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by

Jørgen Lauridsen,

Terkel Christiansen

and

Unto Häkkinen

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FURTHER INFORMATION
Department of Business and Economics
Faculty of Social Sciences
University of Southern Denmark
Campusvej 55
DK-5230 Odense M
Denmark

Tel.: +45 6550 3271
Fax: +45 6615 8790
E-mail: lho@sam.sdu.dk
http://www.sam.sdu.dk/depts/virkl/about.shtml

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Does the choice of measurement scale matter in explaining and decomposing differences in income-related health inequality?

Jorgen Lauridsen, Ph.D., Department of Business and Economics, University of Southern Denmark (*)

Terkel Christiansen, Ph.D. , Institute of Public Health - Health Economics, University of Southern Denmark

Unto Häkkinen, Ph.D., Centre for Health Economics at STAKES (CHESS), Helsinki, Finland

(*) Corresponding author: Campusvej 55, DK-5230 Odense M. E-mail jtl@sam.sdu.dk

Fax +45 6595 7766.

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Abstract

The purpose of the study is to assess the sensitivity of measured income-related inequality in health to the choice of measurement scale used. Measurement of income-related inequality in health is often based on self-assessed health with response categories varying from "very good" to "poor". The choice of instrument is relevant when used to transform the self-assessed health variable to a cardinal scale. Data are from a Finnish and a Danish health survey respectively, and 15D and HUI3 scorings are applied to data from both surveys. Health is measured using an interval regression approach to compute concentration indices showing income-related inequalities in health, and inequalities are decomposed into their determining factors. Using Oaxaca's method, the effect of the determining factors are decomposed into a regressor effect and an elasticity effect. The basic health regression results are not strongly different between the 15D and HUI3 scorings. But it is demonstrated, that the decomposition into regressor effects and elasticity effects can be strongly influenced by choice of scoring.

Introduction

The existing knowledge of income-related health inequality across countries implies that the measured inequality may be sensitive to the choice of measurement scale (van Doorslaer et al. [1] and Clarke et al. [2]), and Wagstaff et al. [3] have found that the ranking of relative inequality among countries may be influenced by whether a health or morbidity measure is used. Therefore, various approaches have been used to transform an ordinal health measure to a cardinal scale, including the approach used by Wagstaff et al. [3]; van Doorslaer et al. [4]; van Doorslaer et al. [1].

A vast number of instruments for measuring health-related quality of life (HRQoL) exist. Most relate to both physical and mental aspects of health, but they differ with respect to a number of characteristics, such as the conceptual model for measuring health, content and scope, and degree to which health has been split into its constituting components and are scaled. For example, the EQ-5D (formerly the EuroQol 5D) instrument (EuroQol Group, 1990 [5]) includes only 5 defined dimensions of health status, while the Canadian Health Utility Index Mark 3 (HUI3) (Feeny et al. [6]; Torrance et al. [7]) includes 8 defined dimensions, and the 15D instrument (Sintonen [8]) includes 15 defined dimensions of health. It is conceivable that the nature and number of included dimensions may in itself have an effect on the total score for a given health condition.

In a comparison between various instruments by Hawthorne et al. [9] it has been demonstrated that correlation between scores obtained from applying different instruments to the same population deviated from the theoretical ideal of a perfect correlation. Thus, the Spearman correlation between scores obtained by the 15D and the HUI3 instruments was 0.74 (n = 996). The deviation from the ideal of 1 is ascribed to a pattern where 15D scores are compressed in the upper range of the scale as compared to scores obtained by the HUI3 instrument. One important consequence of this is that a change of average score by the 15D instrument correspond to a much larger change in scores obtained by the HUI3 instrument. For simplicity we will characterise the 15D instrument as a ‘compressed’ instrument in contrast to the HUI3 which we will characterise as ‘non-compressed’.

Previous evidence on socio-economic determinants of health inequality was provided by van Doorslaer et al. [1] in a comparison across 13 EU countries, based on the third wave of the European Community Household Panel (ECHP). In their paper, they applied interval regression (van Doorslaer et al. [4]) and disentangled the contributions of the potential determinants of health inequality, using Oaxaca’s [10] decomposition along the lines suggested by Wagstaff et al. [11].

The present study adds to existing knowledge by comparing results of analysis of income-related inequality, when different health status instruments are used to scale the thresholds of SAH. It is hypothesised that the results are sensitive to properties of the applied scaling instrument.
It is the purpose of the present paper to assess the sensitivity of measured income-related inequality in health to the choice of measurement scale by using the 15D and HUI3 instruments. The choices of instruments were opportunistic as data were available from application of these instruments. Denmark and Finland were chosen for the same reason.

Methods

Design

The design can be described as comparative analyses between instruments and countries: 1) the two instruments are compared when applied to scaling self-assessed health in the population in each of the two countries; 2) the self-assessed health of the populations in the two countries is compared when scaled with both the 15D and the HUI3 instruments.

Measurement of health

Econometric analysis of an ordered categorical dependent variable, such as SAH, is based on the interval (grouped data) regression model. It uses an alternative to ordered probit in the case where the threshold parameters among SAH categories are known. Using such information the estimates of the coefficients for the individual characteristics are more efficient (Jones [12]).

Our approach is to use 15D scores to scale the threshold values between intervals of SAH using a non-parametric approach. First, we calculate the cumulative frequencies for the SAH categories, say G_1, .. , G_5 (where, of course, G_5 = 100 %). Next, thresholds are determined as the (100*G_j) percentiles for the observed 15D scores. This was based on data from the Finnish survey (see below), but the same thresholds were used when analysing data from the Danish survey as well. Moreover, we used external results from applying the HUI3 in a 1994 Canadian survey, National Population Survey (NPS) (van Doorslaer et al. [13], van Doorslaer et al. [4]). These results were applied to both surveys in the present study.

In the comparison between the two indices we compare 1) results from regression of health equations when the HUI3 and the 15D instruments respectively were used to scale SAH; 2) contribution of regressors to inequality in health when measured by SAH and scaled by either the one or the other instrument. The contributions are decomposed into sources of inequality as explained below.

Measurement of inequality

For any variable, y, the income-related inequality is measured using the familiar concentration index, $C = 2*\text{cov}(y,R)/\mu$, where R is the fractional income rank defined for individual *i* as $R_i = (r_i - ½)/N$, with r_i defined as the unconditional income rank for individual *i*. C can be conveniently calculated using the regression $(2\sigma_R^2/\mu)y_i = \alpha + \beta R_i + u_i$, where σ_R^2 is the variance of R. The estimate of β is then equal to C. Using the regression approach, standard errors and t-values for the calculated C values are readily obtained from the regression procedure output.

Decomposing inequality

Assuming that health is linked to K determinants through a linear regression, $y_i = \Sigma_k \delta_k x_{ik} + \varepsilon_i$, the concentration index, C, for y can be decomposed as

(1) $$C = \Sigma_k (\delta_k \mu_k/\mu)C_k + (1/\mu)CG_\varepsilon = \Sigma_k \eta_k C_k + (1/\mu)CG_\varepsilon$$

where μ is the mean of y, μ_k the mean of x_k, C_k the concentration index for x_k, and CG_ε the generalized concentration index for ε (Wagstaff et al. [11]). Equation (1) shows that C can be thought of as made up by two components: a deterministic component equal to the weighted sum of concentration indices of the *k* regressors where the weight of x_k is simply the elasticity of y with respect to x_k, η_k, and a residual unexplained inequality captured by the last term. The decomposition further shows how each determinant's separate contribution to inequality in health can be separated into three sources: (i) its effect on health (δ_k) (ii) its mean in population (μ_k) and (iii) its association with income rank (C_k)

Decomposing inequality differences between countries and measures.

Applying the Oaxaca [10] decomposition method along the lines suggested by van Doorslaer et al. [1], the explained part of the difference in concentration index for country i over country j may be decomposed as

(2) $$\Delta C = C_i - C_j = \Sigma_k \eta_{kj} (C_{ki} - C_{kj}) + \Sigma_k C_{ki} (\eta_{ki} - \eta_{kj}) = \Sigma_k \Delta C^{(k)}$$

Here, $\Delta C^{(k)}$ equals the sum of two terms,

(3) $$\Delta C^{(k)} = \eta_{ki} (C_{ki} - C_{kj}) + C_{kj} (\eta_{ki} - \eta_{kj})$$

The term $\Delta C^{(k)}$ expresses the contribution of variable x_k to excess income-related inequality in health of country i over country j, and the decomposition shows that this contribution can be ascribed two sources. The first source is between country difference in concentration index for variable x_k as captured by the term $\eta_{ki} (C_{ki} - C_{kj})$. The second source is between country difference in elasticity of x_k on y, as measured by the term $C_{kj} (\eta_{ki} - \eta_{kj})$ (van Doorslaer et al. [1]).

The decomposition (3) further reveals potential important implications of choice of health measurement scale: For the case of inter-country comparison, (3) shows that the impact of socio-demographic inequality (i.e. C_{ki} - C_{kj}) is scaled proportional to the health elasticity, i.e. $\eta_{ki} = \delta_{ki}\mu_{ki}/\mu_i$. Using a 'non-compressed' instrument (like the HUI3, which gives a low score to the low SAH category) may increase δ_{ki}, while a 'compressed' instrument (like 15D that gives a relatively high score to the low SAH category) may reduce δ_{ki}. At the same time, the population mean of health, μ_i, will be lower for the 'non-compressed' instrument than for the 'compressed' so that η_{ki} is higher for the 'non-compressed' instrument . Using parallel arguments for the second part of (3), it is realised that the term (η_{ki} - η_{kj}) will be larger when applying a 'non-compressed' instrument. Now, for most socio-demographic conditions, due to the correspondence between socio-demographic inequality and health inequality, the signs of the inequality (C_{ki}) and the health elasticity (η_{ki}) are equal, and the sign of the inter-country difference in inequality (C_{ki} - C_{kj}) equals the sign of the elasticity difference (η_{ki} - η_{kj}). Concluding, the contribution from a socio-demographic condition to inter-country differences in health inequality should be expected to be relatively overstated when using a 'non-compressed' defined measurement scale.

In order to facilitate comparison of the relative importance of the elasticity difference and the concentration index difference of country i over country j, the *percentage relative excess elasticity* and *percentage relative excess concentration index* are calculated as

(4) $$\text{PREE} = 100*(\eta_{ki} - \eta_{kj})/\eta_{kj}$$

and

(5) $$\text{PREC} = 100*(C_{ki} - C_{kj})/C_{kj}$$

respectively.

Finally, we compare within-country results using 15D scoring of SAH to results obtained using HUI3 scoring. In this case, i and j simply index the results obtained using 15D respective HUI3 scores. For this analysis, the decomposition in (3) simplifies, because the same explanatory variables are used so that the C_k's and the μ_k's are equal (i.e. $C_{k,15D} - C_{k,HUI3} = 0$, and $\mu_{k,15D} = \mu_{k,HUI3}$). This implies that (3) reduces to

(6) $$\Delta C^{(k)} = C_k (\eta_{k,15D} - \eta_{k,HUI3}) = C_k \mu_k (\delta_{k,HUI3}/\mu_{HUI3} - \delta_{k,15D}/\mu_{15D})$$

Thus, the contribution of variable x_k to excess income-related inequality in self-assessed health when scaled by HUI3 over self-assessed health scaled by 15D is essentially determined by 1) the sign and magnitude of C_k (including the scaling with μ_k), and 2) the sign and magnitude of the difference in relative impact of x_k on health, i.e. ($\delta_{k,HUI3}/\mu_{HUI3} - \delta_{k,15D}/\mu_{15D}$). If the signs are equal, then x_k *increases* the excess inequality, and otherwise *reduces* it. Again, important implications of choice of health measurement instrument are realised. If the sign of the income-related distribution of a socio-demographic characteristic (i.e. the sign of C_k) is equal to the sign of its elasticity on health, then a 'non-compressed' health instrument will relatively overstate the contribution of the characteristic to health inequality, as compared to a 'compressed' health instrument. On the other hand, for socio-demographic characteristics where these signs are opposite, 'non-compressed' scaled health measurement will relatively understate the contribution of the characteristics to health inequality.

Data

The Finnish data are based on the Finnish Health Care Survey in 1995/1996 which is a national representative cross-sectional sample of the total non-institutionalised population (Arinen et al. [14]). A subset of 2,697 cases (aged 15 to 92) for which data for 15D were available is applied. The overall response rate was 87.2 per cent. The Danish data on self-assessed health, household income and household composition originate from the 1994 Health and Morbidity Survey by The Danish Institute of Public Health, formerly DIKE. A sample of 6001 was selected, and interview was obtained by 78 percent. The calculations include persons of the age 18 or more.

Both health surveys provided data on SAH in five response categories. In the Danish survey, the respondents were asked (translated): "In your opinion, how is your health in general?" with the following response categories: 1) excellent, 2) very good, 3) good, 4) not so good, and 5) poor. In the Finnish survey, the question was (translated): "Is your present state of health in your opinion....1) good, 2) fairly good, 3) average, 4) rather poor or 5) poor?".

Explanatory variables for the regressions are the respondent's income (log of net household income (Finnish Mark for the Finnish survey, DKR for the Dansih survey), adjusted for household composition, using the approach by Aronson et al. [15] where both parameters are chosen = 0.5), age, gender, activity status, educational level, and marital status. An eventual interaction between age and gender as well as any non-linearities in the age effects are captured by specifying age categories (-30, 31-45, 46-60, 61-70, and 71-) for each gender.

Lauridsen et al. [16] reported the calculation of the following interval boundaries for the 15D: 0, 0.673, 0.789, 0.917, 0.965 and 1. For HUI3, the following interval boundaries, reported by van Doorslaer et al. [4], have been used in the present study: 0, 0.428, 0.756, 0.897, 0.947 and 1. It is seen that the boundary between the two low SAH categories is substantially higher for the 15D than for the HUI3 instrument, so that the former represents a relatively narrow scaled measure, while the latter represents a more broadly scaled one.

Results

Table 1 shows results from the interval regression of self-assessed health equations using HUI3 and 15D to score thresholds between SAH categories. For brevity DK is used for Denmark and SF is used for Finland.

/ Table 1 /

When comparing the Danish and Finnish results for each instrument, it appears that they are quite similar with a few deviations. Moreover, when comparing the two instruments as applied to each of the two countries, the results are in close correspondence.

Table 2 reports the means of the variables and the income-related concentration indices for the dependent and independent variables. The first two rows show the predicted SAH as scored by either HUI3 or 15-D. For both countries, there is an unequal distribution of self-assessed health in favour of the higher income groups. It is seen that the predicted SAH based on HUI3 scores have a lower concentration index than the predicted SAH based on 15D scores, which may be due to the lower HUI3 score assigned to those with poor health.

When comparing the countries, it appears that numerically larger concentration indices are found for elderly males/females, retired and widowed in Denmark. Finland has larger indices for unemployed, housewives and divorced/not-married. For self-employed, students, retired, inactive and widowed, the concentration indices are remarkably larger for Denmark than for Finland.

/ Table 2 /

Table 3 shows the contribution of each regressor according to (2) in per cent of the concentration index for self-assessed health, using HUI3 and 15D scores. The coefficients can be interpreted in the following way (cf. van Doorslaer et al. [1]) with the variable log(income) for Denmark as an example: the income-related health inequality would be, ceteris paribus, 37.5 percent lower if income were equally distributed, or if income had a zero health elasticity. The results for the two approaches to scoring are almost equal for each country.

/ Table 3 /

The age contributions are negative for both females and males above 30 years for both instruments applied to the Danish survey, while these effects are somewhat inconclusive for Finland. Retirement has a high contribution for both countries, but especially for Denmark (between 91 and 93%) as compared to Finland (60%), while the reversed is found for low education.

Results from decomposing the "excess inequality" are shown in table 4 and 5. In table 4, either of the two countries are chosen as reference country, and either of the two scoring methods are used as reference. The first two columns show the contribution of regressors to "excess" inequality when 15D scoring is compared to HUI3 scoring for either Denmark or Finland, according to (6). The next two columns show the contribution of regressors when Denmark is compared to Finland, based on either HUI3 or 15D scoring, according to (3). Convenient ways of interpreting the figures are as follows: For DK, income reduces the excess inequality in health measured by 15D over health measured by HUI3 with 32.73 per cent. If income were equally distributed in DK (so that $C_{INCOME} = 0$), or if the elasticities were equal for 15D and HUI3 scaling method, then the excess inequality in self-assessed health scaled by 15D would be 32.73 per cent higher than what would be the case when scaled by HUI3. Further, when comparing health inequality between DK and SF as scaled by HUI3, income accounts for 104.01 per cent of the difference. If income had similar distributions in DK and SF, and if the income elasticities of health were equal, then the excess inequality in health of DK over SF would be 104.01 per cent lower. The results demonstrate that the choice of scoring instrument matters when calculating contributions to excess inequality. When comparing the HUI3 to the 15D contributions (first two columns), fairly large deviations are found for Denmark as well as for Finland. Especially, income and retirement are seen to reduce the excess inequality, but the compositions of these reductions are conceptually different: Income has a positive concentration index, but a negative difference in relative impact on health, because the elasticity is lower for 15D scaling than for scaling by HUI3. Thus, the reduction in excess inequality caused by income is conceptually due to the lower relative impact of income on health measured by 15D than on health measured by HUI3. Opposed to this, the reduction in excess inequality caused by retirement is conceptually due to the negative concentration index for retirement, as the relative impact of retirement on health measured by

15D is higher than on health measured by HUI3. Similar complex patterns in contribution to excess inequality of 15D over HUI3 scaling are seen for age and gender. Especially instructive figures are those for females (71-): Being economically worse off than young males, the concentration indices for females (71-) are negative for DK as well as for SF. But due to opposite signs of the differences in relative impact on health scaled by 15D and HUI3 (negative for DK, but positive for DK), females (71-) increases excess inequality in DK with 9.11 percent and reduces it in SF with 7.74 percent. For the comparison of Denmark and Finland (the last two columns), the choice of measurement further matters, as the differences in contribution are much higher in the HUI3 measure than in the 15D. This is mainly due to the relatively broader range of scores for the SAH categories when scaled by HUI3 as compared to 15D.

/ Table 4 /

Table 5 shows the sensitivity of measurement of relative excess elasticity to choice of measurement scale. A comparison of the first two columns (calculated according to (6) and (4)) generally reveals the expected relative overstatement of the absolute magnitude of the elasticities by using the 'non-compressed' HUI3 instrument as compared to the 'compressed' 15D. Thus, for example, the elasticity for retirement is 36.4 per cent higher when the HUI3 scaling is used compared to 15D scaling, when Danish data ere used, and it is 42.4 per cent higher when Finnish data are used. Similar conclusions hold true for columns 3 and 4 (calculated according to (3) and (5)). As an example, the excess elasticity of retirement for Denmark over Finland is -16.54 per cent in the 15D scaling, while it is -20.02 per cent in the HUI3 scaling. Finally, for completeness, column 5 reports the excess CI of DK over SF (calculated according to (3) and (5)), which are in common for 15D and HUI.

/ Table 5 /

Discussion

The HUI3-based concentration index for Denmark is close to the value found by van Doorslaer et al. [1] (0.0094 as compared to 0.0103 in the present study), indicating an inequality above average, compared to most other EU countries. Further differences and similarities between Denmark and Finland are found in the concentration indices for the explanatory variables. It is remarkable that the concentration index for retired is relatively high in both countries, but in particular in Denmark, indicating a strong negative association between retirement and income. The findings for especially retired can be supported by OECD statistics for the 1990s about percentage of mean disposable income of people aged 65 and over compared with that of those aged 18-64 years. While the OECD average is about 78%, the percentage is only 67.4 in Denmark and 76.5 in Finland (OECD [17]). Thus, being retired means a relatively high loss of income - and higher in those countries, compared to the OECD as a whole.

The choice of measurement scale does not directly impact the results from the interval regression. Thus, the relative contributions of regressors (cf. Table 3) are not very sensitive to choice of scaling, and the relative comparison of Denmark and Finland turns equally out for HUI3 and 15D measurement scales.

But serious differences are found when calculating the Oaxaca decomposition. The contributions of regressors to excess inequality (cf. Table 4) as well as the relative excess elasticities (cf. Table

5) are highly different. Thus, the separated regressor - and elasticity effects are strongly influenced by choice of measurement scale. As a major effect, the contribution from a regressor to income-related health inequality is relatively overstated when using a ‘non-compressed’ health instrument as compared to a ‘compressed’ instrument. This overstatement is also predominant when evaluating regressor contributions to inter-country differences in income-related health inequality.

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Table 1. Interval regression results. SAH scaled by HUI3 and 15D scores.
Comparison between Denmark 1994 (DK) and Finland 1995/96 (SF).

	HUI3				15D			
	DK		SF		DK		SF	
	Coef.	T-val	Coef.	T-val	Coef.	T-val	Coef.	T-val
Log(Income)	0.0160	4.92	0.0168	4.09	0.0127	5.59	0.0114	4.11
Male(31-45)	-0.0150	-2.64	-0.0309	-4.02	-0.0125	-3.17	-0.0248	-4.78
Male(46-60)	-0.0268	-4.08	-0.0630	-7.65	-0.0211	-4.64	-0.0509	-9.14
Male(61-70)	0.0277	3.19	-0.0079	-0.66	0.0178	2.95	-0.0128	-1.56
Male(71-)	0.0274	2.73	-0.0515	-3.61	0.0189	2.70	-0.0413	-4.28
Female(-30)	-0.0022	-0.41	0.0009	0.12	-0.0022	-0.58	-0.0001	-0.02
Female(31-45)	-0.0174	-2.93	-0.0173	-2.32	-0.0149	-3.62	-0.0148	-2.96
Female(46-60)	-0.0282	-4.23	-0.0495	-6.24	-0.0241	-5.20	-0.0412	-7.70
Female(61-70)	0.0170	1.86	-0.0029	-0.23	0.0149	2.34	-0.0083	-0.90
Female(71-)	0.0229	2.27	-0.0487	-3.47	0.0162	2.28	-0.0384	-4.05
Self-employed	-0.0092	-1.67	-0.0047	-0.76	-0.0063	-1.65	-0.0041	-0.97
Student	-0.0012	-0.20	0.0126	1.70	-0.0005	-0.12	0.0092	1.84
Unemployed	-0.0132	-2.41	-0.0163	-2.72	-0.0097	-2.55	-0.0126	-3.11
Retired	-0.1147	-18.03	-0.1199	-14.11	-0.0862	-19.39	-0.0868	-15.11
Housewife	-0.0211	-1.69	-0.0015	-0.14	-0.0150	-1.72	-0.0027	-0.36
Econ.Inact.	-0.0628	-7.76	0.0021	0.09	-0.0461	-8.16	0.0003	0.02
Low Educ.	-0.0088	-2.05	-0.0424	-5.93	-0.0077	-2.57	-0.0328	-6.78
Medium Educ.	-0.0041	-0.81	-0.0125	-1.94	-0.0036	-1.04	-0.0106	-2.43
Divorced/Sep.	-0.0141	-2.82	0.0019	0.27	-.0097	-2.78	0.0021	0.44
Widowed	0.0057	0.91	0.0234	2.61	0.0026	0.59	0.0151	2.48
Unmarried	0.0039	0.96	0.0026	0.51	0.0016	0.56	0.0008	0.24

Note: Omitted categories are: Male (-30),employed, high education, married

Table 2. Means and income related concentration indices of dependent and independent variables.
Comparison between Denmark 1994 (DK) and Finland 1995/96 (SF).

	Means		Conc. Indices	
	DK	SF	DK	SF
HUI3 pred.	0.9125	0.8925	0.0103	0.0095
15D pred.	0.9350	0.9199	0.0138	0.0137
Log(Income)	5.1502	11.2372	0.0554	0.0231
Male(31-45)	0.1585	0.1326	0.2273	0.1046
Male(46-60)	0.1147	0.1169	0.2815	0.1645
Male(61-70)	0.0565	0.0609	-0.0809	-0.0412
Male(71-)	0.0483	0.0355	-0.4670	-0.2900
Female(-30)	0.1191	0.1329	-0.1252	-0.1112
Female(31-45)	0.1526	0.1624	0.1443	0.0999
Female(46-60)	0.1105	0.1394	0.2013	0.1710
Female(61-70)	0.0555	0.0652	-0.3961	-0.2606
Female(71-)	0.0624	0.0482	-0.6555	-0.5187
Selfemployed	0.0686	0.0939	0.2728	-0.0143
Student	0.0874	0.0912	-0.3318	-0.1704
Unemployed	0.0686	0.1145	-0.0902	-0.3080
Retired	0.2058	0.2409	-0.4977	-0.2534
Housewife	0.0124	0.0265	-0.1836	-0.2087
Econ.Inact.	0.0394	0.0054	-0.2542	-0.0270
Low Educ.	0.6854	0.2950	-0.0715	-0.1809
Medium Educ.	0.2014	0.6203	0.1445	0.0211
Divorced/Sep.	0.0867	0.0728	-0.1072	-0.3256
Widowed	0.0788	0.0593	-0.5468	-0.3889
Unmarried	0.3062	0.2160	-0.0849	-0.1225

Table 3. Contribution of regressors (in % of CI for HUI3 / 15D)
Comparison between Denmark 1994 (DK) and Finland 1995/96 (SF).

	15D		HUI3	
	DK	SF	DK	SF
Log(Income)	37.4643	33.6655	36.2630	35.6422
Male(31-45)	-4.6838	-3.9193	-4.2953	-3.5150
Male(46-60)	-7.0789	-11.1574	-6.8558	-9.9160
Male(61-70)	-0.8435	0.3652	-1.0030	0.1629
Male(71-)	-4.4202	4.8374	-4.8990	4.3314
Female(-30)	0.3356	0.0144	0.2603	-0.1052
Female(31-45)	-3.4128	-2.7460	-3.0428	-2.2932
Female(46-60)	-5.5607	-11.2026	-4.9806	-9.6659
Female(61-70)	-3.4001	1.6011	-2.9676	0.4007
Female(71-)	-6.8596	10.9280	-7.4311	9.9598
Selfemployed	-1.2227	0.0625	-1.3672	0.0519
Student	0.1465	-1.6351	0.2675	-1.6055
Unemployed	0.6230	5.0563	0.6477	4.6963
Retired	91.5943	60.4015	93.2575	59.9251
Housewife	0.3530	0.1706	0.3799	0.0691
Econ.Inact.	4.7901	-0.0005	4.9867	-0.0025
Low Educ.	3.9025	19.9333	3.4265	18.5511
Medium Educ.	-1.0889	-1.5738	-0.9425	-1.3418
Divorced/Sep.	0.9357	-0.5690	1.0420	-0.3680
Widowed	-1.1479	-3.9799	-1.9399	-4.4111
Unmarried	-0.4259	-0.2523	-0.8063	-0.5664

Table 4. Contribution of regressors to excess inequality.
15D and HUI3 compared, and Denmark and Finland compared,
measures as % of excess concentration index.

	15D over HUI3		DK over SF	
	DK	SF	HUI3	15D
Log(Income)	-32.7315	-40.1832	104.01	84.463
Male(31-45)	3.1533	2.5860	-89.45	-14.142
Male(46-60)	6.2002	7.0640	327.07	43.383
Male(61-70)	1.4718	0.3018	-128.22	-15.798
Male(71-)	6.3065	-3.1690	-1012.13	-118.957
Female(-30)	-0.0389	0.3798	40.14	4.309
Female(31-45)	1.9549	1.2531	-84.84	-11.663
Female(46-60)	3.2751	6.1358	506.29	64.242
Female(61-70)	1.6961	2.3568	-370.52	-65.276
Female(71-)	9.1114	-7.7358	-1905.15	-226.931
Selfemployed	1.7917	-0.0274	-156.21	-17.124
Student	-0.6234	1.5375	204.65	22.188
Unemployed	-0.7203	-3.8692	-441.14	-54.227
Retired	-98.1472	-58.8306	3730.53	477.520
Housewife	-0.4590	0.1641	34.30	2.610
Econ.Inact.	-5.5646	0.0073	549.41	64.060
Low Educ.	-2.0273	-15.3758	-1646.99	-194.436
Medium Educ.	0.5122	0.8087	42.622	4.9100
Divorced/Sep.	-1.3542	-0.0937	154.898	19.5525
Widowed	4.2685	5.4018	267.720	33.8906
Unmarried	1.9245	1.2879	-26.983	-2.5740

Note. To ease interpretation, the results in columns 1 and 2 are calculated as “15D over HUI3”. This ensures that the divisor (C_{15D} - C_{HUI3}) is positive, so that the reader have one less sign to keep track of.

Table 5. Percentage relative excess elasticity (PREE) in HUI3 over 15D
Percent relative excess elasticity and CI in Denmark (DK) over Finland (SF)

	HUI3 over 15D		DK over SF		
	DK	SF	15D	HUI3	CI
Log(Income)	29.717	51.96	-49.89	-57.23	140.05
Male(31-45)	22.899	28.72	-40.56	-43.25	117.30
Male(46-60)	29.792	27.56	-59.93	-59.22	71.11
Male(61-70)	59.349	-35.98	-227.18	-416.56	96.31
Male(71-)	48.529	28.52	-161.31	-170.86	61.07
Female(-30)	3.944	-1151.53	2143.49	-321.77	12.58
Female(31-45)	19.484	19.87	-6.95	-7.24	44.36
Female(46-60)	20.033	23.84	-54.43	-55.83	17.73
Female(61-70)	16.968	-64.08	-250.96	-591.54	52.04
Female(71-)	45.180	30.81	-153.69	-159.58	26.37
Selfemployed	49.843	19.07	10.70	39.31	-2008.77
Student	144.737	40.93	-104.97	-108.64	94.66
Unemployed	39.327	33.31	-54.53	-52.48	-70.71
Retired	36.447	42.40	-16.53	-20.02	96.36
Housewife	44.228	-41.85	154.22	530.57	-12.04
Econ.Inact.	39.513	692.59	-120463.28	-21286.52	842.42
Low Educ.	17.670	33.58	-46.46	-52.83	-60.48
Medium Educ.	15.998	22.37	-89.10	-89.66	586.11
Divorced/Sep.	49.227	-7.17	-639.59	-967.39	-67.06
Widowed	126.484	59.08	-77.83	-68.43	40.58
Unmarried	153.699	222.23	163.13	107.17	-30.66