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DOES A SLUMP REALLY MAKE YOU THINNER?

FINNISH MICRO-LEVEL EVIDENCE 1978-2002

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ABSTRACT: This study explores the relationship between obesity and economic conditions in Finland, using individual microdata from 1978 to 2002. The results reveal that an improvement in regional economic conditions measured by the employment-to-population ratio produces a decrease in obesity over the period of investigation, other things being equal. This effect arises from the decline in the height-adjusted weight of people who are deeply overweight (BMI>35). In addition, the effect is strongest for the people in later middle age (aged 45-65). The incidence of obesity is unrelated to the regional growth rate. All in all, the Finnish evidence presented does not support the conclusions reported by Ruhm (2000, 2003, 2004) for the USA, according to which temporary economic slowdowns are good for health. In contrast, at least overweight increases during slumps.

JEL: E32, I12, R11

KEY WORDS: overweight, business cycles, health

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TIIVISTELMÄ: Tutkimuksessa tarkastellaan ylipainon ja talouden tilan välistä yhteyttä Suomessa vuosina 1978-2002 käyttäen mikroaineistoa. Tulosten mukaan alueen työllisyysasteen nousu johtaa väestön liikalihavuuden vähenemiseen. Vaikutus syntyy huomattavasti ylipainoisten (BMI-indeksi > 35) painon vähenemisestä. Lisäksi vaikutus on suurempi myöhemmässä keski-iässä oleville (46-65-vuotiaat). Ylipainon yleisyys on riippumaton alueen talouskasvusta. Suomea koskevat tulokset eivät ole sopusoinnussa Ruhmin (2000, 2003, 2004) Yhdysvalloille raportoimien havaintojen kanssa, joiden mukaan tilapäiset taantumat talouskasvussa ovat hyväksi ihmisten terveydelle. Tulosten valossa ainakin ylipaino-ongelma pahenee talouden taantumien aikana.

JEL: E32, I12, R11

AVAINSANOJA: ylipaino, suhdanteet, terveys

1. Introduction

Early, time-series studies revealed a positive relationship between measures of health and economic conditions (e.g. Brenner 1973, 1975, 1979). However, many authors (Gravelle, Hutchinson & Stern 1981, Stern 1983, Wagstaff 1985, and Cook & Zarkin 1986) concluded that these studies suffer from serious technical problems. Empirical studies that have tried to control for these shortcomings have generally failed to find a consistent relationship between health and economic conditions (Forbes & McGregor 1984, McAvinchey 1988, and Joyce & Mocan 1993). Indeed, Ruhm (2000) reports that while unemployment and mortality both declined rapidly in the USA during the decades after the Great Depression, the improved health was probably due to better nutrition and new medical treatments, e.g. antibiotics, which was not taken into account in the early time-series studies.

Recent studies in developed countries have, surprisingly, found a negative relationship between economic conditions and health (Ruhm 2000, 2003, 2004, Gerdtham & Ruhm 2002, Neumayer 2004, Tapia Granadas 2002).[1] For example, Ruhm (2000) concludes that in the USA, a one percentage point increase in the unemployment rate is associated with a 0.5% reduction in mortality. Gerdtham & Ruhm (2002) find that a similar rise in the OECD unemployment rate is associated with roughly a 0.4% reduction in overall mortality. The newer studies use fixed-effects (FE) models that exploit within-region changes in macroeconomic conditions that automatically control for time-invariant factors that are spuriously correlated with economic conditions across regions. Furthermore, some of these studies (Ruhm & Black, 2002, Ruhm 2003, 2004) have also not only used fixed regional effects on aggregate regional data, but individual microdata as well. The advantage of this method is that a greater set of control variables may be included in the analyses, to differentiate the effects between, for instance, age or educational groups.

A proportion of the reduction in mortality during bad times can be attributed to external sources directly related to economic activity (such as automobile accidents). Ruhm (2000) reports that, for the USA, reductions in automobile accidents during bad times account for roughly one quarter of the reduction in overall mortality. However, there is also evidence that physical health improves during bad times. Ruhm (2004) asks

[1] It should be noted that not all studies have found a negative relationship. Jäntti et al. (2000) find no effect at all on mortality of an increase in the unemployment rate. This study is relevant for this research as it used data for Finnish communities.

whether these improvements in health during bad economic times may be due to changes in health behaviour among individuals. Using US microdata from the Behavioral Risk Factor Surveillance System 1987-2000, he shows that smoking, body-mass index, and leisure-time physical inactivity decline when economic conditions worsen. Interestingly, it is also found that decreases in work hours are associated with improved health. These are all provocative claims, because they challenge the conventional wisdom according to which economic progress is always and everywhere good for one's health. More research and empirical evidence on these matters, particularly on individual health behaviour, is clearly needed before these controversial findings can be accepted as stylized facts.

This study focuses on the relationship between obesity and regional economic conditions, using individual microdata from Finland covering the past two and a half decades. Obesity is an important contributor to many diseases such as cardiovascular diseases.[2] For this reason, it is a good measure for this study. By investigating the effects of economic conditions on health behaviour in Finland, we aim to increase the understanding of these matters in at least three ways. First, these matters have not been investigated in Finland before, and it is not clear that the US results on overweight are also valid in Finland. Indeed, although the incidence of overweight is increasing in Finland, overweight is still much more common in the USA. Second, this study is interesting because of the relatively large regional differences in economic outcomes and health in Finland. In this respect, this study will complement and expand earlier studies of regional health differences in Finland (e.g. Nummela et al. 2000) by incorporating the effects of economic conditions into the analysis. Third, since the data set we use in this study, the Health Behaviour and Health Among the Finnish Population, covers a longer time span (1978-2002) than earlier data used in similar research, we are in a better position to investigate the effects of the business cycle, as there are a greater number of macroeconomic peaks and troughs in our data set.

The rest of the study is organized as follows. Section 2 contains some theoretical considerations. Section 3 provides a description of the data. Section 4 includes a description of empirical strategy and reports the results. The last section concludes.

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[2] These diseases are common in Finland.

2. Theoretical considerations

What may the reasons be that economic hardship, for instance, in the form of higher unemployment rates, may actually improve health, on average, in the economy? According to conventional wisdom, things should perhaps be the other way around? Some answers are provided in Ruhm (2000). First, it is possible that during an economic expansion, non-market "leisure time" becomes more costly, which makes it less worthwhile for the individual to undertake time-consuming health investments in exercise. Second, health may be an input for the production process. Hours of work may be lengthened in order to cope with increased demand, which may increase the risk of accidents. In addition, it is likely that stress increases. Third, good times may increase the prevalence of risky activities, for example driving or drinking. Indeed, Evans and Graham (1988), Ruhm (1995), and Freeman (1999) discover evidence in favour of drinking and vehicle accidents increasing in good economic times.

Importantly, however, it should be remembered that worse health outcomes during temporary economic upswings do not imply the negative effects of permanent economic progress.[3] The key distinction is that agents have greater flexibility in making consumption, time-allocation, and production decisions in the long run. Transitory increases in output usually require more intensive uses of existing production factors. Conversely, long-term growth results from technological improvements or expansions in the capital stock that push the production possibility frontier outwards, and thereby potentially ameliorates costs to health (Ruhm 2004).

3. The data

The data on individuals we are using in this study is Health Behaviour and Health Among the Finnish Population conducted by the National Public Health Institute. This survey has been conducted annually since 1978, and around 5000 randomly selected 15-64 old individuals are included every year. The survey is conducted as post questionnaire. The core questions have remained the same over the years. The data set contains detailed questions on height and weight, physical activity and food choices. In

[3] For example, Pritchett and Summers (1996) report that the long-run income elasticity of infant and child mortality in developing countries is between –0.2 and –0.4.

addition, socioeconomic background variables such as age, education, which are important for health, are included in the survey. Descriptive statistics of the variables is provided in Appendix 1. As noted earlier in the introduction, there has been an increase in the incidence of obesity in Finland during the period of investigation. This is shown as a shift to the right in the distribution of weight across individuals (Figure 1). According to our data around 11% of Finns were obese (BMI>30) based on self-reported information of the survey in the year 2000.[4] This figure seems to be a little bit higher than the European average, but still much lower than in the US (Cutler et al. 2003).

To examine the effect of economic conditions, we link this dataset, using information on individuals' residence, to data from regional national accounts produced by Statistics Finland. Individuals' residence is aggregated to twenty provinces that correspond to the so-called NUTS3 regions stipulated by the European Union.[5] Previously, regional national accounts have not been available in Finland for the years prior to 1988, but new data starting from 1975 has recently been released by Statistics Finland. This means that we are in a good position to investigate the relationship between obesity and economic conditions, because the time span of the data includes a number of business cycle fluctuations. Economic conditions are measured by the regional employment-to-population rate and by the change in real GDP in this study.[6] Appendix 1 reveals that regional disparities are substantial in Finland. These are helpful in identifying the effects of business cycle fluctuations on health.

[4] The self-reported measures of weight tend to underestimate the commonness of obesity among population.

[5] We exclude the Åland Islands, which are an autonomous province of Finland between Finland and Sweden, because there are relatively few observations for that particular province. However, the inclusion of Åland does not change the results.

[6] The correlation coefficient between regional GDP growth and employment growth is 0.6 over the period of investigation. In earlier literature, the unemployment rate has in many instances been favoured as a measure of economic conditions. However, regional unemployment rates are not available for the entire period of investigation in our case. Further, some authors, e.g. Clark and Summers (1982) argue that employment-to-population rates is a better measure of labour market conditions for groups that frequently enter and exit the labour market.

4. Empirical strategy and results

Econometrically we estimate models of the following type:

$$Y_{ijt} = \alpha_j + \beta X_{ijt} + E_{jt} + \lambda_t + \varepsilon_{ijt}$$

where Y is the outcome (height-adjusted weight i.e. log of BMI) for individual *i* living in region *j* in year *t.* X is a vector of individual characteristics (such as age and education), *E* measures economic conditions (the employment-to-population ratio or the growth rate of regional real GDP), ε is an error term, and α and λ represent unobserved determinants of lifestyle behaviours associated with the region and survey year. Thus, in this FE set-up, the effects of economic conditions are identified by intra-region variations, relative to the corresponding changes in other regions.[7]

The results are given in Tables 1-12. Along with the basic results, several checks for the robustness of the results are reported. The results reveal that an improvement in regional economic conditions measured by the employment-to-population ratio produces a decrease in obesity in Finland (Table 1). It should be noted that we do not find any negative effect when we include year dummies, regional dummies, and region-specific time trends. However, we prefer to concentrate on the results obtained from the regressions where we have not taken region-specific time trends into account for two reasons. First, region-specific time trends controls for unobserved factors that vary within regions over time. In a small country like Finland, which is culturally and socially homogenous, these kinds of effects make less sense, than in larger areas, say the European Union or the United States. Second, in Finland, as well as in most Western economies, there has been a strong upward trend in overweight. Chou, Grossman, and Saffer (2002) argue that when including region-specific time trends in regressions of this type, identification becomes cumbersome.

[7] In some regressions we also control for region-specific time trends. This will introduce an additional term $\lambda_t * T$ to our regression model, which will then be as follows: $Y_{ijt} = \alpha_j + \beta X_{ijt} + E_{jt} + \lambda_t + \lambda_t * T + \varepsilon_{ijt}$. This controls for factors that vary over time within regions. However, it is perhaps not very likely that these effects are particularly important in the case of a small country such as Finland.

The observed effect arises from a decline in BMI for people who are severely obese, (BMI>35) (Table 2). This pattern applies separately to men and women (Table 3). In addition, the effect is strongest for the people in later middle age (aged 45-65) (Table 4). There is some minor evidence that Finns aged 16-44 may experience a decline in BMI during economic slowdowns (Table 4). The inclusion of a variable that captures exercise does not alter our results (Table 5). The same applies to the extensions of the basic model with variables that describe commuting and smoking behaviour (Table 5). The regional growth rate is unrelated to the incidence of obesity based on the Finnish evidence (Table 6), but the inclusion of Finland's GDP growth provides support for the conclusion that the incidence of obesity declines in good times (Table 8). Additional results for regional GDP growth are reported in Tables 8-12. Our reading of the Finnish evidence presented is that it does not support the results reported by Ruhm (2000, 2003, 2004) for the USA, according to which temporary economic slowdowns are good for health.

5. Conclusions

This study investigated the relationship between obesity and economic conditions in Finland by using individual microdata from 1978 to 2002. The results reveal that an improvement in economic conditions measured by the employment to population ratio produces a decrease in obesity over the period of investigation. This effect arises from the decline in the height-adjusted weight of people who are seriously obese (BMI>35). In addition, the effect is strongest for older individuals (aged 45-65). The regional growth rate and the incidence of obesity are not related. All in all, the Finnish evidence presented clearly speaks against the results reported by Ruhm (2000, 2003, 2004) for the USA, according to which temporary economic slowdowns are good for health. In contrast, at least overweight increases during slumps.

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Figure 1. **Kernel density estimates for the distribution of BMI for the year 1978 and the year 2002.**

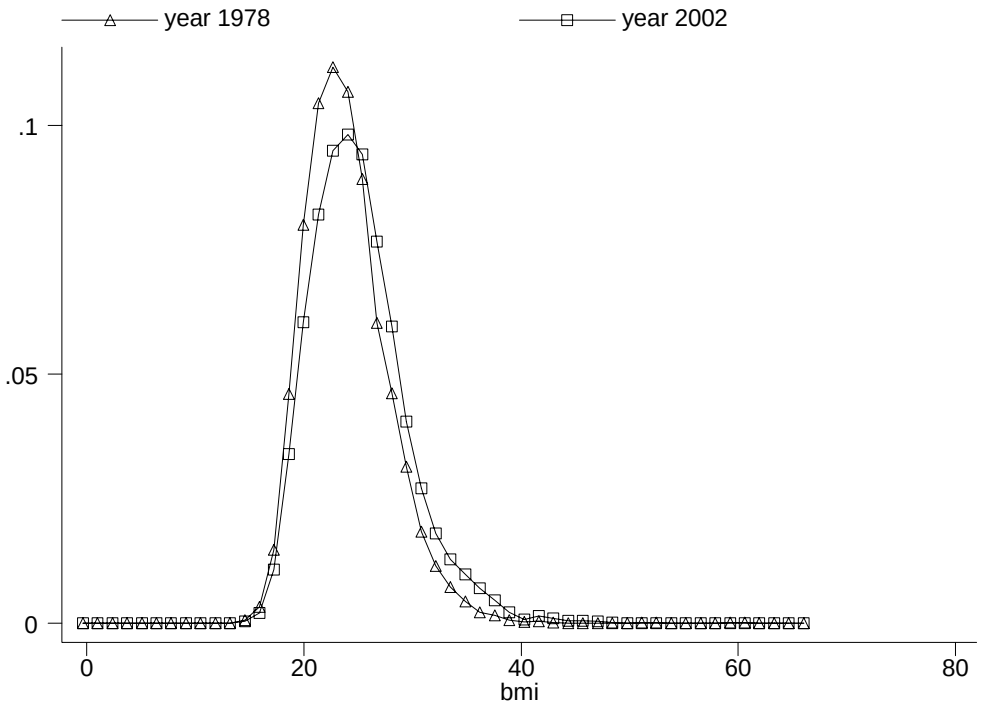

Table 1: OLS regression results (dependent variable: log of BMI)

	(1)	(2)	(3)	(4)	(5)	(6)
Regional E/P rate	-0.000	-0.218	-0.103	0.019	-0.075	0.001
	(0.02)	(6.90)***	(6.47)***	(0.69)	(3.85)***	(0.04)
Female	-0.050	-0.050	-0.050	-0.050	-0.050	-0.050
	(20.45)***	(21.27)***	(20.46)***	(20.49)***	(21.32)***	(20.45)***
Age	0.013	0.013	0.013	0.013	0.013	0.013
	(50.41)***	(48.71)***	(50.05)***	(50.28)***	(48.26)***	(50.41)***
Age squared	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(31.27)***	(28.88)***	(31.09)***	(31.21)***	(28.13)***	(31.27)***
Married	0.013	0.012	0.013	0.013	0.012	0.013
	(6.64)***	(6.15)***	(6.57)***	(6.62)***	(6.11)***	(6.64)***
Divorced	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004
	(1.98)*	(1.75)*	(1.99)*	(1.98)*	(2.01)*	(1.98)*
Widowed	0.025	0.023	0.025	0.025	0.024	0.025
	(5.41)***	(4.65)***	(5.41)***	(5.41)***	(4.92)***	(5.41)***
Retired	0.024	0.024	0.024	0.024	0.024	0.024
	(7.12)***	(7.23)***	(7.16)***	(7.12)***	(7.19)***	(7.12)***
Years of education	-0.006	-0.004	-0.006	-0.006	-0.005	-0.006
	(7.03)***	(5.79)***	(6.80)***	(7.12)***	(7.30)***	(7.03)***
Years of education^2	0.000	0.000	0.000	0.000	0.000	0.000
	(2.42)**	(1.06)	(2.37)**	(2.48)**	(2.38)**	(2.42)**
Observations	93389	93389	93389	93389	93389	93389
R-squared	0.25	0.25	0.25	0.25	0.25	0.25
Regional controls	Yes	Yes	No	No	Yes	Yes
Year controls	Yes	No	Yes	Yes	No	Yes
Region-specific trends	No	No	No	Yes	Yes	Yes

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust t statistics in parentheses. Observations are assumed to be clustered at the regional level. Reference category: Male, not retired, living in Uusimaa, 1978, and Uusimaa*year. Regional controls,year controls, and controls for region-specific time trends are included as indicated.

Table 2: Probit regression results (dependent variable: probability of BMI> 25,BMI>30, BMI>35)

	BMI > 25	BMI > 30	BMI > 35
Regional E/P rate	-0.011	-0.090	-0.060
	(0.14)	(1.83)*	(3.30)***
Female	-0.157	-0.001	0.004
	(27.36)***	(0.52)	(8.75)***
Age	0.034	0.011	0.002
	(41.20)***	(28.44)***	(14.87)***
Age squared	-0.000	-0.000	-0.000
	(26.72)***	(22.58)***	(12.04)***
Married	0.057	-0.001	-0.002
	(9.97)***	(0.36)	(2.03)**
Divorced	0.003	-0.004	-0.001
	(0.36)	(0.99)	(0.64)
Widowed	0.081	0.015	0.001
	(6.71)***	(3.55)***	(0.62)
Retired	0.045	0.043	0.019
	(5.93)***	(12.23)***	(16.31)***
Years of education	-0.023	-0.009	-0.002
	(9.05)***	(10.64)***	(6.36)***
Years of education^2	0.000	0.000	0.000
	(4.24)***	(5.17)***	(3.74)***
Observations	93409	93409	93409

Note: Regressions also include controls for region and year. For probits, coefficients refer to marginal effects Otherwise, see notes to Table 1.

Table 3: Regression results for men and women (dependent variable: log of BMI, probability of BMI> 25, BMI>30, BMI>35)

	Men				Women			
	BMI	BMI > 25	BMI > 30	BMI > 35	BMI	BMI > 25	BMI > 30	BMI > 35
Regional E/P rate	0.015	0.079	-0.102	-0.052	0.000	-0.050	-0.074	-0.067
	(0.76)	(0.80)	(1.86)*	(2.35)**	(0.00)	(0.52)	(1.24)	(2.38)**
Age	0.016	0.047	0.014	0.002	0.011	0.024	0.009	0.002
	(44.28)***	(44.96)***	(20.64)***	(10.41)***	(31.55)***	(19.35)***	(18.23)***	(11.44)***
Age squared	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(31.84)***	(32.05)***	(16.71)***	(9.98)***	(17.83)***	(10.05)***	(13.55)***	(9.59)***
Married	0.014	0.071	-0.005	-0.002	0.012	0.041	0.004	-0.002
	(8.40)***	(9.25)***	(1.66)*	(1.17)	(3.42)***	(3.88)***	(1.04)	(1.77)*
Divorced	0.000	0.006	-0.004	-0.001	-0.007	-0.004	-0.002	-0.000
	(0.15)	(0.52)	(0.60)	(0.76)	(2.28)**	(0.41)	(0.32)	(0.20)
Widowed	-0.007	-0.029	-0.008	-0.002	0.014	0.052	0.016	0.001
	(0.89)	(1.05)	(0.60)	(0.72)	(2.41)**	(3.87)***	(3.21)***	(0.53)
Retired	0.018	0.025	0.041	0.016	0.033	0.066	0.046	0.021
	(3.83)***	(2.02)**	(9.80)***	(9.17)***	(9.32)***	(9.77)***	(8.82)***	(11.40)***
Years of education	-0.001	-0.012	-0.007	-0.002	-0.010	-0.032	-0.011	-0.002
	(1.12)	(3.50)***	(6.03)***	(4.61)***	(11.19)***	(9.65)***	(9.05)***	(5.76)***
Years of education^2	-0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
	(1.16)	(0.85)	(2.57)**	(3.19)***	(5.21)***	(4.69)***	(4.35)***	(2.72)***
Observations	44745	44753	44753	44753	48644	48656	48656	48656
R-squared	0.24				0.24			

Note: Regressions also include controls for region and year. For probits, coefficients refer to marginal effects Otherwise, see notes to Table 1.

Table 4: Regression results per age (dependent variable: log of BMI, probability of BMI> 25, BMI>30, BMI>35)

	45-65 year olds				16-44 year olds			
	BMI	BMI > 25	BMI > 30	BMI > 35	BMI	BMI > 25	BMI > 30	BMI > 35
Regional E/P rate	-0.091	-0.165	-0.354	-0.128	0.042	0.071	0.020	-0.033
	(2.25)**	(1.36)	(2.58)**	(3.09)***	(1.80)*	(0.85)	(0.45)	(1.85)*
Female	-0.023	-0.112	0.013	0.008	-0.065	-0.161	-0.007	0.002
	(5.88)***	(9.55)***	(2.89)***	(5.98)***	(36.72)***	(46.44)***	(3.97)***	(3.42)***
Age	0.023	0.060	0.036	0.007	0.020	0.044	0.010	0.001
	(9.48)***	(6.65)***	(3.72)***	(2.47)**	(37.40)***	(27.97)***	(12.65)***	(3.65)***
Age squared	-0.000	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(8.79)***	(6.00)***	(3.73)***	(2.79)***	(26.11)***	(19.45)***	(9.53)***	(2.48)**
Married	0.021	0.083	-0.004	-0.007	0.010	0.042	0.002	0.000
	(5.41)***	(6.73)***	(0.79)	(4.27)***	(4.81)***	(8.51)***	(0.80)	(0.36)
Divorced	0.005	0.030	-0.003	-0.003	-0.009	-0.010	-0.004	-0.000
	(1.28)	(2.15)**	(0.39)	(1.21)	(3.29)***	(1.44)	(1.41)	(0.13)
Widowed	0.023	0.081	0.015	-0.001	0.017	0.052	0.031	0.010
	(4.24)***	(5.58)***	(2.31)**	(0.28)	(1.85)*	(2.66)***	(2.70)***	(1.81)*
Retired	0.021	0.041	0.060	0.027	0.038	0.080	0.071	0.029
	(8.04)***	(5.29)***	(9.92)***	(13.26)***	(2.85)**	(3.20)***	(8.20)***	(7.18)***
Years of education	-0.007	-0.021	-0.014	-0.003	-0.004	-0.022	-0.007	-0.002
	(5.27)***	(5.32)***	(7.04)***	(3.65)***	(5.98)***	(11.03)***	(9.30)***	(7.14)***
Years of education^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(2.42)**	(2.59)***	(3.32)***	(2.29)**	(0.07)	(5.04)***	(5.00)***	(4.74)***
Observations	34245	34257	34257	34257	59144	59152	59152	59152
R-squared	0.04				0.22			

Note: Regressions also include controls for region and year. For probits, coefficients refer to marginal effects Otherwise, see notes to Table 1.

Table 5: Additional probit regression results (dependent variable: probability of BMI>30)

	BMI > 30	BMI > 30	BMI > 30	BMI > 30	BMI > 30	BMI > 30
Regional E/P rate	-0.090	-0.095	-0.165	-0.090	-0.092	-0.181
	(1.83)*	(1.95)*	(1.39)	(1.83)*	(1.76)*	(1.53)
Female	-0.001	-0.001	-0.005	-0.002	-0.000	-0.004
	(0.52)	(0.55)	(2.23)**	(0.81)	(0.15)	(1.68)*
Age	0.011	0.011	0.011	0.011	0.011	0.011
	(28.44)***	(25.08)***	(20.23)***	(28.30)***	(26.82)***	(17.71)***
Age squared	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(22.58)***	(19.65)***	(16.21)***	(22.53)***	(21.23)***	(13.51)***
Married	-0.001	-0.001	-0.001	-0.001	-0.002	-0.002
	(0.36)	(0.44)	(0.37)	(0.43)	(0.66)	(0.69)
Divorced	-0.004	-0.003	-0.004	-0.003	-0.004	-0.002
	(0.99)	(0.77)	(1.05)	(0.80)	(1.05)	(0.57)
Widowed	0.015	0.017	0.009	0.015	0.015	0.009
	(3.55)***	(3.86)***	(1.32)	(3.56)***	(3.28)***	(1.26)
Retired	0.043	0.046	0.042	0.043	0.043	0.046
	(12.23)***	(13.93)***	(11.31)***	(12.10)***	(9.97)***	(9.19)***
Years of education	-0.009	-0.008	-0.009	-0.009	-0.009	-0.009
	(10.64)***	(9.57)***	(10.03)***	(10.61)***	(10.01)***	(8.73)***
Years of education^2	0.000	0.000	0.000	0.000	0.000	0.000
	(5.17)***	(4.67)***	(5.07)***	(5.12)***	(4.96)***	(4.53)***
Exercise		-0.027				-0.030
		(22.77)***				(19.23)***
Short commute					0.017	0.016
					(4.56)***	(3.47)***
Smoker				-0.005		-0.004
				(3.27)***		(2.01)**
Drinker			-0.015			-0.014
			(7.48)***			(7.11)***
Observations	93409	92437	74540	93409	91538	72508

Note: Regressions also include controls for region and year. For probits, coefficients refer to marginal effects Otherwise, see notes to Table 1.

Table 6: OLS regression results (dependent variable: log of BMI)

	(1)	(2)	(3)	(4)	(5)	(6)
Regional GDP growth	-0.009	-0.030	-0.049	-0.010	0.005	-0.009
	(0.63)	(1.59)	(1.67)	(0.73)	(0.43)	(0.63)
Female	-0.050	-0.050	-0.050	-0.050	-0.050	-0.050
	(20.46)***	(20.99)***	(19.96)***	(20.50)***	(21.32)***	(20.46)***
Age	0.013	0.013	0.013	0.013	0.013	0.013
	(50.39)***	(50.59)***	(49.82)***	(50.26)***	(48.22)***	(50.39)***
Age squared	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(31.26)***	(30.62)***	(30.93)***	(31.20)***	(27.81)***	(31.26)***
Married	0.013	0.012	0.013	0.013	0.012	0.013
	(6.64)***	(6.28)***	(7.05)***	(6.61)***	(6.07)***	(6.64)***
Divorced	-0.004	-0.003	-0.005	-0.004	-0.004	-0.004
	(1.98)*	(1.45)	(2.17)**	(1.98)*	(2.01)*	(1.98)*
Widowed	0.025	0.021	0.025	0.025	0.024	0.025
	(5.41)***	(4.46)***	(5.46)***	(5.42)***	(4.88)***	(5.41)***
Retired	0.024	0.024	0.025	0.024	0.024	0.024
	(7.12)***	(7.20)***	(7.63)***	(7.12)***	(7.19)***	(7.12)***
Years of education	-0.006	-0.002	-0.006	-0.006	-0.005	-0.006
	(7.10)***	(2.82)**	(6.44)***	(7.13)***	(7.12)***	(7.10)***
Years of education^2	0.000	-0.000	0.000	0.000	0.000	0.000
	(2.45)**	(0.51)	(2.37)**	(2.49)**	(2.33)**	(2.45)**
Observations	93389	93389	93389	93389	93389	93389
R-squared	0.25	0.25	0.25	0.25	0.25	0.25
Regional controls	Yes	Yes	No	No	Yes	Yes
Year controls	Yes	No	Yes	Yes	No	Yes
Region-specific trends	No	No	No	Yes	Yes	Yes

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust t statistics in parentheses. Observations are assumed to be clustered at the regional level. Reference categories: Male, not retired, living in Uusimaa, 1978, and Uusimaa*year.

Table 7: OLS regression results (dependent variable: log of BMI)

	(1)	(2)	(3)	(4)	(5)	(6)
Finland's GDP growth	-0.002	-0.000	-0.002	-0.002	0.000	-0.002
	(5.56)***	(2.55)**	(5.48)***	(5.15)***	(0.07)	(5.53)***
Female	-0.050	-0.050	-0.050	-0.050	-0.050	-0.050
	(20.45)***	(20.95)***	(19.95)***	(20.49)***	(21.29)***	(20.45)***
Age	0.013	0.013	0.013	0.013	0.013	0.013
	(50.41)***	(50.76)***	(49.95)***	(50.26)***	(48.16)***	(50.41)***
Age squared	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(31.27)***	(30.77)***	(30.99)***	(31.20)***	(27.79)***	(31.27)***
Married	0.013	0.012	0.013	0.013	0.012	0.013
	(6.64)***	(6.29)***	(7.11)***	(6.61)***	(6.07)***	(6.64)***
Divorced	-0.004	-0.003	-0.005	-0.004	-0.004	-0.004
	(1.98)*	(1.45)	(2.17)**	(1.99)*	(2.01)*	(1.98)*
Widowed	0.025	0.021	0.025	0.025	0.024	0.025
	(5.41)***	(4.47)***	(5.45)***	(5.42)***	(4.88)***	(5.41)***
Retired	0.024	0.024	0.025	0.024	0.024	0.024
	(7.12)***	(7.21)***	(7.68)***	(7.12)***	(7.18)***	(7.12)***
Years of education	-0.006	-0.002	-0.006	-0.006	-0.005	-0.006
	(7.09)***	(2.75)**	(6.42)***	(7.13)***	(7.13)***	(7.09)***
Years of education^2	0.000	-0.000	0.000	0.000	0.000	0.000
	(2.44)**	(0.51)	(2.36)**	(2.49)**	(2.33)**	(2.44)**
Observations	93389	93389	93389	93389	93389	93389
R-squared	0.25	0.25	0.25	0.25	0.25	0.25
Regional controls	Yes	Yes	No	No	Yes	Yes
Year controls	Yes	No	Yes	Yes	No	Yes
Region-specific trends	No	No	No	Yes	Yes	Yes

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust t statistics in parentheses. Observations are assumed to be clustered at the regional level. Reference category: Male, not retired, living in Uusimaa, 1978, and Uusimaa*year. Regional controls, year controls, and controls for region-specific time trends are included as indicated.

Table 8: Probit regression results (dependent variable: probability of BMI> 25, BMI>30, BMI>35)

	BMI > 25	BMI > 30	BMI > 35
Regional GDP growth	-0.013	-0.022	-0.005
	(0.23)	(0.92)	(0.54)
Female	-0.157	-0.001	0.004
	(27.35)***	(0.51)	(8.76)***
Age	0.034	0.011	0.002
	(41.20)***	(28.59)***	(14.95)***
Age squared	-0.000	-0.000	-0.000
	(26.74)***	(22.69)***	(12.07)***
Married	0.057	-0.001	-0.002
	(9.97)***	(0.36)	(2.02)**
Divorced	0.003	-0.004	-0.001
	(0.36)	(0.99)	(0.63)
Widowed	0.081	0.015	0.001
	(6.71)***	(3.53)***	(0.61)
Retired	0.045	0.043	0.019
	(5.94)***	(12.22)***	(16.35)***
Years of education	-0.023	-0.009	-0.002
	(9.09)***	(10.65)***	(6.45)***
Years of education^2	0.000	0.000	0.000
	(4.25)***	(5.14)***	(3.70)***
Observations	93409	93409	93409

Note: Coefficients are marginal effects. Otherwise, see notes to Table 1.

Table 9: Regression results for men and women (dependent variable: log of BMI, probability of BMI> 25, BMI>30, BMI>35)

	Men				Women			
	BMI	BMI > 25	BMI > 30	BMI > 35	BMI	BMI > 25	BMI > 30	BMI > 35
Regional GDP growth	-0.026	0.042	-0.068	-0.034	0.007	-0.067	0.020	0.022
	(1.83)*	(0.49)	(2.15)**	(2.06)**	(0.31)	(0.84)	(0.49)	(1.22)
Age	0.016	0.047	0.014	0.002	0.011	0.024	0.009	0.002
	(44.28)***	(44.96)***	(20.69)***	(10.37)***	(31.54)***	(19.34)***	(18.28)***	(11.51)***
Age squared	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(31.83)***	(32.00)***	(16.73)***	(9.93)***	(17.83)***	(10.06)***	(13.57)***	(9.64)***
Married	0.014	0.071	-0.005	-0.002	0.012	0.041	0.004	-0.002
	(8.41)***	(9.24)***	(1.65)*	(1.16)	(3.42)***	(3.87)***	(1.05)	(1.76)*
Divorced	0.000	0.006	-0.004	-0.001	-0.007	-0.004	-0.002	-0.000
	(0.14)	(0.51)	(0.60)	(0.74)	(2.29)**	(0.41)	(0.32)	(0.20)
Widowed	-0.007	-0.029	-0.008	-0.002	0.014	0.052	0.016	0.001
	(0.89)	(1.05)	(0.60)	(0.73)	(2.41)**	(3.87)***	(3.18)***	(0.51)
Retired	0.018	0.025	0.041	0.016	0.033	0.066	0.046	0.021
	(3.82)***	(2.02)**	(9.80)***	(9.10)***	(9.33)***	(9.77)***	(8.82)***	(11.42)***
Years of education	-0.001	-0.012	-0.006	-0.002	-0.010	-0.032	-0.011	-0.002
	(1.13)	(3.51)***	(6.00)***	(4.56)***	(11.20)***	(9.67)***	(9.08)***	(5.79)***
Years of education^2	-0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
	(1.14)	(0.86)	(2.53)**	(3.11)***	(5.19)***	(4.69)***	(4.34)***	(2.64)***
Observations	44745	44753	44753	44753	48644	48656	48656	48656
R-squared	0.24				0.24			

Note: Regressions also include controls for region and year. For probits, coefficients refer to marginal effects. Otherwise, see notes to Table 1.

Table 10: Regression results per age (dependent variable: log of BMI, probability of BMI> 25, BMI>30, BMI>35)

	45-65 year olds				16-44 year olds			
	BMI	BMI > 25	BMI > 30	BMI > 35	BMI	BMI > 25	BMI > 30	BMI > 35
Regional GDP growth	-0.010	-0.005	-0.027	-0.005	-0.014	-0.021	-0.023	-0.008
	(0.37)	(0.05)	(0.33)	(0.19)	(0.77)	(0.33)	(0.68)	(0.75)
Female	-0.023	-0.112	0.013	0.008	-0.065	-0.161	-0.007	0.002
	(5.88)***	(9.56)***	(2.91)***	(6.03)***	(36.75)***	(46.42)***	(3.98)***	(3.42)***
Age	0.023	0.060	0.036	0.007	0.020	0.044	0.010	0.001
	(9.46)***	(6.64)***	(3.70)***	(2.45)**	(37.36)***	(27.95)***	(12.68)***	(3.65)***
Age squared	-0.000	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(8.77)***	(5.99)***	(3.71)***	(2.77)***	(26.08)***	(19.44)***	(9.55)***	(2.47)**
Married	0.021	0.083	-0.004	-0.007	0.010	0.042	0.002	0.000
	(5.44)***	(6.76)***	(0.78)	(4.29)***	(4.80)***	(8.50)***	(0.80)	(0.36)
Divorced	0.005	0.030	-0.003	-0.003	-0.009	-0.010	-0.004	-0.000
	(1.28)	(2.16)**	(0.40)	(1.20)	(3.29)***	(1.44)	(1.42)	(0.12)
Widowed	0.023	0.081	0.015	-0.001	0.017	0.052	0.031	0.010
	(4.23)***	(5.57)***	(2.29)**	(0.29)	(1.85)*	(2.65)***	(2.70)***	(1.82)*
Retired	0.021	0.041	0.060	0.027	0.038	0.080	0.071	0.029
	(8.04)***	(5.29)***	(9.89)***	(13.28)***	(2.85)**	(3.20)***	(8.20)***	(7.18)***
Years of education	-0.007	-0.021	-0.014	-0.003	-0.004	-0.022	-0.007	-0.002
	(5.35)***	(5.40)***	(6.97)***	(3.68)***	(6.04)***	(10.99)***	(9.27)***	(7.04)***
Years of education^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(2.42)**	(2.61)***	(3.22)***	(2.19)**	(0.11)	(5.03)***	(5.00)***	(4.66)***
Observations	34245	34257	34257	34257	59144	59152	59152	59152
R-squared	0.14				0.22			

Note: Regressions also include controls for region and year. For probits, coefficients refer to marginal effects Otherwise, see notes to Table 1.

Table 11: Regression results per employment sector (dependent variable: log of BMI, probability of BMI> 25, BMI>30, BMI>35)

	Blue-collar workers				White-collar workers			
	BMI	BMI > 25	BMI > 30	BMI > 35	BMI	BMI > 25	BMI > 30	BMI > 35
Regional GDP growth	0.020	0.176	-0.011	0.016	-0.031	-0.099	0.000	-0.007
	(0.65)	(1.25)	(0.20)	(0.64)	(1.24)	(1.20)	(0.00)	(0.46)
Female	-0.049	-0.162	-0.002	0.004	-0.072	-0.224	-0.023	-0.000
	(17.73)***	(17.63)***	(0.40)	(3.57)***	(70.59)***	(66.10)***	(10.06)***	(0.20)
Age	0.011	0.036	0.012	0.002	0.009	0.025	0.007	0.002
	(17.35)***	(14.59)***	(8.95)***	(3.55)***	(20.46)***	(14.43)***	(5.80)***	(3.14)***
Age squared	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(11.57)***	(9.76)***	(7.16)***	(3.06)***	(12.37)***	(7.95)***	(4.16)***	(2.74)***
Married	0.005	0.037	-0.017	-0.004	0.009	0.037	-0.003	-0.001
	(1.71)	(3.16)***	(2.85)***	(3.33)***	(2.71)**	(3.44)***	(0.57)	(0.49)
Divorced	-0.011	-0.013	-0.021	-0.006	-0.003	-0.008	-0.004	-0.001
	(2.81)**	(0.95)	(2.23)**	(2.78)***	(0.88)	(0.47)	(0.54)	(0.28)
Widowed	0.016	0.047	-0.002	-0.007	0.004	0.030	-0.006	-0.002
	(2.21)**	(1.54)	(0.17)	(1.63)	(0.76)	(2.43)**	(0.69)	(0.49)
Years of education	-0.004	-0.018	-0.008	0.000	-0.010	-0.032	-0.011	-0.002
	(2.25)**	(2.34)**	(3.62)***	(0.07)	(9.00)***	(7.17)***	(8.39)***	(4.26)***
Years of education^2	0.000	0.000	0.000	-0.000	0.000	0.001	0.000	0.000
	(0.55)	(1.17)	(1.68)*	(1.03)	(5.79)***	(4.44)***	(5.21)***	(3.71)***
Observations	17335	17338	17338	17338	38077	38083	38083	38083
R-squared	0.15				0.19			

Note: Regressions also include controls for region and year. For probits, coefficients refer to marginal effects Otherwise, see notes to Table 1.

Table 12: Additional probit regression results (dependent variable: probability of BMI>30)

	BMI > 30	BMI > 30	BMI > 30	BMI > 30	BMI > 30	BMI > 30
Regional GDP growth	-0.022	-0.016	-0.008	-0.023	-0.016	-0.002
	(0.92)	(0.68)	(0.30)	(0.93)	(0.66)	(0.06)
Female	-0.001	-0.001	-0.005	-0.002	-0.000	-0.004
	(0.51)	(0.55)	(2.24)**	(0.81)	(0.15)	(1.69)*
Age	0.011	0.011	0.011	0.011	0.011	0.011
	(28.59)***	(25.20)***	(20.21)***	(28.45)***	(27.00)***	(17.71)***
Age squared	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(22.69)***	(19.74)***	(16.19)***	(22.64)***	(21.38)***	(13.51)***
Married	-0.001	-0.001	-0.001	-0.001	-0.002	-0.002
	(0.36)	(0.44)	(0.37)	(0.42)	(0.66)	(0.69)
Divorced	-0.004	-0.003	-0.004	-0.003	-0.004	-0.002
	(0.99)	(0.77)	(1.06)	(0.80)	(1.05)	(0.58)
Widowed	0.015	0.017	0.009	0.015	0.015	0.009
	(3.53)***	(3.84)***	(1.32)	(3.55)***	(3.27)***	(1.26)
Retired	0.043	0.046	0.042	0.043	0.043	0.046
	(12.22)***	(13.92)***	(11.27)***	(12.09)***	(9.97)***	(9.18)***
Years of education	-0.009	-0.008	-0.009	-0.009	-0.009	-0.009
	(10.65)***	(9.55)***	(10.02)***	(10.63)***	(10.01)***	(8.70)***
Years of education^2	0.000	0.000	0.000	0.000	0.000	0.000
	(5.14)***	(4.62)***	(5.05)***	(5.10)***	(4.93)***	(4.50)***
Exercise		-0.027				-0.030
		(22.97)***				(19.25)***
Short commute					0.017	0.016
					(4.55)***	(3.45)***
Smoker				-0.005		-0.004
				(3.28)***		(2.02)**
Drinker			-0.015			-0.014
			(7.51)***			(7.14)***
Observations	93409	92437	74540	93409	91538	72508

Note: Regressions also include controls for region and year. For probits, coefficients refer to marginal effects. Otherwise, see notes to Table 1.

Appendix 1. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Log of BMI	94486	3.183462	0.157053	2.373839	4.18452
Regional GDP growth	94470	0.026811	0.038862	-0.14862	0.180642
Regional employment growth	94470	0.001053	0.030561	-0.09376	0.091584
Regional population growth	94470	0.003628	0.005585	-0.01463	0.013999
The employment-to-population rate	94470	0.462311	0.062989	0.338438	0.612987
Female	94507	0.520946		0	1
Age	94507	38.94148	13.81972	15	64
Married	94507	0.626218		0	1
Divorced	94507	0.062408		0	1
Widowed	94507	0.024432		0	1
Retired	94507	0.090967		0	1
Years of education	93048	11.05998	3.663117	0	52
Exercise	93846	0.515600		0	1
Short commute	92895	0.881511		0	1
Drinker	75553	0.833905			
Smoker	94912	0.314344			

Note: Exercise is a dummy variable that takes the value 1 if individual exercises more often than once a week. Short commute is a dummy variable taking the value 1 if the daily commute is shorter than 30 minutes. Drinker is a dummy taking the value 1 if the individual has drunk alcohol during the last year. Smoker is a dummy taking the value 1 if the individual is a smoker.

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