southern Europe. The possession of a dishwasher decreases

the weight of the members of the household. The impact of the durable consumer goods on the weight of the household members varies over the weight distribution according to quantile analysis. A position in the upper part of the weight distribution might increase the propensity to posses a car, which has the potential to induce an endogeneity problem. Instrumental quantile analysis indicates that the possession of car actually appears to increase the weight in the upper part of the weight distribution.

The paper is organized as follows. In section 2 the theoretical analysis is conducted. The data is presented more closely in section 3. Section 4 contains the results for the OLS analysis in the various countries. Quantile analysis and instrumental variable regression performed in section 5. Section 6 concludes.

2. Theory on time use and weight

The aim of this section is to formulate a framework, which is useful for the interpretation of the results in the empirical section. That section presents evidence for the hypothesis that the body mass is a result of the agent's choice of various activities. It is a natural to assume that the agent's have preferences about the body mass, and more generally health, and this is the outset of the analysis. The present section results in an analysis where the effect of changes in the budget set can be traced on the choices of activities and body masse.

The point of departure is Becker's analysis of household production. This theory is extended to encompass preference about body mass. Specifically is assumed that the preference of the agent can be formulated as a utility function of the following form

$$V\left(z_1, z_2, ...z_n, b\right) = U\left(z_1, z_2, ...z_n\right) - \frac{\eta}{2}\left(b - b^*\right)^2 \qquad (1.1)$$

The first term on the right hand side is the standard Becker utility function for household production, which is supposed to depend on "basic commodities" or "activities" of the agent, where z_j is an activity. The second term on the right hand side is a simple formulation of the preferences for the

body mass of the agent, b. The agent is penalized if the body mass deviates from is the desired level of the body mass b^*. The penalty is quadratic in the deviation and scaled by the parameter η. This is a short hand formulation of more general considerations of determining the level of investment in health.

In accordance with the empirical results to follow, it is assumed that the body mass depends on the level of the chosen activities, $b = b(z_1, z_2, ...z_n)$. This entails that there is a side effect from the chosen activities on body mass, or a complementarity effect as indicated in the title of the paper. Some activities might increase the body mass $\partial b / \partial z_j > 0$, while others might decrease the body mass $\partial b / \partial z_j < 0$.

The production of activities is described as standard,

$$z_j = z_j\left(x_j, T_j\right) = \min\left(\frac{x_j}{c_j}, \frac{T_j}{t_j}\right). \tag{1.2}$$

where x_j is a good which enters an input, T_j is the time used in the production of activity z_j, and where the production process is assumed to be limitational with technological coefficients c_j and t_j.

Maximization takes place under two restrictions. The time restriction

$$T - H - \sum t_j z_j \geq 0, \tag{1.3}$$

where T is total time available and H is working hours. The budget constraint is

$$Y + wH - \sum p_j c_j z_j \geq 0, \tag{1.4}$$

where Y is non-labour income, w is the wage rate, and p_j is the price of good x_j.

Combining equations (1.3) and (1.4) entails the following inequality

$$Y + wT \geq \sum \pi_j z_j, \quad \pi_j = p_j b_j + w t_j \,. \tag{1.5}$$

The entity π_j on the right hand side is the price per unit of activity z_j. It is the sum of the price of the amount of the good and the price of the amount of time that it takes to produce on unit of the activity. The sum of the costs of the activities on the right hand side of (1.4) cannot exceed the full income on the left hand side.

The Lagrangian becomes

$$\mathrm{A} = V\left(z_1, z_2, ...z_n\right) - \lambda\left[Y + wT - \sum \pi_j z_j\right], \tag{1.6}$$

and the first order conditions becomes

$$\begin{aligned} \frac{\partial \mathrm{A}}{\partial z_j} &= \frac{\partial U}{\partial z_j} - \eta\left(b - b^*\right)\frac{\partial b}{\partial z_j} - \lambda \pi_j = 0 \\ \frac{\partial \mathrm{A}}{\partial \lambda} &= -\left[Y + wT - \sum \pi_j z_j\right] = 0 \end{aligned} \,. \tag{1.7}$$

In the case of choice between two activities one obtains the indifference curve

$$-\frac{dz_j}{dz_i} = \frac{\partial U / \partial z_i - \eta\left(b - b^*\right)\partial b / \partial z_i}{\partial U / \partial z_j - \eta\left(b - b^*\right)\partial b / \partial z_j} = \frac{p_i c_i + w t_i}{p_j c_j + w t_j} \tag{1.8}$$

To fix ideas, assume that $b > b^*$ and $\partial b / \partial z_i > 0$, such that an agent in excess of the desired body mass consider the level of an activity which increases the body mass. According to (1.8), the effect of preferences about the body mass is a lower level of this activity i, where the magnitude of the

reduction depends positively on the parameter η, which measure the preferences of the agent for being close to the desired body mass.

As an example of relevance according to empirical results to follow, consider the activity of driving a car to work compared to using other modes of transportation, which entails more physical activity than car-driving, such as taking a bike or using public transportation. According to the formulation (1.8), the amount that car driving is reduced depends on the preferences of the agent, a low η entails that considerations about the body mass will enter to a minor degree in the decision of mode of transportation. However, the choice does also depend on the price ratios on the right hand side of (1.8). If alternative modes of transportation are time-intensive and the wage rate of the agent is high, this draws in the direction of more car-driving. Moreover, the unit price of using the car, p_i, also enters into the price ratio. This entails that public intervention in the form of taxes on gasoline and cars have an impact on the body mass of the agents. The point here is, that choices of the agents are determined by preferences and budget set, and that the budget set, and consequently the body mass of the agents, is influenced by public intervention, given the technology of for example various modes of transportation.

3. The data

The data stems from the ECHP, which is a survey conducted in most of the member states of the European Community. The intention of the survey is that results from the survey should be comparable across different countries. Most of the questions are therefore similar and the same is the case with the sample design.

During the years 1998-2001 questions about weight and height was included in the survey in most countries. Unfortunately, the data set does not include some of the larger countries in Europe. The questions were not posed in France, Germany has its own survey and does not participate in ECHP, and the same is the case with the UK. Left are ten countries with valid information.

The participating countries are shown in the head of Table A1 in the appendix. For the sake of interpretation of the results of the paper the countries are ordered according to latitude such that that

the northernmost country, Finland, is first, and the southernmost country, Greece, is the last in the table.

Table A1 shows summary statistics for males for the variables applied in the present study. That there is a problem to analyze is clear from the first row in the table, which shows that the average BMI in all the countries is higher than the threshold for being overweight. The share of males being overweight is higher than 50 percent for seven of the participating countries, as seen in the second row. The most obese country in the sample according to this survey is Finland, where the share of obese men is 11.7 percent, according to the third row in the table. The least obese country is Italy, where 8.1 percent of the males are obese, but there does not appear to be any systematic differences in obesity between different regions in Europe.

After the means of the different covariates applied in the study, the sample size in the various countries is shown. Because of missing information for some of the respondents, it is not possible to apply all of the respondents in the ECHP for the present study. The last row shows that the share of observations in the ECHP, which it is possible to apply, is 90 percent or more in all countries except Sweden. Unfortunately, a large share of the Swedes has not answered the questions about weight and height such that only 52 percent of Swedish observations are applicable for the present study. It is likely that the attrition is non-random and the results for Sweden are probably less reliable than the results for the other nine countries.[1]

Table A2 in the appendix shows that females are not so overweight as males. The mean BMI is below 25 in all countries and the share of overweight females is below 40 percent in all countries. Except for Portugal, the share of obese females is less than the share of obese males. The share of applicable observations for females is 85-90 percent for most countries and the share is thus slightly lower than the share of applicable observations for men. Portugal has a higher share, and for Swedish females the share of applicable observations is also down on 52 percent.

[1] For the Swedish observations a linear probability model of responding on weight and height on the explanatory variables yielded several significant coefficients, including variables for the possession of durable goods. This is the case for both men and women and the attrition for Sweden is thus to some extent non-random with respect to observable characteristics.

4. Determinants of the average BMI

In this section I report results for the determinants of the average BMI. The results for the main variables of economic interest are first reported for males and then for females. Then results are mentioned for those of the various conditioning variables, which have an independent interest.

According to the point estimate in Table 1, the *possession of a car* in the household increases is associated with increases in the weight for the man in a household in all European countries. The highest point estimate is for Denmark, where the weight increases by 2.77 percent. Looking away from Sweden, where there are problems with attrition, the lowest point estimate is for Spain, where the weight of the man increases by 1.55 percent. The point estimates are therefore clustered in a rather small band; there is uniform pattern of increases in weight associated with the possession of a car in all European countries. Significant differences from zero are obtained for 6 out of the 10 countries.

[Table 1 around here.]

The consequence of the possession of a *microwave oven* exhibits an analogous pattern for the first 7 countries in the table. The highest point estimate is for Austria, where the microwave oven is associated with an increase on 2.62 percent of the weight of the man in the household. The lowest is for Ireland, where the weight increases by 0.64 percent. Significance is obtained for 4 out of the 7 coefficients. However, the coefficients for the last three countries in the table are all very close to zero. The contention is that the use of the microwave oven in the Southern European countries Portugal, Italy and Greece is different from the use in Northern European countries. Spain is an exception from the categorization of countries, as there in this Southern European country is a positive and significant effect from the microwave.

The possession of a *dishwasher* is associated with smaller weight in most countries as there are negative coefficients 8 of the countries. The exceptions are Sweden, which have a coefficient close to zero, and Portugal. However, only two of the negative coefficients are significantly different from zero.

Looking at the analogous results for females displayed in Table 2, we see that there is no systematic association between the possession of a *car* and the weight of the female in the household. There are 4 positive coefficients and 6 negative, and the only significant coefficient is a negative one. While the possession of a car is associated with increases in the weight of the man in the household, it is not possible to trace any systematic effect for females. One contention is that the differential effects for males and females are associated with the use of the car. The different response pattern could arise, if the prime user of the car is the male, while females use the car less intensively.

[Table 2 around here.]

With respect to the *microwave oven*, there is no effect to trace on the weight of Southern European women. The coefficients for Spain, Portugal, Italy and Greece are all negative but none of them are significant. Among the Northern European countries, there is a negative coefficient for Finland, but the rest are positive and 3 of them are significant. The general pattern is therefore that a microwave oven appears to increase the weight of both males and females in Northern Europe while it has no effect for males and females in Southern Europe. One contention for explanation is a differential use of the microwave oven across the European countries.[2]

The *dishwasher* is associated with a negative impact on the weight of females in all European countries. In four of the countries the effect is significantly different from zero and this in on a one percent level for three of them. There appears a pattern of a negative association between the possession of a dishwasher and the weight of both males and females in the household. A dishwasher is a highly timesaving device. To the extent that the saved time is partly used to e.g. food preparation, this constitutes a hypothesis that might explain the observed uniform pattern of correlation across European countries.

All the three durable consumption good, the car, the microwave oven and the dishwasher are timesaving devices. We do not observe the use of these devices, but according to the theory section of

[2] The microwave oven has a whole range of application, from heating ready-prepared food for dinner to heating warm milk for cappuccino. If the last use of the oven is the predominant one in Southern Europe while the former one constitutes the prime use of the oven in Northern Europe, then this might be one route by which the differential effect across European regions could arise.

the paper, the contention is that the use of these devices is going to affect the weight of the agents. According to the theory section, the value of time is a determining factor in decisions of importance for the weight of the agents. To the extent that this is the case one would expect that persons who do not work full-time have more opportunity to pursue goals with respect to weight. That is, one would expect persons who work part time have less weight than persons working full time.

This is actually the case for men according to the evidence presented in Table 1. The reference person works fulltime, and the coefficients to the variable "*not working fulltime*" are negative for all European countries. The coefficients are significant for the last four countries in the sample, the Southern European countries. However, this pattern is not found for women according to Table 2. Only three of the coefficients are negative, while the remaining seven are positive. One of the negative coefficients is significant, and three of the positive coefficients are significant. As both positive and negative coefficients are significant, this variable for females is one of the few cases in the present study, where it is not possible to detect a systematic pattern of the determinants of weight across European countries.

It is also possible to interpret the results for some of the other variables as a result of time constraints. *Children* are expected to make this constraint tight and according to the line of thought, the expectation is a positive coefficient. The result is that half of the coefficients for males are negative and the other half positive. One of the positive coefficients is significantly different from zero but this is not the case for any of the positive coefficients. For females the result is more in compliance with the line of thought. There are four negative coefficients, but they are all small in absolute value. Among the six positive coefficients, three are significantly different from zero and this is for Southern European countries.

To the extent that *singles* are less constrained with respect to time than persons with partners, the results of the present study comply with the expected outcome. All the coefficients are negative both for males and females. Four of the coefficients for males are significant, while this is the case for two of the coefficients for females.

Most of the other variables are to be considered as conditioning variables. The standard result in health studies is that more *education* increases health and this is also valid in the present case. The

reference group is the one with secondary education and in comparison primary education increases weight while tertiary education decreases weight.

The variables for *smoking* also give standard results. The reference person is a person, who has never smoked, and in comparison smokers have less weight, while former smokers have higher weight.

The *income* of the household members does not appear to have any effect for men. The variable enters both linear and squared and only one out of 20 coefficients for men is significantly different from zero. For females there appears to be a negative association between the income of the household and weight. All the coefficients for the linear term are negative and six of them are significantly different from zero, including five on a one percent level. As the coefficients to the squared income are small, most of the association between female weight and income is captured by the linear term.

A main conditioning variable is *age*, which is an important determinant of differences in weight as measured by the contribution to the R-squared of the regressions. For males, the linear term is positive and significantly different from zero on a one percent level for all countries. As the coefficients so the squared age are significantly negative for 9 of the countries, there appears to be a decreasing impact of age on weight. There are important differences in impact across European countries. The least steep age profile is found in Denmark, where ten more years of age is associated with an increase in weight on 1.71 percent for males. This is less than half of impact in Austria, which has the steepest profile with a coefficient to the linear term on 4.25 percent. For females, all the coefficients to the linear term of age are also significantly different from zero on a one percent level. However, only two of the coefficients to age squared are significantly different from zero, so the concavity of the impact on weight from age appears to be less pronounced for females. The lowest point estimate for the linear term of age is the one for Denmark, which is 2.02, and the highest is again obtained for Austria, where the point estimate is 5.08. However, several countries are close to the Austrian level: this is case for Finland and all the Southern European countries. There are thus considerable differences in the pace by which both males and females gain weight with age across European countries.

The main impression of the results of the regressions is that the BMI responds in rather uniform way on different covariates in the Western European countries. In some cases there are regional differences such that countries in Southern Europe respond different from countries in Northern Europe. However, this might be informative in further analysis of the determinants of BMI. The uniform response includes most of the variables, which in this study are interpreted as consequences of the time use of the agents.

4. Determinants for quantiles of the weight distribution

In the following I report results of the impact of covariates on different quantiles of the weight distribution. The main interest is the impact of covariates in the upper end of the weight distribution, where health problems arise. As one of the explanatory variables might be endogenous, I also report results where this variable is instrumented.

The analysis is performed on a sample where the data for the countries are pooled. Due to space constraints it is impractical to report quantile regressions for 10 countries. The results of the previous section showed that there was a rather uniform response pattern on the different covariates in the various countries. This uniform response pattern lends credibility to the pooling procedure. One might of course not preclude that similar OLS results for two countries could arise from a different impact of a variable over the weight distribution between the two countries. However, inspecting results of quantile regressions for the single countries has not revealed any noticeable differences of such a differential response pattern across countries.

The first to note in the results for males in Table 3 is the OLS results for the pooled sample. The impression is that they comply well with the overall pattern for the various countries in Table 1, both with respect to sign and magnitude. Because of the larger sample size, many of the coefficients are significantly different from zero. This is for example the case with the dishwasher, where the estimates were negative for most of the countries in Table 1, but where only two were significantly different from zero. The reference person is a Belgian, whose BMI is shown as the constant term in the regression. The country dummies shows that reference men in Finland, Sweden, Ireland, Aus-

tria, Portugal, Spain and Greece have significantly higher weight, while there is no significant difference to the reference persons in Denmark, Ireland and Italy.

[Table 3 around here.]

The OLS and quantile results in Table 3 are based on a data set obtained from a simple pooling of data sets for the countries included in the survey. The number of observations in the survey varies positively with the population size of the countries, and no attempts have been made in order to adjust the sample such that is becomes more "representative" of the European population. Furthermore, no sample weights are applied in the OLS and quantile analysis of Table 3. The main reason is that the parameters of the quantile analysis are the results of a linear programming procedure which does not lend itself to weighting.[3] With respect to the OLS results, the parameters are expected to be unaffected by the weighting procedure to the extent that the weighting are based on the conditioning variables. It is worth noting that there are only minor differences between the unweighted OLS results reported in Table 3 and the OLS results in Table 1 where sample weights are applied. In the present case the interest is not on marginal distributions, in which case sample weights have to be applied.

The quantile estimation is performed for selected levels of the BMI distribution, including conventional thresholds applied in the literature. They include the limit for obesity (BMI = 30), the limit for overweight (BMI = 25), and the limit for underweight (BMI = 20). In addition, estimates for the intermediate level of BMI equal to 22.5 and 27.5 are included.

We start looking at the variables, which are interpretable in the context of time use. The average effect on the male BMI of the possession of a *car* in the household is 2.01 percent according to the OLS estimate, but this is the average of a considerable variation across the BMI distribution. Persons in the lower part of the distribution are most affected by the possession of a car, while males in the upper part of the distribution are less affected. The coefficient for a male, who is on the borderline of being obese, is insignificant.[4] The effect of a *microwave oven* tends to exhibit the opposite

[3] An alternative procedure to weighting would be replication of those parts of the data which is underweighted in the sampling procedure.
[4] The standard errors on the quantile estimates are obtained by a bootstrap procedure taken clustering into account.

pattern: a minor effect in the bottom of the BMI distribution and a larger effect in the upper part. The possession of a *dishwasher* does also not appear to have a higher impact in the upper part of the BMI distribution.

For women we also find a considerable variation of the impact of the explanatory variables across the weight distribution. According to the OLS results in Table 4, the average effect of *car* possession is small, negative and insignificant. This complies with the evidence for the various countries in Table 2. However, this OLS estimate is an average of an effect which is positive in the lower part of the weight distribution and negative in upper part. According to the evidence in Table 2, the effect of the possession of a *microwave oven* varies across countries, such that there is a positive effect in most of the Northern European countries and no effect in Southern Europe. The pooled result is a small, positive and insignificant effect on the average. There does not seem to be any systematic variation across the weight distribution. The result for the *dishwasher* is a significant reduction in BMI irrespective the location in the weight distribution. The effect is large in the upper part of the weight distribution and smaller in the lower part.

[Table 4 around here.]

With respect the effect of *not working fulltime* for men, the average effect for the sample is negative and significant. This complies with the results in Table 1, where a negative effect of this variable was found for all the countries. However, the average is the result of a large negative effect in the lower part of the distribution, a smaller in the middle of the distribution, while the effect is close to zero at the BMI threshold for being obese. The corresponding result for females is a negative and insignificant coefficient in the bottom of the weight distribution, while moving in the weight distribution yields positive, significant and increasing coefficients such that the average is a small, significant positive effect.

For men there is no noticeable effect of having *children*, while the positive and significant effect for females does not vary noticeable over the weight distribution. Being single is associated with a significant smaller weight for both genders. This effect does not vary significantly over the weight distribution.

Most of the conditioning variables do not display any noticeable pattern over the weight distribution. An exception is the negative impact of current smoking, which is decreasing for both males and females as one move up in the weight distribution.

It appears as though the *increase in weight over time* has been more pronounced for females than for males. Conditional on the variables in the OLS analysis, there is an increase for men on 0.28 percent from 1998 to 2001. Men in Finland and Austria gained weight in a significant amount from 1998 to 2001 according to Table 1 but this was not the case for the rest of the countries. For women there is an increase on 0.74 percent from 1998 to 2001. According to Table 2 there was a significant increase in the weight of women in 6 countries, Finland, Denmark, Belgium, Austria, Spain and Portugal, while women in Sweden, Ireland, Italy and Greece did not gain weight during this time period conditional on the explanatory variables in the analysis. According to the coefficients to the year dummies, this increase in the average weight of women is a result of a high weight increase in the upper part of the weight distribution and a more moderate increase in the lower parts. The point estimates in Table 4 indicates that the quantile at the threshold for being an obese women has moved 1.55 percent up in the weight distribution from 1998 to 2001. At the other end of the weight distribution, the quantile for being underweight has only moved 0.35 percent from 1998 to 2001.

The coefficients for the country dummies in the quantile regressions indicate the *cross-country differences in the conditional weight distribution* relative to the reference country, Belgium. For example indicates the coefficient for males in Finland at BMI equal to 20 that one has to move on 4.36 percent up in the weight distribution for Finland before the threshold level of 20 in BMI is reached. This implies that Belgium has a higher proportion of men with underweight than Finland, conditional on the covariates in the analysis. Most other countries have coefficients similar to the one for Finland, the exception being the one for Greece which indicates than the share of men in Greece with very low BMI is lower than the other European countries. Analogously, the rest of the positive countries dummies in the quantile regressions indicate how much the weight distribution is pushed to the right compared to the Belgium weight distribution for men. At the threshold for obesity there is not much difference between the countries: one coefficient is significantly positive and two are significantly negative. A larger share of the men in Spain is obese compared to Belgium while a smaller share in Portugal and Italy are obese, conditioning on the covariates.

Compared to males, the results of Table 4 for females indicate a more diverse pattern of differences in weight distribution across countries. Finland, Denmark, Ireland and Greece have a significantly higher share of obese women than Belgium, conditional on the covariates. Only Italy has a share that is significantly less than Belgium. In the other end of the weight distribution, all countries, with the exception of Italy, have a significantly smaller share of underweight women.

4. Endogeneity and fixed effect estimation

Included in Table 3 and 4 is an attempt to take into account a potential endogeneity problem. One might imagine that person with a high BMI are more likely to by a car as a high weight can cause problems with other means of transportation. The instrument in the regression is a variable for the urbanization degree of the living area of the respondents. Urbanized areas contain substitutes for cars in the form of public transportation. Commuting distances might also me smaller in urbanized areas such that individualized transportation modes as walking or cycling is a possible substitute to the car. This instrument is therefore potentially valid and the auxiliary regressions perform well.[5]

The sample applied in the IV analysis is not the full pooled sample of the samples used for the various countries in the previous section. The instrumental variable is not available for Sweden and Spain, so these countries are omitted. The same is the case with observations in the rest of the countries where the instrumental variable is not available. There are no major differences in the results from quantile regression on the full, pooled sample and the smaller sample applied in this section.[6]

The result for males is an increase in the coefficient for the effect of the car on BMI from 2.01 percent in the OLS regression to 13.26 percent in the IV regression. Most of the other coefficients do not change in a noticeable way. To the extent that the instrument is valid, the instrumentation of car possession therefore refutes that the positive value of the car in the OLS regression is due to endogeneity bias. However, the substantial increase in the coefficient as a consequence of instrumentation is somewhat puzzling. The same qualitative result is obtained for all the countries in the sam-

[5] Report test statistic for weak instruments.
[6] Is this correct?

ple, when the IV procedure is performed on country data. Another variable for urbanization is available for some of the countries and when this is applied, the same substantial increase in the coefficient is obtained. For females, similar results are obtained.

Furthermore, instrumental analysis of the impact of the covariates on the different quantiles is performed. An expression for instrumental analysis of the impact of quantile α of is

$$\frac{1}{n}\sum_{1}^{n}\left(\alpha 1\{y_i - x_i b > 0\} - (1-\alpha)1\{y_i - x_i b < 0\}\right)z_i \qquad (1.9)$$

where y_i is the dependent variable, x_i the covariates, b the coefficients, $1\{\ \}$ is the indicator function, and z_i the instruments. This is the estimator proposed by Abadie (1995) and analysed in Honore and Hu (2004). The estimator applied in this context is the version by Chernozhukov and Hansen (2005).

The result for car possession is displayed in Figure 1. The upper graph to the left contains the results for car possession for men in Table 3. However, instead of 5 selected estimates on the distribution, the graph contains estimates ranging from the 10^{th} quantile to the 90^{th} quantile. The upper graph to the right contains the corresponding results for the instrumental variable analysis. The graph indicates that car passion has a substantial and significant increase in the weight of men in the upper part of the weight distribution. In the lower part of the weight distribution, the possession of a car does not have a significant effect.[7]

[Figure 1 around here.]

Analogous results are obtained for females. There is a tendency for a significant impact of a car on the weight in the upper part of the weight distribution when instruments for car possession are applied.

Finally, a fixed effect estimation is performed and the results are reported in Table 5.. The length of the panel is rather short, 4 years. If the changes in characteristics take time in order to affect the weight, one would not expect to significant results.

[7] More work has to be done in order to get better standard errors in Figure 1 (they are probably to small).

[Table 5 around here.]

There are no significant effects for car possession. The possession of a microwave oven has a positive and significant affect the weight for men, but not for women. The possession of a dishwasher has a zero or negative impact. The effect is significantly negative for all females. The results for not working fulltime give mixed results.

5. Conclusion

[This section has to be substantially amended] This paper has demonstrated that it is possible to analyze a part of a serious health problem with economic analysis. This includes both economic theory and econometric analysis.

The theory section dealt with time-constrained agents, who have goals with respect to their weight. These goals have an impact on the choice of activities of the agents. Various activities have a differential impact on the weight of the agents. The price of the activities enters the budget constraint of the agents and the price of the activities has therefore consequences for the weight of the agents. Activities associated with for example the possession of certain durable consumer goods is thus expected to have consequences for the weight of individuals.

This hypothesis was tested in the empirical section of the paper. Timesaving devices as cars, microwave ovens and dishwashers are expected to have a differential impact on the weight of individuals. The results include that the possession of a car increases the weight of the male in the household. This result is obtained uniformly for all Western European Countries. The possession of a microwave oven increases the weight of individuals in Northern Europe but not in Southern Europe. This can be rationalized if the use of the microwave oven varies over the regions of Europe. A dishwasher decreases the weight of members of the household in Western Europe. Time constraints are expected to be less tight for part-time workers. Males on part-time weigh less than males on full-time, but this is not the case for females.

It is in the upper end of the weight distribution that weight is a health problem. Quantile regressions gave the result that car possession does not have a pronounced effect for males in the extreme upper end of the weight distribution, where males are on the borderline of being obese. But it does affect males with moderate weight problems. The opposite pattern over the weight distribution prevails for the possession of a microwave oven, where males with high weight are affected mostly. The possession of a dishwasher reduces weight for females in the upper end of the weight distribution while the effect in the lower end of the weight distribution is smaller. There might be an endogeneity problem as persons with high weight could be more likely to by cars, but results from instrumental variable regressions indicated that cars still increases the weight of males when this problem is taken into account in the analysis.

The possession of consumer durables is affected by the price and therefore also of the net taxation of the durables. This is especially relevant in the case of the car. The amount of taxation varies considerable across countries and the results of the present paper are directly relevant as a contribution in considerations about the level of taxation of this durable. With respect to the other durables, the microwave oven and the dishwasher, we cannot directly observe the activities in the household that are affected by the possession of these durables. It is desirable with more direct evidence of the use of these goods and the routes by witch they affect the weight of the members of the household. One cannot preclude that there are informational problems in relation to the link between various activities in the households, including the use of various consumer durables, and the weight of the members of the households. To the extent that such informational problems are alleviated, this might have a potential to contribute to a reduction of the obesity problem.

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Table A1. Summary statistics for males

	Finland	Sweden [a)]	Denmark	Ireland	Belgium	Austria	Spain [b)]	Portugal	Italy	Greece
Mean of BMI	25.787	25.462	25.327	25.578	25.320	25.698	25.928	25.581	25.229	26.125
	(0.038)	(0.045)	(0.047)	(0.042)	(0.051)	(0.039)	(0.029)	(0.028)	(0.023)	(0.031)
Share of overweight (BMI 25+)	0.536	0.512	0.483	0.531	0.481	0.529	0.555	0.528	0.467	0.609
	(0.005)	(0.007)	(0.007)	(0.006)	(0.006)	(0.005)	(0.004)	(0.004)	(0.003)	(0.004)
Share of obese (BMI 30+)	0.117	0.095	0.094	0.089	0.110	0.111	0.129	0.091	0.081	0.101
	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)
Car in the household	0.902	0.874	0.806	0.894	0.941	0.937	0.890	0.781	0.964	0.819
	(0.003)	(0.004)	(0.005)	(0.004)	(0.003)	(0.003)	(0.002)	(0.003)	(0.001)	(0.003)
Microwave in the household	0.900	0.805	0.582	0.814	0.791	0.719	0.641	0.395	0.257	0.167
	(0.003)	(0.005)	(0.007)	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.003)	(0.003)
Dishwasher in the household	0.668	0.626	0.595	0.437	0.535	0.683	0.303	0.226	0.336	0.280
	(0.005)	(0.006)	(0.007)	(0.006)	(0.006)	(0.005)	(0.004)	(0.003)	(0.003)	(0.004)
Work fulltime	0.734	0.803	0.814	0.768	0.782	0.767	0.734	0.812	0.704	0.795
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)	(0.004)
Don't work fulltime	0.266	0.197	0.186	0.232	0.218	0.233	0.266	0.188	0.296	0.205
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)	(0.004)
0 children	0.670	0.684	0.644	0.597	0.627	0.654	0.677	0.632	0.696	0.678
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.004)	(0.004)	(0.003)	(0.004)
1 child or more children	0.330	0.316	0.356	0.403	0.373	0.346	0.323	0.368	0.304	0.322
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.004)	(0.004)	(0.003)	(0.004)
Single	0.267	0.311	0.259	0.399	0.253	0.324	0.371	0.314	0.371	0.311
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.004)	(0.004)	(0.003)	(0.004)
Spouse, work fulltime	0.494	0.466	0.494	0.184	0.359	0.280	0.211	0.400	0.240	0.288
	(0.005)	(0.007)	(0.007)	(0.005)	(0.006)	(0.005)	(0.003)	(0.004)	(0.003)	(0.004)
Spouse, don't work fulltime	0.239	0.222	0.247	0.418	0.388	0.396	0.418	0.286	0.389	0.400
	(0.004)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.004)	(0.004)	(0.003)	(0.004)
Primary education	0.237	0.168	0.161	0.424	0.255	0.174	0.535	0.789	0.498	0.466
	(0.004)	(0.005)	(0.005)	(0.006)	(0.006)	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)
Secondary education	0.763	0.832	0.839	0.576	0.745	0.826	0.465	0.211	0.502	0.534
	(0.004)	(0.005)	(0.005)	(0.006)	(0.006)	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)
Territory education	0.275	0.317	0.291	0.192	0.371	0.068	0.242	0.069	0.092	0.179
	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)
Smoke daily	0.279	0.186	0.359	0.282	0.332	0.328	0.428	0.359	0.335	0.521
	(0.005)	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)	(0.004)	(0.004)	(0.003)	(0.004)
Smoke sometimes	0.052	0.131	0.043	0.051	0.063	0.078	0.064	0.063	0.093	0.132
	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
Have smoked daily	0.213	0.253	0.177	0.141	0.170	0.140	0.138	0.110	0.096	0.064
	(0.004)	(0.006)	(0.005)	(0.004)	(0.005)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)
Have smoked sometimes	0.029	0.000	0.032	0.033	0.060	0.076	0.049	0.076	0.052	0.040
	(0.002)	(-)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Have never smoked	0.427	0.430	0.389	0.493	0.375	0.379	0.322	0.393	0.424	0.243
	(0.005)	(0.007)	(0.006)	(0.006)	(0.006)	(0.005)	(0.004)	(0.004)	(0.003)	(0.004)

Table A1. Summary statistics for males *(continued)*

	Finland	Sweden [a]	Denmark	Ireland	Belgium	Austria	Spain [b]	Portugal	Italy	Greece
Income in Euro [c]	14089	13929	18229	14702	18882	17176	11703	9259	12246	9900
	(84)	(105)	(110)	(335)	(292)	(97)	(60)	(55)	(51)	(61)
Age	41.404	42.305	40.951	40.029	41.063	40.943	38.953	39.634	40.196	41.517
	(0.129)	(0.158)	(0.157)	(0.159)	(0.146)	(0.140)	(0.098)	(0.106)	(0.087)	(0.112)
Live in densely-populated area [d]	0.554	----	0.286	0.250	0.550	0.574	----	0.455	0.383	0.445
	(0.006)	----	(0.007)	(0.006)	(0.007)	(0.006)	----	(0.004)	(0.004)	(0.005)
Live intermediate area [d]	0.164	----	0.500	0.152	0.401	0.239	----	0.281	0.375	0.318
	(0.004)	----	(0.008)	(0.005)	(0.007)	(0.005)	----	(0.004)	(0.004)	(0.004)
Live in thinly-populated area [d]	0.283	----	0.214	0.598	0.050	0.187	----	0.263	0.243	0.237
	(0.005)	----	(0.006)	(0.007)	(0.003)	(0.005)	----	(0.004)	(0.003)	(0.004)
Sample size	9338	5669	5682	6730	6185	8297	16595	14897	21478	12607
Number of age 20-64 in data	10264	10834	6184	7455	6899	8804	18190	16280	22914	13244
Share in sample	0.910	0.523	0.919	0.903	0.897	0.942	0.912	0.915	0.937	0.952

Source: ECHP for 1998-2001 for individuals aged 20-64.

Note: [a] For Sweden are data from 1998 and the degree of urbanisation variable not available.

[b] For Spain is the degree of urbanisation variable not available.

[c] Income are equalised for household members using the modified-OECD scale and converted to the average EU level using purchasing power parities (PPP) for each country.

[d] The degree of urbanisation is registered by the interviewers.

Table A2. Summary statistics for females

	Finland	Sweden [a)]	Denmark	Ireland	Belgium	Austria	Spain [b)]	Portugal	Italy	Greece
Mean of BMI	24.622	24.134	23.985	24.195	23.744	24.114	23.981	24.647	23.227	24.446
	(0.046)	(0.052)	(0.055)	(0.052)	(0.055)	(0.046)	(0.034)	(0.035)	(0.027)	(0.038)
Share of overweight (BMI 25+)	0.383	0.332	0.326	0.345	0.296	0.342	0.331	0.394	0.260	0.383
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.004)	(0.004)	(0.003)	(0.004)
Share of obese (BMI 30+)	0.122	0.082	0.087	0.089	0.088	0.092	0.094	0.102	0.057	0.082
	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Car in the household	0.841	0.826	0.777	0.868	0.908	0.903	0.862	0.770	0.947	0.784
	(0.004)	(0.005)	(0.006)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.002)	(0.004)
Microwave in the household	0.903	0.812	0.574	0.845	0.787	0.730	0.654	0.409	0.255	0.173
	(0.003)	(0.005)	(0.007)	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)	(0.003)	(0.003)
Dishwasher in the household	0.667	0.630	0.599	0.447	0.512	0.695	0.298	0.233	0.339	0.296
	(0.005)	(0.006)	(0.007)	(0.006)	(0.006)	(0.005)	(0.004)	(0.003)	(0.003)	(0.004)
Work fulltime	0.634	0.647	0.645	0.388	0.463	0.450	0.366	0.566	0.383	0.428
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.004)	(0.004)	(0.003)	(0.004)
Don't work fulltime	0.366	0.353	0.355	0.612	0.537	0.550	0.634	0.434	0.617	0.572
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.004)	(0.004)	(0.003)	(0.004)
0 children	0.639	0.617	0.600	0.533	0.606	0.614	0.657	0.611	0.671	0.654
	(0.005)	(0.006)	(0.007)	(0.006)	(0.006)	(0.005)	(0.004)	(0.004)	(0.003)	(0.004)
1 child or more children	0.361	0.383	0.400	0.467	0.394	0.386	0.343	0.389	0.329	0.346
	(0.005)	(0.006)	(0.007)	(0.006)	(0.006)	(0.005)	(0.004)	(0.004)	(0.003)	(0.004)
Single	0.253	0.279	0.245	0.375	0.299	0.302	0.354	0.316	0.344	0.290
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.004)	(0.004)	(0.003)	(0.004)
Spouse, work fulltime	0.598	0.596	0.651	0.513	0.592	0.541	0.529	0.589	0.515	0.593
	(0.005)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)	(0.004)	(0.004)	(0.003)	(0.004)
Spouse, don't work fulltime	0.150	0.125	0.103	0.113	0.109	0.157	0.116	0.096	0.141	0.117
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.002)	(0.002)	(0.003)
Primary education	0.199	0.140	0.174	0.386	0.251	0.299	0.535	0.737	0.475	0.476
	(0.004)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.004)	(0.004)	(0.003)	(0.005)
Secondary education	0.801	0.860	0.826	0.614	0.749	0.701	0.465	0.263	0.525	0.524
	(0.004)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.004)	(0.004)	(0.003)	(0.005)
Territory education	0.364	0.352	0.298	0.197	0.381	0.072	0.257	0.107	0.090	0.154
	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)
Smoke daily	0.184	0.241	0.353	0.280	0.248	0.212	0.284	0.083	0.169	0.232
	(0.004)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.004)	(0.002)	(0.003)	(0.004)
Smoke sometimes	0.043	0.100	0.033	0.046	0.050	0.067	0.052	0.028	0.072	0.178
	(0.002)	(0.004)	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)	(0.001)	(0.002)	(0.003)
Have smoked daily	0.138	0.211	0.168	0.100	0.114	0.079	0.070	0.023	0.035	0.011
	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)
Have smoked sometimes	0.044	0.000	0.049	0.033	0.073	0.064	0.046	0.041	0.042	0.022
	(0.002)	(-)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)
Have never smoked	0.590	0.449	0.397	0.541	0.515	0.579	0.548	0.825	0.682	0.557
	(0.005)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.004)	(0.003)	(0.003)	(0.004)

Table A2. Summary statistics for females *(continued)*

	Finland	Sweden [a)]	Denmark	Ireland	Belgium	Austria	Spain [b)]	Portugal	Italy	Greece
Income in Euro [c)]	13645	13636	17750	14002	17831	16314	11291	9113	11827	9639
	(79)	(103)	(110)	(229)	(268)	(93)	(61)	(56)	(50)	(59)
Age	40.570	41.349	40.146	39.394	40.144	40.826	38.519	39.802	39.259	39.634
	(0.127)	(0.155)	(0.157)	(0.153)	(0.139)	(0.136)	(0.095)	(0.104)	(0.084)	(0.109)
Live in densely-populated area [d)]	0.589	----	0.285	0.270	0.570	0.549	----	0.470	0.398	0.466
	(0.006)	----	(0.007)	(0.006)	(0.007)	(0.006)	----	(0.004)	(0.004)	(0.005)
Live intermediate area [d)]	0.166	----	0.509	0.178	0.383	0.231	----	0.287	0.368	0.313
	(0.005)	----	(0.008)	(0.005)	(0.006)	(0.005)	----	(0.004)	(0.004)	(0.004)
Live in thinly-populated area [d)]	0.246	----	0.206	0.551	0.047	0.221	----	0.244	0.235	0.221
	(0.005)	----	(0.006)	(0.007)	(0.003)	(0.005)	----	(0.004)	(0.003)	(0.004)
Sample size	9152	5654	5577	6472	6570	8042	16162	14933	20592	12236
Number of age 20-64 in data	10448	10903	6413	7594	7741	9022	18636	15518	23266	13822
Share in sample	0.876	0.519	0.870	0.852	0.849	0.891	0.867	0.962	0.885	0.885

Source: ECHP for 1998-2001 for individuals aged 20-64.

Note: [a)] For Sweden are data from 1998 and the degree of urbanisation variable not available.

[b)] For Spain is the degree of urbanisation variable not available.

[c)] Income are equalised for household members using the modified-OECD scale and converted to the average EU level using purchasing power parities (PPP) for each country.

[d)] The degree of urbanisation is registered by the interviewers.

Table 1. OLS results for the determinants of log body mass index (BMI) for males, percent

	Finland	Sweden	Denmark	Ireland	Belgium	Austria	Spain	Portugal	Italy	Greece
Car	1.73	0.68	2.77*	2.73*	1.94	1.56	1.55*	2.25**	2.22*	1.56**
	(1.10)	(0.69)	(1.16)	(1.37)	(1.52)	(1.32)	(0.66)	(0.75)	(0.92)	(0.56)
Microwave oven	1.85	1.89**	1.73*	0.64	1.50	2.62**	1.18**	-0.20	0.32	-0.09
	(1.07)	(0.53)	(0.74)	(0.86)	(0.84)	(0.61)	(0.44)	(0.58)	(0.36)	(0.52)
Dishwasher	-0.46	0.05	-0.34	-0.72	-0.77	-1.22	-1.80**	1.20	-0.71*	-0.14
	(0.76)	(0.49)	(0.88)	(0.66)	(0.77)	(0.68)	(0.49)	(0.68)	(0.35)	(0.44)
Not working fulltime	-1.02	-0.34	-0.62	-1.17	-0.35	-0.81	-1.11*	-1.67*	-0.89*	-1.11*
	(0.79)	(0.62)	(1.05)	(0.82)	(0.98)	(0.79)	(0.54)	(0.65)	(0.41)	(0.51)
One child or more	-1.25	-1.04	-0.95	1.29	-1.31	1.17	0.84	-0.81	0.46	1.16*
	(0.79)	(0.54)	(0.97)	(0.77)	(0.92)	(0.71)	(0.78)	(0.60)	(0.43)	(0.51)
Single	-0.63	-0.25	-2.13	-3.07*	-4.78**	-0.48	-2.01	-3.14**	-0.99	-2.13**
	(0.90)	(0.56)	(1.22)	(1.24)	(1.34)	(1.03)	(1.11)	(0.81)	(0.63)	(0.70)
Spouse not working fulltime	1.43	0.96*	-0.42	-0.24	-0.37	-0.83	-0.55	0.47	-0.03	0.90
	(0.80)	(0.44)	(0.91)	(0.82)	(0.85)	(0.65)	(0.74)	(0.64)	(0.44)	(0.48)
Primary education	0.12	-0.08	2.17	1.93*	1.48	0.58	1.52**	2.48**	1.84**	-0.31
	(0.79)	(0.62)	(1.17)	(0.77)	(0.85)	(0.84)	(0.50)	(0.77)	(0.38)	(0.43)
Tertiary education	-0.86	-4.07**	-2.22**	-1.37	-3.05**	-5.16**	-0.52	-1.46	-2.29**	-1.50**
	(0.77)	(0.45)	(0.78)	(0.93)	(0.85)	(1.05)	(0.59)	(1.27)	(0.62)	(0.53)
Smoke daily	0.63	-2.93**	-1.44	-2.21**	-0.67	0.42	-1.66**	-2.70**	-0.52	-0.20
	(0.78)	(0.57)	(0.96)	(0.78)	(0.96)	(0.75)	(0.61)	(0.62)	(0.38)	(0.47)
Smoke occasionally	3.64**	-0.36	-1.90	-3.46*	1.80	1.55	-0.30	2.18*	-0.84	-0.34
	(1.20)	(0.65)	(1.95)	(1.58)	(1.24)	(0.84)	(0.63)	(0.99)	(0.44)	(0.51)
Used to smoke daily	4.30**	1.76**	2.17*	4.15**	4.24**	3.84**	2.46**	1.86*	1.90**	2.35**
	(0.92)	(0.52)	(1.03)	(0.89)	(1.03)	(0.93)	(0.58)	(0.84)	(0.60)	(0.76)
Used to smoke occasionally	2.67	0	-0.44	-0.60	1.10	0.05	0.00	1.17	0.69	0.87
	(1.45)	(-)	(1.35)	(1.02)	(1.17)	(0.87)	(0.60)	(0.76)	(0.60)	(0.71)
Income in Euro/10.000	0.21	0.68	0.00	0.62	0.26	-0.21	0.25	0.61	-0.52	0.64
	(0.54)	(0.36)	(0.59)	(0.33)	(0.24)	(0.44)	(0.41)	(0.53)	(0.27)	(0.33)
Income in Euro/10.000 squared	-0.08	-0.03	-0.07	0.00	0.00	0.03	0.02	-0.27**	0.04	-0.11
	(0.08)	(0.02)	(0.07)	(0.00)	(0.00)	(0.05)	(0.02)	(0.08)	(0.05)	(0.06)
Age/10	2.54**	2.20**	1.71**	1.98**	2.66**	4.25**	2.85**	1.78**	3.39**	2.39**
	(0.33)	(0.21)	(0.40)	(0.36)	(0.41)	(0.33)	(0.28)	(0.28)	(0.21)	(0.24)
Age/10 squared	-0.80**	-0.89**	-0.49	-1.24**	-0.97**	-1.09**	-1.03**	-0.98**	-0.88**	-0.69**
	(0.28)	(0.18)	(0.33)	(0.27)	(0.31)	(0.26)	(0.18)	(0.18)	(0.15)	(0.16)
Year 1999	0.50*	-----	0.64*	-0.53	0.00	0.11	-0.20	0.34	-0.23	0.20
	(0.22)	-----	(0.31)	(0.36)	(0.27)	(0.23)	(0.24)	(0.20)	(0.16)	(0.24)
Year 2000	1.05**	-0.16	0.86*	-0.51	0.51	-0.23	-0.50	0.17	-0.03	0.17
	(0.33)	(0.47)	(0.36)	(0.47)	(0.31)	(0.29)	(0.27)	(0.27)	(0.17)	(0.25)
Year 2001	1.39**	0.31	0.75	-0.29	1.03**	0.42	0.15	0.48	-0.22	0.13
	(0.45)	(0.48)	(0.43)	(0.46)	(0.39)	(0.33)	(0.29)	(0.31)	(0.21)	(0.26)
Constant	320.96**	323.13**	320.86**	323.19**	3221.99**	322.03**	325.71**	323.61**	320.95**	325.39**
	(1.60)	(1.03)	(1.43)	(1.75)	(1.92)	(1.50)	(1.36)	(1.24)	(1.05)	(0.91)

Table 1. OLS results for the determinants of log body mass index (BMI) for males, percent *(continued)*

	Finland	Sweden	Denmark	Ireland	Belgium	Austria	Spain	Portugal	Italy	Greece
Mean log BMI*100	324.02	322.87	322.25	323.30	321.99	323.74	324.56	323.35	321.95	325.47
St.dev. log BMI*100	13.77	13.03	13.52	13.17	15.15	13.36	13.83	12.80	12.90	12.61
Root MSE	13.30	12.87	12.84	12.37	13.92	12.07	12.99	11.63	11.90	11.89
R-squared	0.09	0.09	0.08	0.17	0.15	0.17	0.14	0.15	0.16	0.11
No. of obs.	9338	5669	5682	6730	6185	8297	16595	14897	21478	12607
No. of persons	3337	4046	1852	2531	2066	2624	5678	4548	6829	3868

Source: ECHP for 1998-2001 for individuals aged 20-64.

Notes: Standard errors corrected for clustering and heteroscedasticity in parenthesis. Sample weights are used.
* significant at 5%; ** significant at 1%
Reference person: age 40, secondary education, no children, working fulltime, have a spouse working fulltime, never smoked, equalised size of personnel household income on 13000 Euro, no car, no microwave, no dishwasher, year 1998.

Table 2. OLS results for the determinants of log body mass index (BMI) for females, percent

	Finland	Sweden	Denmark	Ireland	Belgium	Austria	Spain	Portugal	Italy	Greece
Car	1.37	-0.21	0.52	-0.76	-1.42	0.01	1.36	-1.23	-2.33*	-0.05
	(1.21)	(0.75)	(1.47)	(1.51)	(1.52)	(1.30)	(0.73)	(1.02)	(1.08)	(0.66)
Microwave oven	-0.77	2.15**	3.18**	1.74	0.97	2.06**	-0.53	-0.11	-0.63	-1.06
	(1.26)	(0.62)	(0.94)	(1.10)	(0.91)	(0.76)	(0.50)	(0.70)	(0.43)	(0.67)
Dishwasher	-1.04	-1.79**	-1.74	-0.48	-2.11*	-0.93	-2.38**	-1.18	-1.89**	-0.25
	(0.85)	(0.58)	(1.17)	(0.76)	(0.83)	(0.77)	(0.51)	(0.79)	(0.45)	(0.60)
Not working fulltime	2.30**	1.45**	-2.84**	0.10	0.94	-0.63	1.27*	1.17	-0.04	0.73
	(0.78)	(0.54)	(1.05)	(0.82)	(0.80)	(0.68)	(0.51)	(0.77)	(0.42)	(0.50)
One child or more	-0.13	0.58	-0.71	-1.00	-0.02	1.21	1.60**	2.61*	0.94	2.17**
	(0.89)	(0.58)	(1.12)	(0.95)	(0.95)	(0.79)	(0.58)	(1.25)	(0.50)	(0.63)
Single	-2.07	-0.58	-2.10	-3.74**	-0.47	-1.42	-0.49	-1.10	-1.49*	-1.17
	(1.08)	(0.66)	(1.65)	(1.24)	(1.01)	(0.97)	(0.72)	(1.76)	(0.59)	(0.80)
Spouse not working fulltime	-1.37	1.52*	-0.71	-1.83	2.10	0.37	1.64*	1.19	0.45	0.15
	(1.03)	(0.67)	(1.31)	(1.65)	(1.40)	(1.06)	(0.81)	(1.23)	(0.71)	(0.90)
Primary education	0.84	1.27	4.57**	0.66	2.97**	3.96**	5.27**	4.38**	3.72**	2.76**
	(0.97)	(0.79)	(1.45)	(0.95)	(1.05)	(0.83)	(0.60)	(0.93)	(0.48)	(0.68)
Tertiary education	-1.69*	-2.29**	-1.94*	-2.00*	-2.59**	-4.56**	-1.05	-0.12	-1.84**	-2.94**
	(0.82)	(0.50)	(0.99)	(0.93)	(0.87)	(1.05)	(0.59)	(1.32)	(0.69)	(0.69)
Smoke daily	-0.60	-1.45*	-0.19	-0.79	-3.73**	-1.42	-2.40**	-4.29**	-1.95**	-0.89
	(0.99)	(0.61)	(1.16)	(0.98)	(0.94)	(0.95)	(0.58)	(1.47)	(0.55)	(0.64)
Smoke occasionally	-1.38	-0.52	0.81	-1.86	-0.44	-2.38*	-2.06*	-0.23	-0.41	-0.07
	(1.30)	(0.72)	(2.23)	(1.22)	(1.26)	(1.04)	(0.90)	(1.72)	(0.58)	(0.54)
Used to smoke daily	1.97*	1.21	1.57	2.07	1.45	2.39*	-1.34	-6.68**	0.44	-1.10
	(0.96)	(0.64)	(1.20)	(1.64)	(1.31)	(1.21)	(0.71)	(1.99)	(0.95)	(1.57)
Used to smoke occasionally	1.29	0.00	0.94	0.07	0.62	-1.10	0.10	-3.18**	0.94	-1.18
	(1.19)	(-)	(1.99)	(1.29)	(1.33)	(1.25)	(0.84)	(1.16)	(0.82)	(1.25)
Income in Euro/10.000	-2.48**	-0.83	-0.77	-0.97*	-0.84**	-1.93**	-0.90**	-1.16	-1.45**	-0.33
	(0.72)	(0.47)	(0.81)	(0.46)	(0.27)	(0.57)	(0.35)	(0.60)	(0.32)	(0.47)
Income in Euro/10.000 squared	0.13	0.01	-0.02	0.01*	0.01**	0.07	0.01	0.02	0.02	-0.11
	(0.09)	(0.04)	(0.09)	(0.00)	(0.00)	(0.09)	(0.02)	(0.08)	(0.06)	(0.08)
Age/10	4.82**	3.23**	2.02**	2.76**	3.85**	5.08**	4.87**	4.37**	4.80**	4.93**
	(0.37)	(0.23)	(0.48)	(0.45)	(0.40)	(0.34)	(0.25)	(0.54)	(0.21)	(0.27)
Age/10 squared	-0.48	-0.35	-0.48	-0.53	-0.28	0.01	-0.36	-0.93**	0.05	-0.90**
	(0.34)	(0.21)	(0.40)	(0.34)	(0.36)	(0.30)	(0.22)	(0.33)	(0.19)	(0.23)
Year 1999	0.32	-----	0.13	-0.33	0.44	0.01	0.25	0.78**	-0.43*	0.97**
	(0.24)	-----	(0.36)	(0.42)	(0.32)	(0.30)	(0.26)	(0.26)	(0.18)	(0.29)
Year 2000	1.56**	0.25	0.43	-0.26	0.12	0.20	0.56	1.36**	0.05	0.35
	(0.37)	(0.56)	(0.48)	(0.51)	(0.38)	(0.39)	(0.29)	(0.32)	(0.20)	(0.31)
Year 2001	1.82**	0.23	1.44**	0.04	1.33**	0.98*	1.33**	2.06**	-0.01	0.08
	(0.44)	(0.55)	(0.54)	(0.63)	(0.46)	(0.42)	(0.32)	(0.39)	(0.23)	(0.32)
Constant	319.13**	316.68**	317.65**	319.84**	317.45**	315.38**	313.76**	317.20**	315.22**	318.20**
	(1.75)	(1.15)	(1.94)	(1.87)	(1.97)	(1.69)	(1.04)	(1.57)	(1.22)	(0.97)

Table 2. OLS results for the determinants of log body mass index (BMI) for females, percent *(continued)*

	Finland	Sweden	Denmark	Ireland	Belgium	Austria	Spain	Portugal	Italy	Greece
Mean log BMI*100	318.88	317.17	316.41	317.24	315.20	316.90	316.27	319.12	313.29	318.35
St.dev. log BMI*100	16.92	15.22	16.09	16.33	17.12	16.38	16.79	16.16	15.47	15.81
Root MSE	15.68	15.09	15.95	15.88	16.04	14.53	14.52	14.88	13.84	14.53
R-squared	0.13	0.08	0.07	0.09	0.14	0.19	0.27	0.21	0.24	0.20
No. of obs.	9152	5654	5577	6472	6570	8042	16162	14933	20592	12236
No. of persons	3242	4000	1836	2423	2177	2568	5487	4551	6570	3799

Source: ECHP for 1998-2001 for individuals aged 20-64.

Notes: Standard errors corrected for clustering and heteroscedasticity in parenthesis. Sample weights are used.
* significant at 5%; ** significant at 1%
Reference person: age 40, secondary education, no children, working fulltime, have a spouse working fulltime, never smoked, equalised size of personnel household income on 13000 Euro, no car, no microwave, no dishwasher, year 1998.

Table 3. Quantile, OLS and IV regressions results for the determinants of log body mass index (BMI) for males, percent

	BMI = 20 [a)]	BMI = 22.5 [a)]	BMI = 25 [a)]	BMI = 27.5 [a)]	BMI = 30 [a)]	OLS [b)]	IV-regression [b, c)]
Car	3.84**	2.73**	2.01**	1.53**	0.56	2.01**	13.26*
	(0.55)	(0.23)	(0.20)	(0.25)	(0.40)	(0.21)	(5.57)
Microwave oven	0.76*	0.67**	0.56**	0.97**	1.38**	0.85**	0.25
	(0.38)	(0.18)	(0.14)	(0.17)	(0.28)	(0.14)	(0.37)
Dishwasher	-0.44	-0.43*	-0.64**	-0.89**	-1.03**	-0.67**	-1.498**
	(0.35)	(0.19)	(0.16)	(0.20)	(0.25)	(0.14)	(0.50)
Not working fulltime	-2.34**	-1.41**	-0.93**	-0.67**	-0.02	-0.88**	0.10
	(0.38)	(0.20)	(0.17)	(0.21)	(0.28)	(0.16)	(0.50)
One child or more	0.53	0.14	0.11	-0.15	-0.11	-0.02	0.02
	(0.30)	(0.20)	(0.17)	(0.18)	(0.29)	(0.15)	(0.20)
Single	-1.52**	-1.60**	-1.98**	-2.24**	-2.21**	-1.90**	-0.66
	(0.40)	(0.29)	(0.25)	(0.27)	(0.37)	(0.20)	(0.67)
Spouse not working fulltime	0.58	0.51*	0.13	0.29	0.40	0.32*	0.62**
	(0.39)	(0.21)	(0.17)	(0.20)	(0.29)	(0.16)	(0.24)
Primary education	-0.38	0.57**	1.10**	1.50**	1.64**	1.11**	1.52**
	(0.32)	(0.21)	(0.15)	(0.20)	(0.30)	(0.15)	(0.32)
Tertiary education	-1.15**	-1.60**	-1.88**	-2.04**	-2.41**	-1.95**	-1.87**
	(0.35)	(0.24)	(0.19)	(0.25)	(0.40)	(0.17)	(0.26)
Smoke daily	-2.35**	-1.83**	-0.82**	-0.44	0.08	-1.00**	-0.42
	(0.27)	(0.16)	(0.16)	(0.23)	(0.24)	(0.15)	(0.26)
Smoke occasionally	1.12*	0.74**	0.28	-0.39	-0.98*	0.06	-0.07
	(0.49)	(0.26)	(0.20)	(0.23)	(0.41)	(0.19)	(0.25)
Used to smoke daily	1.79**	2.16**	2.81**	2.95**	3.18**	2.69**	2.72**
	(0.37)	(0.24)	(0.22)	(0.28)	(0.38)	(0.19)	(0.27)
Used to smoke occasionally	1.21*	0.64*	0.48	0.31	-0.10	0.48*	0.52
	(0.54)	(0.32)	(0.27)	(0.26)	(0.38)	(0.24)	(0.31)
Income in Euro/10.000	0.34*	0.13	0.01	-0.10	-0.16	0.06	-0.30
	(0.16)	(0.10)	(0.08)	(0.11)	(0.12)	(0.08)	(0.23)
Income in Euro/10.000 squared	0.00	0.00	0.00	0.00	0.00	0.00	0.00*
	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age/10	2.06**	2.44**	2.66**	2.85**	3.02**	2.66**	2.82**
	(0.15)	(0.09)	(0.08)	(0.09)	(0.13)	(0.07)	(0.12)
Age/10 squared	-0.47**	-0.74**	-0.91**	-0.96**	-1.01**	-0.91**	-1.09**
	(0.13)	(0.07)	(0.05)	(0.06)	(0.09)	(0.05)	(0.09)
Year 1999	-0.38*	-0.09	0.11	0.26**	0.11	0.03	0.02
	(0.19)	(0.10)	(0.07)	(0.09)	(0.14)	(0.06)	(0.07)
Year 2000	-0.41	-0.08	0.10	0.33**	0.25	0.07	0.11
	(0.23)	(0.10)	(0.08)	(0.10)	(0.17)	(0.07)	(0.08)
Year 2001	-0.66**	0.08	0.32**	0.53**	0.50**	0.28**	0.20*
	(0.22)	(0.12)	(0.09)	(0.12)	(0.19)	(0.08)	(0.09)

Table 3. Quantile, OLS and IV regressions results for the determinants of log body mass index (BMI) for males, percent *(continued)*

	BMI = 20 [a)]	BMI = 22.5 [a)]	BMI = 25 [a)]	BMI = 27.5 [a)]	BMI = 30 [a)]	OLS [b)]	IV-regression [b, c)]
Finland	4.36**	2.92**	1.67**	1.35*	1.11	2.07**	2.87**
	(0.80)	(0.52)	(0.38)	(0.61)	(0.72)	(0.40)	(0.55)
Sweden	3.63**	1.89**	0.56	-0.01	-1.00	0.65	----
	(0.81)	(0.51)	(0.32)	(0.55)	(0.69)	(0.37)	----
Denmark	3.94**	1.23*	0.92*	0.35	-0.55	0.86	2.39*
	(0.91)	(0.57)	(0.46)	(0.63)	(0.74)	(0.45)	(0.94)
Ireland	3.99**	3.07**	2.32**	0.89	-0.83	1.74**	1.86**
	(0.78)	(0.50)	(0.37)	(0.53)	(0.72)	(0.40)	(0.47)
Austria	4.88**	3.37**	1.85**	0.72	-0.19	1.94**	2.09**
	(0.78)	(0.56)	(0.37)	(0.61)	(0.68)	(0.41)	(0.46)
Spain	6.07**	4.65**	3.61**	2.54**	1.39*	3.37**	----
	(0.70)	(0.45)	(0.35)	(0.52)	(0.65)	(0.37)	----
Portugal	5.70**	3.74**	2.17**	0.17	-1.48*	1.69**	2.45**
	(0.90)	(0.52)	(0.36)	(0.52)	(0.71)	(0.38)	(0.55)
Italy	4.60**	2.58**	0.36	-1.14*	-2.75**	0.44	-0.75
	(0.69)	(0.48)	(0.33)	(0.49)	(0.70)	(0.36)	(0.76)
Greece	8.83**	6.81**	4.39**	2.27**	0.11	4.23**	4.48**
	(0.74)	(0.50)	(0.38)	(0.55)	-0.72	(0.38)	(0.44)
Constant	295.10**	308.56**	320.08**	329.72**	339.96**	321.42**	311.18**
	(0.97)	(0.59)	(0.43)	(0.63)	(0.72)	(0.44)	(5.04)
R^2	----	----	----	----	----	0.13	0.07
No. of obs.	107478	107478	107478	107478	107478	107478	71117
No. of persons	37379	37379	37379	37379	37379	37379	20976

Source: ECHP for 1998-2001 for individuals aged 20-64.

Notes: a) The standard errors in parenthesis are bootstrap standard errors corrected for clustering.
b) The standard errors corrected for clustering and heteroscedasticity in parenthesis.
c) The endogen variable is car and the instrument is degree of urbanization where people there live in densely-populated area is use as the dummy variable. The instrument variable is only available for 2000 and 2001, but through some other variables the instrument variable can be calculated for 1998 and 1999 for most of the observations. The instrument variable is not available for Sweden and Spain.
* Significant at 5%; ** significant at 1%
Reference person: age 40, secondary education, no children, working fulltime, have a spouse working fulltime, never smoked, equalised size of personnel household income on 13000 Euro, no car, no microwave, no dishwasher, year 1998, live in Belgium.

Table 4. Quantile, OLS and IV regressions results for the determinants of log body mass index (BMI) for females, percent

	BMI = 20 [a)]	BMI = 22.5 [a)]	BMI = 25 [a)]	BMI = 27.5 [a)]	BMI = 30 [a)]	OLS [b)]	IV-regression [b, c)]
Car	0.83**	0.04	-0.55	-1.32**	-1.91**	-0.42	13.67
	(0.24)	(0.24)	(0.28)	(0.44)	(0.48)	(0.24)	(8.51)
Microwave oven	0.16	0.30	0.24	0.19	0.40	0.32	-0.47
	(0.18)	(0.17)	(0.26)	(0.28)	(0.36)	(0.17)	(0.54)
Dishwasher	-0.85**	-1.36**	-1.49**	-1.84**	-2.06**	-1.37**	-2.61**
	(0.19)	(0.17)	(0.20)	(0.27)	(0.44)	(0.17)	(0.89)
Not working fulltime	-0.25	0.37*	0.79**	1.28**	1.57**	0.57**	0.94**
	(0.16)	(0.18)	(0.21)	(0.24)	(0.32)	(0.15)	(0.30)
One child or more	0.36*	0.71**	0.90**	1.24**	0.94*	0.78**	1.00**
	(0.16)	(0.18)	(0.21)	(0.26)	(0.40)	(0.18)	(0.28)
Single	-2.28**	-2.33**	-2.08**	-1.71**	-1.41**	-1.89**	0.97
	(0.23)	(0.21)	(0.23)	(0.32)	(0.44)	(0.21)	(1.75)
Spouse not working fulltime	0.40	0.39	0.85**	1.15**	1.86**	0.92**	1.38**
	(0.32)	(0.28)	(0.31)	(0.34)	(0.56)	(0.25)	(0.44)
Primary education	2.18**	3.22**	3.69**	4.07**	4.78**	3.21**	3.92**
	(0.21)	(0.21)	(0.26)	(0.32)	(0.39)	(0.19)	(0.54)
Tertiary education	-1.09**	-1.70**	-2.64**	-3.26**	-3.34**	-2.23**	-2.13**
	(0.25)	(0.20)	(0.25)	(0.31)	(0.50)	(0.20)	(0.28)
Smoke daily	-2.87**	-2.01**	-1.53**	-1.04**	-0.74	-2.10**	-1.43**
	(0.21)	(0.20)	(0.23)	(0.31)	(0.45)	(0.20)	(0.37)
Smoke occasionally	-0.05	-0.33	-1.02**	-0.98**	-0.88	-0.78**	-0.68*
	(0.26)	(0.21)	(0.28)	(0.36)	(0.60)	(0.23)	(0.30)
Used to smoke daily	0.31	0.04	0.43	0.68	0.58	0.28	0.73
	(0.27)	(0.30)	(0.34)	(0.48)	(0.51)	(0.28)	(0.41)
Used to smoke occasionally	-0.02	-0.86**	-0.97**	-0.39	-0.49	-0.60*	-0.40
	(0.31)	(0.28)	(0.36)	(0.58)	(0.60)	(0.30)	(0.41)
Income in Euro/10.000	-0.82**	-1.10**	-1.24**	-1.29**	-1.28**	-1.09**	-1.71**
	(0.12)	(0.11)	(0.16)	(0.21)	(0.22)	(0.10)	(0.42)
Income in Euro/10.000 squared	0.01	0.01	0.01	0.01	0.01	0.01**	0.01**
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)
Age/10	3.59**	4.23**	4.57**	4.85**	4.72**	4.21**	4.52**
	(0.09)	(0.08)	(0.07)	(0.11)	(0.16)	(0.07)	(0.22)
Age/10 squared	-0.06	-0.14*	-0.34**	-0.70**	-0.98**	-0.41**	-0.42**
	(0.07)	(0.07)	(0.08)	(0.09)	(0.14)	(0.06)	(0.09)
Year 1999	0.06	0.25**	0.29**	0.35*	0.56*	0.25**	0.24**
	(0.11)	(0.09)	(0.11)	(0.15)	(0.22)	(0.07)	(0.09)
Year 2000	0.20	0.36**	0.51**	0.82**	0.99**	0.44**	0.28**
	(0.13)	(0.10)	(0.12)	(0.16)	(0.22)	(0.08)	(0.09)
Year 2001	0.35**	0.54**	0.83**	1.28**	1.55**	0.74**	0.38**
	(0.13)	(0.11)	(0.14)	(0.17)	(0.23)	(0.09)	(0.11)

Table 4. Quantile, OLS and IV regressions results for the determinants of log body mass index (BMI) for females, percent *(continued)*

	BMI = 20 [a)]	BMI = 22.5 [a)]	BMI = 25 [a)]	BMI = 27.5 [a)]	BMI = 30 [a)]	OLS [b)]	IV-regression [b, c)]
Finland	2.67**	3.10**	4.07**	4.34	3.95**	3.31**	5.05**
	(0.47)	(0.40)	(0.66)	(0.73)**	(1.06)	(0.47)	(1.00)
Sweden	2.03**	1.85**	1.55**	0.73	-0.02	1.37**	----
	(0.36)	(0.40)	(0.59)	-0.55	(0.91)	(0.41)	----
Denmark	1.32*	1.65**	2.37**	2.19**	2.30*	1.65**	3.97**
	(0.55)	(0.50)	(0.67)	(0.77)	(1.14)	(0.52)	(1.37)
Ireland	1.74**	2.05**	1.58*	1.19	0.63	1.19*	1.19*
	(0.43)	(0.45)	(0.65)	(0.64)	(1.08)	(0.49)	(0.57)
Austria	1.74**	1.07*	0.67	0.32	-0.79	0.70	1.02
	(0.45)	(0.45)	(0.56)	(0.71)	(0.96)	(0.47)	(0.53)
Spain	1.44**	0.61	-0.30	-1.62**	-2.77**	-0.14	----
	(0.38)	(0.36)	(0.50)	(0.57)	(0.88)	(0.41)	----
Portugal	2.60**	1.76**	0.05	-1.83**	-3.12**	0.54	1.31*
	(0.41)	(0.40)	(0.57)	(0.64)	(0.96)	(0.43)	(0.55)
Italy	-1.40**	-2.15**	-3.96**	-6.05**	-7.66**	-3.58**	-5.11**
	(0.39)	(0.38)	(0.57)	(0.64)	(0.86)	(0.40)	(1.19)
Greece	3.40**	2.51**	0.93	-1.52*	-3.18**	1.25**	1.82**
	(0.39)	(0.43)	(0.59)	(0.65)	(0.87)	(0.43)	(0.53)
Constant	300.26**	311.34**	321.60**	331.41**	340.39**	317.10**	304.25**
	(0.51)	(0.48)	(0.64)	(0.85)	(1.05)	(0.48)	(7.68)
R^2	----	----	----	----	----	0.18	0.09
No. of obs.	105390	105390	105390	105390	105390	105390	69770
No. of persons	36653	36653	36653	36653	36653	36653	20696

Source: ECHP for 1998-2001 for individuals aged 20-64.

Notes: a) The standard errors in parenthesis are bootstrap standard errors and corrected for clustering.
b) The standard errors corrected for clustering and heteroscedasticity in parenthesis.
c) The endogen variable is car and the instrument is degree of urbanization where people there live in densely-populated area is use as the dummy variable. The instrument variable is only available for 2000 and 2001, but through some other variables the instrument variable can be calculated for 1998 and 1999 for most of the observations. The instrument variable is not available for Sweden and Spain.
* Significant at 5%; ** significant at 1%
Reference person: age 40, secondary education, no children, working fulltime, have a spouse working fulltime, never smoked, equalised size of personnel household income on 13000 Euro, no car, no microwave, no dishwasher, year 1998, live in Belgium.

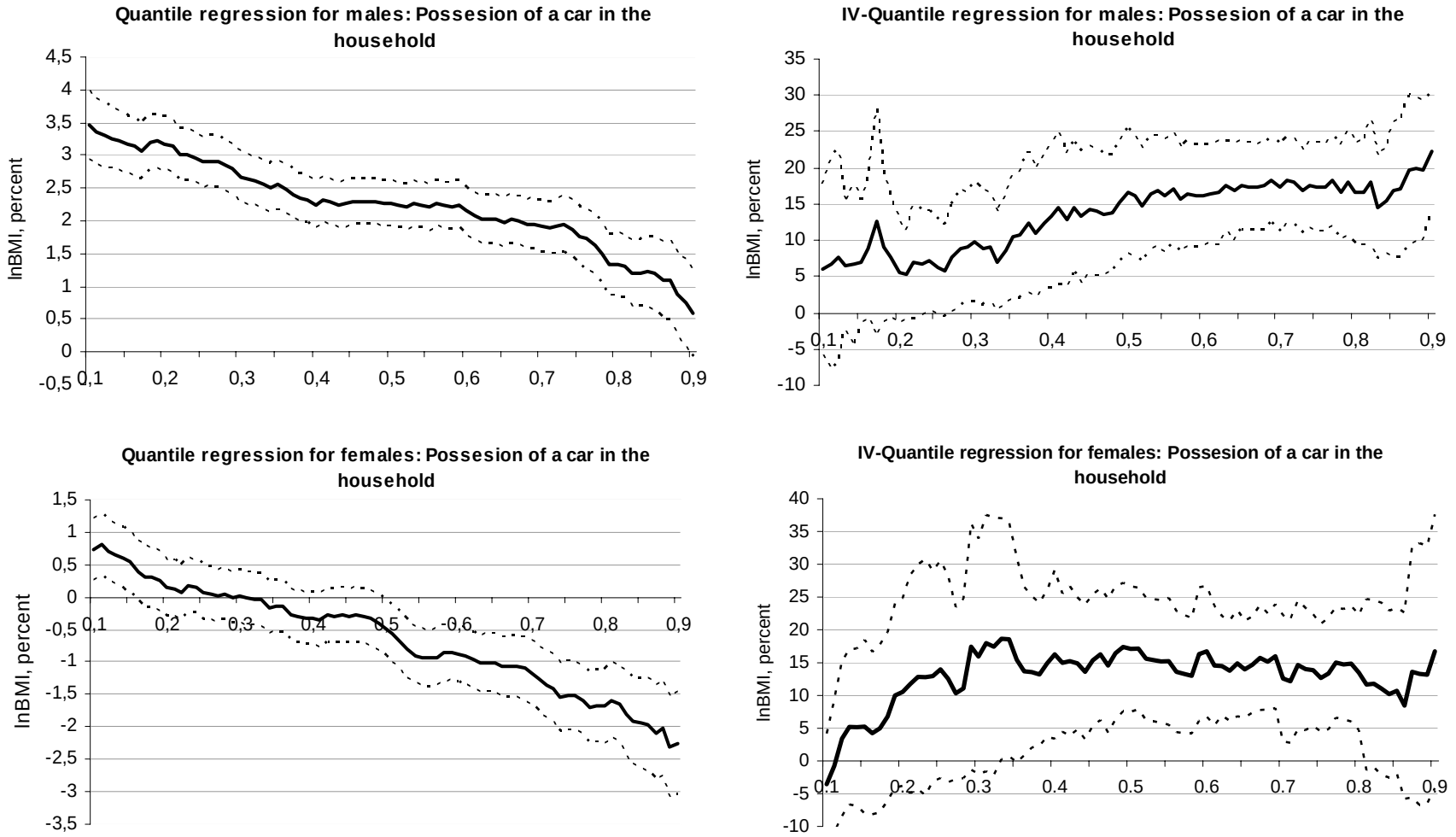
Table 5. Fixed effects estimation results for the determinants of log body mass index (BMI), percent

	All		Singles	
	Males	Females	Males	Females
Car	0.16	-0.14	-0.05	-0.10
	(0.13)	(0.14)	(0.21)	(0.22)
Microwave oven	0.34**	0.02	0.43*	-0.16
	(0.09)	(0.10)	(0.17)	(0.18)
Dishwasher	-0.17	-0.33**	0.00	-0.12
	(0.10)	(0.11)	(0.19)	(0.21)
Not working fulltime	-0.14	0.51**	-0.32*	0.35*
	(0.10)	(0.09)	(0.15)	(0.17)
R-squared	0.02	0.02	0.01	0.01
No. of obs.	107478	105390	35395	33144
No. of persons	37379	36653	13877	13110

Source: ECHP for 1998-2001 for individuals aged 20-64.

Notes: The fixed effects estimation is estimated for all the variables as in the quantile regression, but they are left out in the table.
* Significant at 5%; ** significant at 1%

Figure 1. Quantile and IV-Quantile regression results for the determinants of log body mass index for males and females, percent.



Source: ECHP for 1998-2001 for individuals aged 20-64.

Notes: The instrument is degree of urbanization where people there live in densely-populated area is use as the dummy variable.
Coefficient estimates are on the vertical axis, while the quantile index is on the horizontal axis. The broken lines is the 95% confidence band using robust standard errors. All estimates were computed at 0.01 unit intervals in the interval [0.1, 0.9].
The quantiles for males corresponds to 0.028 for BMI = 20, 0.172 for BMI = 22.5, 0.477 for BMI = 25, 0.746 for BMI = 27.5, 0.899 for BMI = 30. For females the quantiles is equal to 0.135 for BMI = 20, 0.411 for BMI = 22.5, 0.666 for BMI = 25, 0.825 for BMI = 27.5, 0.910 for BMI = 30.