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FURTHER EVIDENCE ON THE INDIVIDUAL WELFARE FUNCTION OF INCOME: AN EMPIRICAL INVESTIGATION IN THE NETHERLANDS[1,2]

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The theoretical foundation for this paper has been laid in [3]. One of the premises of the theory there exposed, is that every individual can evaluate his welfare position with respect to his income level on a bounded scale. A description of this evaluation may be given by the individual welfare function of income. One of the outcomes of the theory is that under fairly general assumptions the individual welfare function will tend to a lognormal distribution function $\Lambda(.; \mu, \sigma)$.

In [4] this has been tested empirically, making use of a consumer survey of the Belgian Consumer Union. The thesis was supported by the empirical results, while μ and σ proved to be individually determined. Moreover, the value of μ could be largely explained by income and family size. The first dependency, that the welfare function shifts to the right with an increase of income, has been called *preference drift*.

In this paper we estimated the welfare function of income on the basis of a survey by the Consumer Union in The Netherlands. Besides yielding further evidence on the Belgian results, we handled a much finer social differentiation; accordingly, we could measure the preference drift and the influence of the family size on individual welfare for much finer specified social subgroups.

Finally, we compared our new results for the Dutch survey with the results of the Belgian survey on which we reported in this journal in 1971.

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[2] A more extensive version of this paper is available on request from the Economic Institute Groenhovenstraat 5, Leyden.

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1. Introduction

The individual welfare function of income is a concept which was introduced in [3], and which bears a superficial similarity to the old-fashioned cardinal utility function of income. We do not wish to spend a lot of space here to point out the differences between our concept and the Edgeworthian concept; instead, we refer to the aforementioned monograph for a theoretical foundation or to our earlier article in the Spring 1971 issue of this journal. At this place we restrict ourselves to the following short (and admittedly superficial) introduction. Let y be the level of the individual's annual income, which is assumed to be a constant stream over time; then this level is evaluated by the individual on some scale in terms of "bad", "insufficient", "sufficient", "good", etc. Actually, the individual is evaluating his income in comparison with a worst income level, assumed to be zero, and a best income level, "equal to" ∞. This may very well be on a *numerical* scale. Denoting the evaluation of income level y by $U(y)$, it is not unnatural to evaluate the worst income level $y = 0$ by $U(0) = 0$, and the best level by $U(\infty) = 1$. This is also the way in which for instance students are evaluated; also then evaluations "good", "bad", etc. are translated into numbers on a finite scale. It is not really necessary to situate the interval scale on [0, 1], it may as well be [0, 10], or any other finite interval. It is only essential that it should be bounded, reflecting the psychological reality that every individual is evaluating his income by comparing it with a worst position and a position of complete satiation although any finite amount of money may not suffice to create such a situation. Assuming that $U(y)$ has the interval [0, 1] as its range, the typical shape of $U(y)$ is expected to be as sketched in fig. 1; we call $U(y)$ the *individual welfare function of income*. For the theory and philosophy behind this concept we refer to [3], but we want to state here one thing: the individual welfare function of income does not measure any objectively measurable property of income but only the *relative welfare* as perceived by the individual; it is measured as a proportion between welfare obtained compared to the optimal imaginable situation. It is determined up to a positive linear transformation. (In [3] it is called a *neo-cardinal* concept for reasons which become clear, if the concept is embedded in a world of a varying number of commodities.) In [3] it is shown that under fairly general conditions $U(y)$ will be an approximately lognormal distribution function, i.e.,

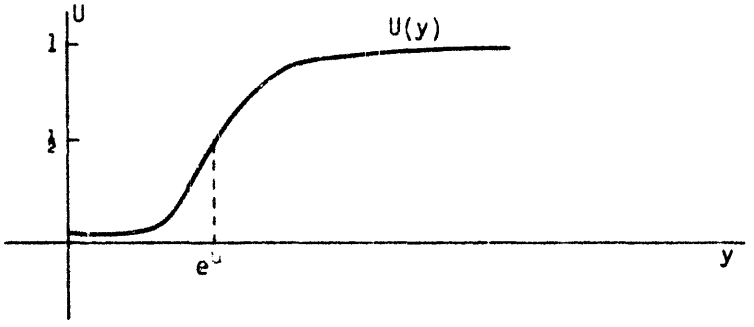

Fig. 1. Individual welfare function of income.

$$U(y) = \Lambda(y; \mu, \sigma) = \frac{1}{\sigma\sqrt{2\pi}} \int_{-\infty}^{\ln(y)} \exp(-\tfrac{1}{2}(t-\mu)^2/\sigma^2)\,dt.$$

The values of the parameters μ and σ are individually determined. So the welfare function of income is *individual*, although it obeys always to an approximately lognormal specification.

In [4] a first attempt was made to verify the operationality of this theory and to *estimate* the welfare function of a number of individuals.

More specifically, on the basis of a survey among about 3000 members of the Belgian Consumer Union, the following conclusions could be drawn:

(a) the individual's welfare function can be estimated;
(b) the shape appeared to be approximately lognormal;
(c) the parameters μ and σ appeared to be quite stable.

There was a definite relationship between μ and the individual income and family size. On the other hand σ could *not* be shown to depend on individual income and family size.

In this paper we shall continue the analysis and consider a survey among members of the Dutch consumer union. At first we shall look for confirmation on the observability of the welfare function, its lognormality and the estimation of the parameters on the basis of this new survey. The main part of this paper, however, will be devoted to a closer analysis of μ and σ and their determinants. Since the recent survey is much more informative than the previous one with respect to the sociological characteristics of the sample, we are able to provide for a better explanation of μ and σ. Finally, we compare the Dutch and Belgian results.

2. The estimation method

Although we might refer to [4], we think the reader will prefer that we repeat here in short the method we employed to estimate the welfare function in Belgium.

The income concept the individual has in mind is *net* income. Actually, the function $U(y) = \Lambda(y; \mu, \sigma)$ can be estimated if we have at hand a number of observations of the type $(y_i, U(y_i))_{i=1}^n$, through which we can fit a curve of the lognormal family. However, the difficulty is that we cannot provide the individual with a series of income levels and ask him straightaway how he evaluates these levels on a zero–one scale. The individual does not have the habit to evaluate in such a way. A second problem is that we would have to rely in an anonymous questionnaire on a fixed series $(y_i)_{i=1}^n$ say 800, 1000, 1200, ..., 2000 guilders per month. For some people these income levels may be really different with respect to evaluation, but for other people, say the rich, there will be no real difference between these levels, all being very insufficient. The same holds for the poor man, who cannot make any differentiation between 1800 and 2000 except that both are royal income levels.

In this paper we shall employ an indirect method developed in [4] which already proved to be successful. It is based on the following question, where we quote a typical answer (in Roman).

Taking into account your own situation with respect to family and job you would call your *net-income* (including fringe benefits and with substraction of social security premiums)*

per { week A / month B / year C

excellent	*if it were above*	*f* 45,000
good	*if it were between*	*f* 35,000 and 45,000
amply sufficient	*if it were between*	*f* 30,000 and 35,000
sufficient	*if it were between*	*f* 25,000 and 30,000
barely sufficient	*if it were between*	*f* 22,000 and 25,000
insufficient	*if it were between*	*f* 20,000 and 22,000
very insufficient	*if it were between*	*f* 17,000 and 20,000
bad	*if it were between*	*f* 12,000 and 17,000
very bad	*if it were below*	*f* 12,000

* Encircle your reference period.

In this way the individual furnishes us a division of the income range into income brackets $(y_1, y_2], (y_2, y_3], \ldots, (y_n, y_{n+1})$ where $y_1 = 0$ and

$y_{n+1} = \infty$. The division differs from individual to individual and it is certain that the division is not given by the individual in a random way. There seems to be a general principle behind the fact, that always the extreme brackets are wider than the brackets in the middle.

It is not unreasonable to assume that the individual tries to inform us as *exactly* as possible about his welfare function. He attempts to maximize the *information value* of his answer. Can we define the information value more sharply?

Let us consider the above answer. The welfare evaluation of an income in the brackets (25, 30], labelled "sufficient", is on the average

$$\tfrac{1}{2}[U(25) + U(30)] = U(\bar{y}_6)$$

by which equation $\bar{y}_6$ is defined.

However, we cannot say that any income level in (25, 30] is evaluated by $U(\bar{y}_6)$. The *average inaccuracy* of this evaluation may be measured by

$$\int_{25}^{30} [U(y) - U(\bar{y}_6)]^2 \, dU(y).$$

When we have a partition $[0, y_2], (y_2, y_3], \ldots, (y_n, \infty)$ the *total average inaccuracy* of this partition is by definition

$$\sum_{i=1}^{n} \int_{y_i}^{y_{i+1}} [U(y) - U(\bar{y}_i)]^2 \, dU(y). \tag{1}$$

Now it is evident that the separate integrals increase with the variation of the U-function on $(y_i, y_{i+1}]$ and the interval length $(y_{i+1} - y_i)$. Hence the individual selects narrow brackets where the U-function is steep, and wide brackets where it increases slowly. Mathematically, the individual attempts to choose the y_i-values in such a way that (1) is minimized. Applying the "integral transformation" $z = U(y)$ we replace minimization of (1) by the problem

$$\min_{z_2, \ldots, z_n} \sum_{i=1}^{n} \int_{z_i}^{z_{i+1}} \tfrac{1}{2}[z - \bar{z}_i]^2 \, dz, \tag{2}$$

where

$$z_i = U(y_i) \quad \text{and} \quad \bar{z}_i = \tfrac{1}{2}(z_i + z_{i+1}).$$

Integration of (2) yields

$$\min_{z_2,\ldots,z_n} \tfrac{1}{12} \sum_{i=1}^{n} (z_{i+1} - z_i)^3. \tag{3}$$

Setting $p_i = z_{i+1} - z_i$ we have $\Sigma_{i=1}^{n} p_i = 1$. So the problem reduces to

$$\min_{p_1,\ldots,p_n} \sum_{i=1}^{n} p_i^3,$$

subject to

$$\sum_{i=1}^{n} p_i = 1.$$

The solution is $p_i = (1/n)$ which implies $z_i = (i-1)/n$ and

$$U(y_i) = \frac{i-1}{n}.$$

In words, the result can be stated as: *the individual partitions the income range according to equal percentiles of the welfare function.* In the actual situation our question leaves room for nine brackets, so y_i is the $(i-1)$st 11.1%-quantile of the distribution defined by the distribution function U.

We observe that the definition of the average inaccuracy by (1) contains an element of arbitrariness, but fortunately any other reasonable criterion yields the same solution $p_i = (1/n)$. We refer to [3] for a more detailed analysis. Secondly, it may be asked whether we observe by this method points of the individual welfare function or something else. Although it cannot be proved in an objective way, we believe that our point estimates present an empirical reflection of the theoretical concept of an individual welfare function. Actually, the concept is *empirically stamped* by repeated measurement. In the same way the concept of *clock*-time acquired its significance in the Middle Ages; in the same way *temperature* as a measurable concept, was empirically stamped in the 18th century, and in our century the still less visualizable concept of I.Q. got its significance for a considerable part of the population.

After this not unimportant sideline we come back to pursue the analysis. By the method described we have found for the individual a series of points $\{y_i, U(y_i)\}_{i=2}^{9}$, which have to be on the graph of his welfare function. The question is whether the assumption, that the individual welfare function is lognormal, is plausible and how we may estimate the parameters μ and σ. We solve this question essentially by mak-

ing a scatter of the points on *lognormal* paper, where the horizontal axis has a logarithmic scale and the vertical axis performs the transformation $x = N^{-1}(.; 0, 1)$ where $N(.; 0, 1)$ is the standard-normal distribution function. If the points $\{y_i, U(y_i)\ _{i=2}^{9}\}$ were points of the graph of a distribution function $\Lambda(y; \mu, \sigma)$, there would strictly hold

$$U(y_i) = N(\ln(y_i); \mu, \sigma) = N\left(\frac{\ln(y_i)-\mu}{\sigma}; 0, 1\right).$$

We know that the logarithms of the y_i's quoted are 11.1%-quantiles, say, $u_2, \ldots, u_9$ of the normal distribution, hence there has to hold

$$\frac{\ln(y_i)-\mu}{\sigma} = u_i,$$

or

$$\ln(y_i) = \sigma u_i + \mu. \tag{4}$$

It stands to reason that the individual answers will not satisfy (4) strictly, but we may assume that (4) holds approximately; we estimate μ, σ from the linear model

$$\ln(y_i) = \sigma u_i + \mu + \epsilon_i, \tag{5}$$

where ϵ_i is the random disturbance term. We assume that all ϵ_i are independently distributed with equal variance and expectation zero.

Applying ordinary regression on the eight observations (y_i, u_i) from the questionnaire we get estimates for μ and σ. If the individual has not inserted all answers but has forgotten, say, the first and the third, we have still six observations (y_3, u_3), (y_5, u_5), ..., (y_9, u_9) on which we may apply the regression. Only the two-point answers are excluded, since a regression would be trivial in that case.

3. Social classifications of the material

The members of the Consumer Union in The Netherlands, at the sampling date numbering over 300,000 members, receive a monthly journal with consumer information, tests, and so on. The October 1971 issue included an 8-page questionnaire, which was to be answered by the member, and to be sent anonymously to the Consumer Union as a letter for which the respondent had to pay a stamp. Answering the questionnaire took about an hour and a half. The questionnaire contained ques-

tions about the attitude of the respondent towards the Union, his consumer behavior and more specifically his purchase plans of durables, and finally a set of questions about his social background and the very unusual question about income evaluation quoted in the previous section.

Although the conditions looked unfavorable, the response was rather large. About 15,000 members took the pains to answer the questions and mostly this was done in a very accurate way. About half of them answered the most difficult questions, those with respect to the income evaluation. Undoubtedly, this good result is due to the very good reputation of the Union among its members.

We chose 6186 questionnaires at random for detailed inspection. We might pose the question what the sample represents. Not very much is known of the membership of the Consumer Union from other sources. Investigations in which the answers of the *complete* questionnaire were compared to other scarce information, indicate that the sample is at least representative for the Union, except for the characteristic that the respondents filled in the questionnaire and the non-respondents did not. This seems to have an effect in such a way, that higher educated people tend to be over-represented. Nevertheless, even if the sample were not representative for the Union or the Dutch population, it is still informative for our investigations about the individual welfare function.

Our main subject will be the estimation of the individual welfare function as described in section 2 and the explanation of the parameter values by objectively observable variables.

We consider the following characteristics:

(A) *The annual net income of the individual.* Since the questionnaire was anonymous, the response to this question was rather high. Actually the income could be specified per week, per month or per year so that every respondent could answer in the unit he is most used to. The concept of net income itself, although rather understandably described, of course causes some interpretation differences among the respondents. However, it does not seem fatal for the estimation of parameters and relationships. We think that the respondents mainly list their "permanent net-income" which also serves as a basis for their income perception and evaluation. Annual income in guilders has been tabulated afterwards in six brackets, namely [0–8000], (8000–12000], (12000–18000], (18000–26000], (26000–36000], (36000, ∞)].

(B) *The family size.* That is the number of dependents on the respondent.

(C) *The principal breadwinner of the family.* Mainly this is the man but sometimes it may be the wife (especially if divorced), or a third person.

(D) *The activities of the spouse of the breadwinner.* In most cases the husband is the breadwinner, but sometimes it is the wife. For simplicity we shall assume in our textual representation that the husband is always the breadwinner, excusing ourselves to the feminist reader "qui mal y pense". We asked whether the wife of a husband-breadwinner also has a paid full-time job, a part-time job, has a job incidentally or no job at all.

(E) *The level of education of both parents.* We observe that the Dutch educational system can be classified more or less according to two characteristics, namely, with respect to *level* and *nature* (vocational versus general) of education. So we get the following table in order of increasing level:

general		*vocational*	
primary education	(1)		
ext. primary education	(2)	primary vocational education	(3)
secondary education	(4)	secondary vocational educ.	(5)
		higher vocational education	(6)
university education (7)			

The figures between brackets indicate the order used in the specific question; they will be used afterwards. Actually, we assumed the respondents to have a university degree if they had passed their first examination, so we have a number of university students as respondents with university education.

(F) *Working environment.* We distinguish between

civil service	(1)
non-profit organisation	(2)
private enterprise	(3)
independent	(4)
not working	(5)

(G) *Job classification.* We dinstinguish between

unskilled labor	(1)
skilled labor	(2)
administrative personnel	(3)
lower and middle executives	(4)
non-civic army and police personnel	(5)
instructors, teachers, professors, etc.	(6)
secondary and higher professional experts	(7)
the professions and higher personnel (doctors, judges, directors, etc.)	(8)

commerical professions (salesman, etc.)	(9)
agrarians	(10)
retired	(11)
without profession (housewife, student)	(12)
temporarily unemployed	(13)

4. The individual welfare function and determinants

The first objective of this article is to gather more evidence on the individual welfare function and its lognormality. In that respect we are satisfied.

We are interested in those people who state their income *and* answer the difficult "income evaluation question" (see section 2). So we could select 3201 questionnaires out of the randomly chosen subsample of 6186 members. Punching errors urged us to eliminate 85 observations; finally we eliminated the respondents, who did not specify their family composition. Our final subsample consisted of 3010 observations. It will be noticed that most tables add up to a smaller number of observations since not every respondent filled in every relevant question.

The majority of the respondents answered the income evaluation question completely; we included in our sample every answer, in which at least *three* different income levels were specified.

We might think that education has something to do with the ability to answer the evaluation question. In table 1 we present the distribution of 3, 4, 5, 6, 7 and 8-level answers for the different education groups (characteristic E). In the last row we compare the numbers of the different education groups in the subsample of 3201 observations with the total sample of 6186 observations. We conclude that there is a slight bias in favor of the higher educated groups. However, the bias is by no means dramatic. Apparently, each group is able to answer our ' difficult income question".

According to the method described in section 2 we estimated the μ and σ of 3010 individuals. Moreover we estimated for each individual the evaluation of his welfare position by "filling in" the income mentioned into his *own* welfare function. Let the ith individual have a welfare function $\Lambda(.; \mu_i, \sigma_i)$, then we have estimated μ_i, σ_i and $\Lambda(.; \mu_i, \sigma_i)$. Before we consider those estimates a few words about the goodness of fit. The goodness of fit can be measured by various coefficients; among them are the correlation coefficient and the estimates of the standard

Table 1
Specified income levels – education (numbers).

Education / Number of levels	Not specified	Primary education	Ext. primary education	Primary vocation. education	Secondary education	Secondary vocation. education	Higher vocation. education	University education	Total
3	8	3	10	4	16	8	35	31	115
4	11	2	17	1	14	13	52	46	156
5	11	6	32	6	26	17	63	74	235
6	17	2	30	5	35	25	58	43	215
7	4	4	12	4	10	8	45	29	116
8	87	46	315	141	305	256	759	455	2364
Total	138	63	416	161	406	327	1012	678	3201
Total number of respondents in the 6186-sample	420	176	824	374	767	586	1746	1295	6186

deviations of the regression coefficients. The average non-squared correlation coefficient of the 3201 measurements is equal to 0.97. The estimated standard deviations of the estimates of μ and estimates of σ are on the average equal to 0.04 and 0.05. Compared to the average values of μ and σ, 9.55 and 0.54 this amounts to about 0.4% and 10% respectively.

However, the level of μ depends on the chosen money unit, so it seems more appropriate to compare the estimated standard deviations of the individual regression coefficients with the variation of the estimated coefficients within the sample. We find a *descriptive* sample standard deviation of 0.49 for μ and a sample standard deviation of 0.25 for σ. We conclude therefore that the main part of the variation of the coefficients within the sample is due to systematic differences between people and only a small part of it may be ascribed to errors of measurement.

Apart from the goodness of fit, we are concerned with the form of the relation (5), which should be linear in our view. If the estimated relation is non-linear in the independent variables, one might expect that the disturbances would follow a definite pattern around the regression line instead of being scattered unsystematically. In other words, we would expect that the disturbances are correlated in some way. We considered the possibility of auto-correlated disturbances, i.e., we assumed an auto-regressive scheme of the disturbances of the type

$$\epsilon_i = \rho\epsilon_{i-1} + \delta_i,$$

where the δ_i are random with constant variance and expectation zero. We estimated ρ by the formula

$$\rho = \frac{\sum_{t=2}^{n} \epsilon_t \epsilon_{t-1}}{\sum_{t=2}^{n} \epsilon_{t-1}^2},$$

where n is the number of specified income levels and ϵ_t is the ith estimated disturbance. The average of all the estimates of ρ in the sample appeared to be equal to 0.03, where the standard deviation of the estimated auto-correlation coefficients within the sample equals 0.36. This provides an additional argument in favor of the lognormality of the welfare function. Moreover, it indicates that on the average our estimates of the standard deviations of the regression coefficients are unbiased.

Now let us consider the results with respect to their economic signifi-

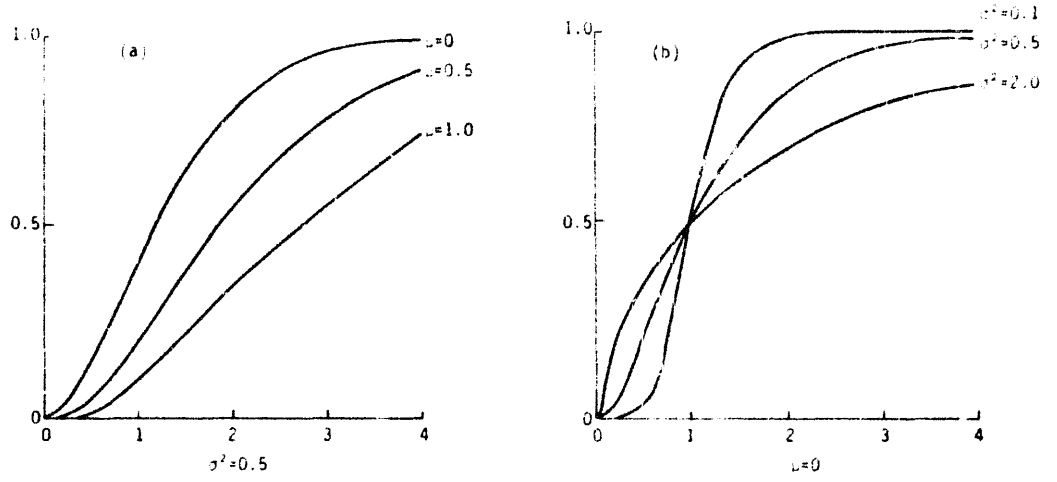

Fig. 2. The lognormal distribution function for different parametervalues. (a) Distribution functions for $\mu = 0, 0.5, 1.0$. (b) Distribution functions for $\sigma^2 = 0.1, 0.5, 2.0$.

cance. In figs. 2a and 2b we have sketched welfare functions for several values of μ and σ. From these figures we already get an idea of the significance of changes in μ and σ. Before we consider the tables, let us interpret the differences in μ and σ in a more analytic way. Consider two individuals with equal σ but different μ, say μ_1 and μ_2. The first has a net income y_1. Which income y_2 needs the other to enjoy the same welfare level?

The welfare level of the first individual is

$$\Lambda(y_1; \mu_1, \sigma) = \Lambda(y_1 e^{-\mu_1}; 0, \sigma).$$

The second one enjoys a level

$$\Lambda(y_2; \mu_2, \sigma) = \Lambda(y_2 e^{-\mu_2}; 0, \sigma).$$

In order that both enjoy the same welfare level, either person measuring on his *own* welfare scale, there has to hold:

$$y_2 = y_1 e^{\mu_2 - \mu_1} \approx y_1(1 + (\mu_2 - \mu_1)).$$

The approximation is only valid if $\mu_2 - \mu_1$ is small. For instance, if $\mu_2 - \mu_1 = 0.1$ it would mean that the second person needs 10% more income than the first to be at the same welfare level. We call e^{μ} the *natural unit (of income)*.

Differences with respect to σ are interpreted in the same way. Let both have equal μ but different σ_1 and σ_2. The first welfare level is

$$\Lambda(y_1; \mu, \sigma_1) = N\left(\frac{\ln(y_1) - \mu}{\sigma_1}; 0, 1\right).$$

The second person is at a level

$$\Lambda(y_2; \mu, \sigma_2) = N\left(\frac{\ln(y_2) - \mu}{\sigma_2} ; 0, 1\right).$$

Hence, if both individuals enjoy the same welfare level, there has to hold

$$y_2 = y_1^{\sigma_2/\sigma_1} \cdot \exp[\mu(1 - \sigma_2/\sigma_1)].$$

The ratio σ_2/σ_1 can be interpreted as an elasticity. If y_1 increases with 1%, y_2 has to increase by σ_2/σ_1 % in order to give the second individual the same welfare increase. We call σ the individual's *welfare sensitivity*.

Finally, let $\mu_1 \neq \mu_2$ and $\sigma_1 \neq \sigma_2$; then the income levels y_1 and y_2 are equivalent with respect to their respective welfare evaluation if

$$y_2 = y_1^{\sigma_2/\sigma_1} \cdot \exp(\mu_2 - \mu_1, \sigma_2/\sigma_1).$$

Having estimated the parameters μ_i, σ_i for the ith individual, it is tempting to consider $\Lambda(y_i; \mu_i, \sigma_i)$, that is, the individual's evaluation of his *own* actual welfare position. Moreover, we are interested in the variation of the welfare evaluation over different individuals in the subgroups considered. In order to get an idea, we give in fig. 3 the frequency distribution of $\Lambda(y_i; \mu_i, \sigma_i)$ over the [0, 1] interval, corresponding to the subgroup with higher vocational education. For simplicity we characterize these frequency distributions by their respective means and standard deviations. The means have been tabulated.

This should not be understood as implying that the sum total of the individual welfare evaluations equals the total welfare of the group in the best utilitarian tradition of interpersonal utility comparison. The mean is *only* used as a rough indication of the location of the frequency distribution of welfare evaluations.

We present the most interesting results in tables 2 and 3.[4] A cell of table 2 reads as follows:

The North-West element is the mean of the welfare evaluations Λ in the corresponding subgroup. The North-East element is the average value of μ. The South-East element is the average value of σ, and the South-West element represents the number of observations n. If n is smaller than 10, we omit the results.

[4] More extensive tables of the results are available on request from the Economic Institute.

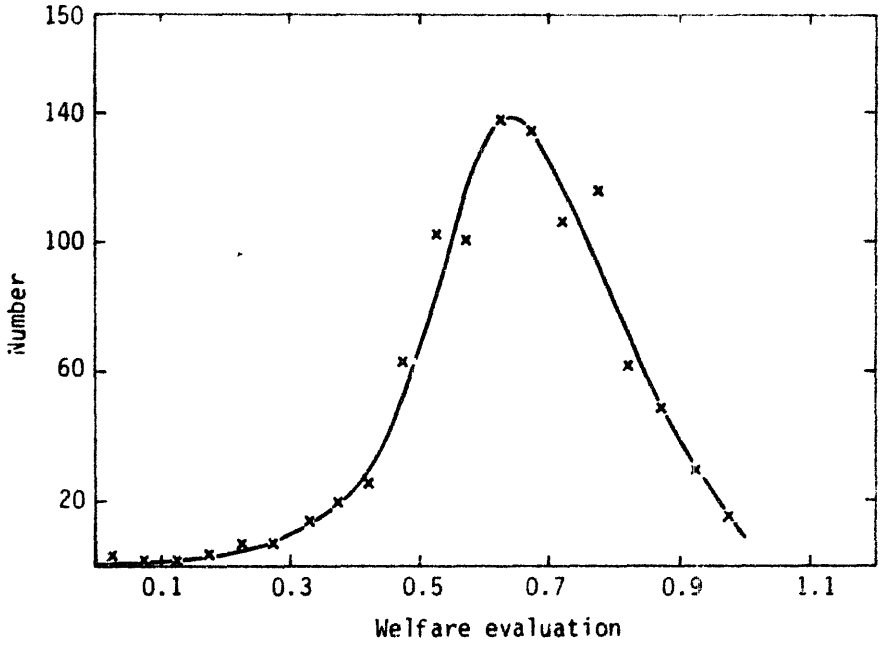

Fig. 3. Frequency distribution of welfare evaluations of people with higher vocational education.

We tabulated the results for a number of other two-dimensional subdivisions, but we saw always the same influence of the income characteristic. Hence we present in table 3 only the marginal figures, corresponding to several one-dimensional subclassifications.

Consideration of table 2 leads to some interesting propositions. At first we see that the values of μ are found to be around 9.5, but that their variation is considerable. There is a definite dependency of μ on income, which will be analyzed in the following section. In this section we shall concentrate ourselves on the "vertical" differences in table 2.

4.1. The natural unit

Table 2 shows that the natural unit of couples where both partners work, is in each income group smaller than that of couples with the same income where only the husband had a paid job. The explanation is, that the reference group of working couples is a lower class than their income would indicate. The intermediate groups yield mainly a value of μ in between.

It seems that education has some influence on the natural unit, albeit probably indirectly because education and income are positively correlated. In the same way the job types with a higher average income seem

Table 2
The welfare characteristics in some social and income groups.

Income-brackets × 1000 guilders	0–8		8–12		12–18		18–26		26–36		36/year		Total	
Wife works	–	–	0.55	9.18	0.69	9.39	0.74	9.59	0.77	9.88	0.81	10.29	0.69	9.53
full-time	5	–	73	0.45	121	0.51	125	0.55	52	0.64	25	0.67	401	0.55
Wife works	–	–	0.52	9.23	0.66	9.45	0.74	9.61	0.78	9.87	0.84	10.04	0.68	9.53
part-time	4	–	57	0.44	138	0.53	122	0.56	40	0.52	15	0.60	376	0.53
Wife works	–	–	0.47	9.30	0.65	9.43	0.67	9.74	0.80	9.79	–	–	0.63	9.57
incidentally	4	–	37	0.47	78	0.48	68	0.51	16	0.61	6	–	209	0.51
Wife works	0.36	9.09	0.52	9.25	0.62	9.48	0.67	9.73	0.71	9.97	0.73	10.35	0.63	9.59
not at all	24	0.61	310	0.47	624	0.48	529	0.51	192	0.57	85	0.59	1764	0.50
Total	0.33	9.10	0.52	9.24	0.64	9.46	0.69	9.69	0.74	9.81	0.76	10.33	0.61	9.55
	37	0.57	477	0.48	961	0.49	844	0.53	300	0.57	131	0.61	2750	0.54
Primary education	–	–	0.56	9.18	0.66	9.43	–	–	–	–	–	–	0.61	9.30
	3	–	27	0.36	21	0.44	4	–	2	–	1	–	58	0.44
Ext. primary	0.44	8.94	0.54	9.21	0.65	9.42	0.71	9.69	0.81	9.73	–	–	0.64	9.45
education	13	0.50	102	0.45	166	0.47	102	0.49	10	0.68	4	–	397	0.48
Primary vocational	–	–	0.52	9.19	0.65	9.39	0.74	9.59	–	–	–	–	0.61	9.30
education	2	–	80	0.43	55	0.49	15	0.49	2	–	0	–	154	0.46
Secondary education	0.43	8.84	0.58	9.19	0.62	9.51	0.68	9.70	0.71	9.99	0.73	10.31	0.63	9.55
	17	0.54	70	0.49	142	0.50	122	0.54	37	0.59	12	0.62	400	0.52
Secondary vocational	0.28	9.02	0.54	9.21	0.65	9.44	0.72	9.65	0.75	9.87	–	–	0.63	9.44
education	12	0.42	82	0.46	153	0.46	64	0.52	12	0.61	4	–	327	0.48
Higher vocational	–	–	0.52	9.24	0.64	9.46	0.70	9.67	0.74	9.92	0.76	10.29	0.66	9.59
education	8	–	117	0.50	353	0.49	377	0.53	116	0.56	29	0.69	1000	0.52
University education	0.43	8.85	0.51	9.26	0.61	9.48	0.68	9.74	0.73	9.96	0.77	10.26	0.65	9.70
	27	0.59	96	0.55	128	0.55	198	0.54	128	0.57	86	0.60	663	0.56
Total	0.39	8.92	0.53	9.22	0.64	9.46	0.70	9.69	0.74	9.93	0.77	10.31	0.61	9.55
	82	0.56	574	0.48	1018	0.49	882	0.53	307	0.57	136	0.62	2999	0.54

Table 3
Welfare characteristics in some social classes.

Working environment	n	μ	σ	Λ
Civil service	955	9.59	0.52	0.65
Non-profit organisation	463	9.57	0.50	0.66
Private enterprise	1282	9.55	0.50	0.65
Independent	130	9.62	0.61	0.66
Not working	136	9.29	0.55	0.57
Total	2966	9.55	0.54	0.61
Labor type				
Unskilled labor	11	9.04	0.42	0.50
Skilled labor	140	9.26	0.43	0.61
Administrative personnel	294	9.35	0.49	0.62
Lower and middle executives	399	9.55	0.48	0.64
Non-civic army/police, personnel	112	9.55	0.48	0.61
Instructors, teachers, etc.	424	9.61	0.53	0.67
Professional experts	915	9.56	0.51	0.65
The professions	362	9.89	0.58	0.68
Remaining commercial professions	128	9.51	0.57	0.66
Agrarians	15	9.54	0.58	0.58
Retired	54	9.65	0.49	0.68
Without profession	118	9.14	0.56	0.54
Temporarily unemployed	9	–	–	–
Total	2981	9.55	0.54	0.61

to have a higher μ. Apparently the natural unit is not only determined by one's own income, but by the average group income as well.

4.2. The welfare sensitivity

With respect to the wife's activities we observe that the less activities in a paid job the wife has, the less the respondent's welfare sensitivity is. A possible explanation might be that the wife started working just because welfare sensitivity was high, or that the wife's outside activities have extended the opportunities of spending money.

The clearest pattern occurs when we look at the education groups. Recalling the fact that σ has something to do with the imagination to spend money, this would indicate a relation between σ and education. This appears to be true. Analyzing the columns of table 2, we see that primary education (1) yields the smallest σ. Then we get primary vocational education (3), followed by extended primary vocational education (2), which yields almost the same σ-value as secondary vocational

education (5). In the same way secondary education (4) and higher vocational education (6) yield the same σ-value. Finally, university education yields the highest σ. Roughly speaking: general education seems to be equivalent to vocational education at the next-higher level from a σ-viewpoint.

Finally, we notice that the welfare sensitivity of the independent is markedly higher than the σ of the other groups. This may be due to the fact that the independent has spending outlets in his business next to the usual outlets in his family household.

4.3. Welfare evaluation

Table 2 suggests that the couples where both partners work (full-time or part-time) are usually happier with their income than the other families. This is the reflection of the fact that the natural units in these families tend to be lower than in other families.

Satisfaction with a certain income level decreases with higher education. This stems from the fact that the reference situation of different education groups is different. The skilled worker may consider an income as nearly excellent, which someone with a university degree considers hardly sufficient.

Finally, we notice that the average welfare evaluation of the separate education groups only slightly differs, although their average income levels show considerable differences (the income levels are not tabulated in the text). Once again we hypothesize that the individual's welfare evaluation is mainly dependent on comparison with the members of his social group.

5. A further explanation of the parameter values

In the previous section we discussed the existence of a number of interesting and intuitively appealing relationships between μ and mostly qualitative variables. In this section we shall attempt to explain μ, σ by quantitative variables.

Actually the number of quantitative variables is rather limited. We may take the actual *income* y_i of individual i as an explanatory variable, since the influence of y_i was rather strong in the tables. A second variable is the *family size* fs_i, not yet considered.

A functional specification which proved to be successful in Belgium is

$$\mu_i = \beta_1 \ln(fs_i) + \beta_2 \ln(y_i) + \beta_3 + \epsilon. \tag{6}$$

It was estimated on the basis of a cross-person analysis, where the data were provided by the sample.

A priori we may think the Dutch and the Belgian do not differ that much. Indeed, also here the equation (6) made sense and so we stick to this specification. Moreover, we retain comparability with the Belgian results. If the simplistic hypothesis on which (6) is based, that an individual is characterized by his income and family size is justified, also the "cross-situation" application of (6) is legitimate, provided that the change in y or fs takes place under *ceteris paribus* conditions.

We shall interpret β_1 and β_2 by means of a "cross-situation" analysis with respect to one individual.

5.1. The family size elasticity β_1

Let there be a relation (6) and let us consider a man with income y whose family size increases with $100\infty\%$. Then it is intuitively clear that he has to be compensated in income to retain the same welfare.

Let us assume $\beta_2 = 0$ for the moment. In that case his welfare level was

$$\Lambda(y; \mu, \sigma) = N(\ln(y) - \mu; 0, \sigma),$$

where Λ is the lognormal distribution function and N the normal distribution function.

If fs is increased by a factor $(1 + \alpha)$ the effect is that the individual's welfare position decreases from

$$N(\ln(y) - \beta_1 \ln(fs) - \beta_3; 0, \sigma)$$

to

$$N(\ln(y) - \beta_1 \ln(fs) - \beta_3 - \beta_1 \ln(1 + \alpha); 0, \sigma).$$

Hence, if fs increases by a proportion $(1 + \alpha)$, income has to be multiplied by a factor $(1 + \alpha)^{\beta_1}$ to hold the individual's welfare constant. Hence

$$\beta_1 = \frac{\delta \ln y}{\delta \ln (fs)} \text{ (welfare being constant).}$$

We call β_1 the *constant welfare elasticity of income with respect to family size*, or the *family size elasticity* for short.

5.2. The preference drift β_2

In the same way we can interpret β_2, assuming $\beta_1 = 0$. Let us assume that the individual expects an increase of his income y by a factor $(1 + \alpha)$. In that case he perceives his future welfare position ex ante as

$$N(\ln(y) + \ln(1 + \alpha) + \beta_2 \ln(y) - \beta_3 ; 0, \sigma).$$

However, if the increase is realized, his welfare function will adapt itself to the new income level and the new income will be evaluated ex post by

$$N(\ln(y) + \ln(1 + \alpha) - \beta_2 \ln(y) - \beta_2 \ln(1 + \alpha) - \beta_3 ; 0, \sigma).$$

Hence *ex ante* and *ex post* evaluation differ, the *ex post* evaluation being the smaller one. The new income is evaluated ex post on the old welfare scale as the income $y(1 + \alpha)^{(1 - \beta_2)}$ instead as $y(1 + \alpha)$. The parameter β_2 measures how the individual welfare function shifts to the right with the rise of income. We call this phenomenon the *preference drift* effect.

In the measurement of β_2 a methodological problem is involved. Probably not every incidental income-change will affect μ. Only changes in income, which can be considered to be *permanent* are likely to influence μ. In other words the preference drift is related to *permanent income*. However, we do not dispose of figures about permanent income, but only of figures about *actual* income. When we consider the actual income as a stochastic variable, with permanent income as its expectation, we know that our estimates of β_2 will be biased downwards (see for instance [1, pp. 138, 183, 184]). The bias increases with the variance of the stochastic part of income. On the other hand, we feel that people will not give their actual income (who knows exactly his own net income?) but their perceived income, which may be equated to "permanent income". We believe therefore that the bias of measurement will be small, except for groups with really unstable incomes, such as the independent.

Now let us assume β_1 *and* β_2 are unequal to zero. In that case we have

$$\ln(y) - \mu = \ln(y) - \beta_1 \ln(fs) - \beta_2 \ln(y) - \beta_3 .$$

In that case the *family size elasticity* is

$$\frac{\delta \ln(y)}{\delta \ln(fs)} = \frac{\beta_1}{1-\beta_2} \qquad \text{(welfare being constant)}$$

according to our definition. It appears that in the presence of preference drift the income Δy, by which the individual has to be compensated, increases. A primary income compensation $\beta_1(\Delta \ln(fs))$ as before leads to a shift in μ of $\beta_2 \cdot \beta_1(\Delta \ln(fs))$. This in turn causes the need for a secondary compensation of $\beta_2 \cdot \beta_1(\Delta \ln(fs))$ and so on in order to retain the old welfare level. The sum of all needed compensations yields

$$\Delta \ln(y) = (\beta_1 + \beta_1 \cdot \beta_2 + \beta_1 \beta_2^2 + \ldots)\Delta \ln(fs) = \frac{\beta_1}{1-\beta_2} \Delta \ln(fs).$$

However, let us assume that our individual is not compensated in money for a family increase. In that case he translates his family increase as an income decrease in terms of his old welfare function. His welfare evaluation changes from $\Lambda(y; \mu, \sigma)$ into $\Lambda(y; \mu + \beta_1 \Delta \ln(fs), \sigma)$.

The decrease, measured in log-income, is only $\beta_1 \Delta \ln(fs)$. Hence we find the interesting result that, due to the preference drift, a *family allowance* has to be an overcompensation compared to the actual welfare loss in order to be satisfactory.

Now we present the estimated values of β_1 and β_2 in (6) for the various classifications in tables 4 and 5. In the appendix we give the standard deviations and R^2 of the marginal cells. The standard deviations are *mostly small*, although there are some figures of bad quality. Tables 4 and 5 read as follows. In a cell the North-West element is β_1, the North-East element is β_2, while the lower element is the number of observations in the subgroup.

5.3. Wife's activities – education

The preference drift is undoubtedly maximal in the group of extended primary education. An income increase is fairly quickly assimilated. In the extreme case of a preference drift greater than one, the individual becomes unhappier with more income. This sounds rather awkward but we have to stay aware of the fact that these estimates stem from *cross*-sections and not from personal interviews. It is not the personal feeling which is registered but a (clinical) observation of facts about *different* people. Primary education and primary vocational education have a moderate preference drift. It is interesting to notice that couples where the wife works either full-time or not at all have the highest preference drift. Those families may be the families whose in-

Table 4
Preference drifts and family size elasticities in some social groups.

education / Wife's activities	Primary education	Ext. Primary education	Primary vocational education	Secondary education	Secondary vocational education	Higher vocational education	University education	Total
Full-time	0.30 0.29 11	0.21 0.77 58	0.13 0.53 33	0.13 0.78 50	0.25 0.77 49	0.26 0.60 116	0.18 0.60 83	0.20 0.65 400
Part-time	– – 8	0.04 0.66 54	0.26 0.51 17	0.02 0.56 52	0.14 0.48 38	0.20 0.51 106	0.22 0.42 101	0.15 0.51 376
Incidental	– – 4	−0.14 1.05 32	0.04 0.17 11	0.07 0.61 23	0.13 0.43 21	0.15 0.54 66	0.12 0.59 52	0.05 0.59 209
Not at all	0.04 0.35 31	0.15 0.72 225	0.13 0.53 84	0.07 0.72 232	0.13 0.63 178	0.09 0.71 638	0.14 0.66 373	0.10 0.70 1761
Total	0.11 0.33 54	0.14 0.73 369	0.10 0.50 145	0.09 0.70 357	0.16 0.65 286	0.18 0.62 926	0.17 0.60 609	0.14 0.65 2746
Working environment								
Civil service	0.17 0.11 15	0.17 0.74 135	0.09 0.72 42	0.19 0.55 109	0.05 0.74 106	0.15 0.68 331	0.05 0.69 217	0.11 0.70 955
Non-profit organisation	– – 3	−0.16 1.13 35	– – 5	0.09 0.81 34	0.16 0.49 38	0.15 0.50 223	0.19 0.47 125	0.13 0.58 463
Private enterprise	0.05 0.63 31	0.11 0.73 202	−0.02 0.44 96	0.14 0.62 218	0.14 0.66 163	0.17 0.59 392	0.17 0.62 179	0.13 0.65 1281
Independent	– – 4	0.21 0.21 12	– – 6	0.18 0.59 24	0.08 0.40 11	−0.03 0.35 27	0.34 0.52 46	0.11 0.52 130
Not working	– – 5	– – 8	– – 1	−0.06 0.83 14	– – 6	0.03 0.33 21	0.33 0.59 80	0.21 0.54 135
Total	0.09 0.34 58	0.12 0.71 392	0.03 0.49 150	0.13 0.63 399	0.10 0.65 324	0.15 0.57 994	0.16 0.61 647	0.12 0.63 2964

Table 5
Preference drifts and family size elasticities in social groups, job-type-education

Education / Job-type	Primary education	Ext. primary education	Primary vocational education	Secondary education	Secondary vocational education	Higher vocational education	University education	Total
Unskilled labor	– –	– –	– –	– –	– –	– –	– –	0.18 0.59
	6	3	1	0	0	0	1	11
Skilled labor	0.02 0.80	0.11 0.88	0.07 0.34	– –	0.13 0.37	– –	– –	0.10 0.42
	17	18	84	1	19	1	0	140
Administrative personnel	– –	0.17 0.61	– –	0.26 0.33	0.28 0.52	0.16 0.12	– –	0.18 0.44
	8	134	8	83	33	20	7	293
Lower and middle executives	0.06 0.67	0.09 0.84	−0.26 0.93	0.19 0.84	0.09 0.80	0.28 0.29	0.77 0.84	0.13 0.72
	10	98	27	91	75	88	10	399
Non-civic army/police	– –	0.29 0.55	0.25 1.39	0.04 0.54	– –	0.11 1.13	– –	0.09 0.83
	6	31	13	22	7	26	7	112
Instructors, teachers, etc.	– –	– –	– –	0.04 0.50	– –	0.17 0.56	0.26 0.45	0.17 0.52
	1	4	1	12	4	270	132	424
Professional experts	– –	0.16 0.69	– –	0.05 0.73	0.12 0.53	0.14 0.68	0.18 0.47	0.12 0.63
	2	44	7	101	144	459	161	915
The professions	– –	−0.50 0.08	– –	0.03 0.57	0.15 0.34	0.09 0.46	0.09 0.67	0.06 0.64
	1	11	2	33	10	80	225	362
Commercial professions	– –	0.16 0.50	– –	0.06 0.48	0.06 0.80	−0.09 0.63	– –	0.07 0.56
	1	35	5	38	16	25	7	127
Agrarians	– –	– –	– –	– –	– –	– –	– –	−0.08 0.78
	1	2	3	0	6	3	0	15
Retired	– –	– –	– –	– –	– –	0.37 0.62	0.08 0.50	0.02 0.57
	2	7	0	8	6	16	15	54
Without profession	– –	– –	– –	– –	– –	0.19 0.46	0.49 0.40	0.43 0.34
	1	3	2	8	4	4	88	117
Temporarily unemployed	– –	– –	– –	– –	– –	– –	– –	– –
	1	2	1	0	2	0	3	9
Total	0.09 0.34	0.12 0.71	0.03 0.50	0.13 0.63	0.10 0.62	0.15 0.58	0.17 0.62	0.13 0.64
	57	392	154	397	323	999	656	2978

come is most stable. The "permanent income" effect hinted at in the beginning of this section may cause the differences.

The family size elasticity is increasing with education (if reordered as before). Here it is seen that the working housewife is more sensitive to family changes than her sister without a paid job, in accordance with intuition.

5.4. Working environment – education

Table 4 shows in the marginal cells that the civil service has the largest preference drift (0.70), followed by privately employed people. We notice that the preference drift of the 55 people with extended primary education in a non-profit organization is rather amazing (1.13).

There is no pattern in the family size elasticity in table 4 except for the fact that people with university education, especially if independent or not-working (students) have a large family size elasticity. Indeed the existence of a child in such a family may imply a considerable loss of (material) welfare.

5.5. Education – job type

The differences in preference drift as shown in table 5 are illuminating. Especially the preference drift of non-civic army personnel with a vocational (i.e. military) education is frightening. This may be ascribed to the fact, that within the army, there is a close connection between income and social position. It may be that after a promotion the new social environment requires more additional income than the salary increase provides. The family size elasticities are smaller than we expected, except for the "without profession" group, which consists mainly of students.

Finally, a word about the welfare sensitivity σ. As in the Belgian experience, it appears here that σ cannot be "explained" by $\ln(y)$ and $\ln(fs)$. The only factors which seem to have some influence are education and the dichotomy, independent-employed. We list as an example the regression of σ on $\ln(y)$ and $\ln(fs)$ for the total sample of 3010 observations.

$$\underset{}{\sigma} = \underset{(0.08)}{-0.04\ \ln(fs)} + \underset{(0.00)}{0.06\ \ln(y)} - 0.014 \quad (R^2 = 0.015).$$

The welfare sensitivity seems to be genuinely individual.

Table 6
Main characteristics of the Dutch and Belgian surveys.*

	Belgium Dec. 1969	The Netherlands Sept. 1971
Sample size	2789	3010
Average log natural unit (μ)	3.03	9.55
	(0.43)	(0.49)
Average log income ($\ln y$)	3.20	9.77
	(0.79)	(0.46)
Average welfare sensitivity (σ)	0.52	0.54
	(0.26)	(0.25)
Preference drift (β_2)	0.19	0.64
	(0.00)	(0.01)
Family size elasticity (β_1)	0.30	0.13
	(0.01)	(0.01)
Adjusted correlation coefficient (R^2)	0.26	0.60

* Between brackets the relevant estimated standard deviations have been added.

6. A comparison between the Belgian and Dutch results

As mentioned in the introduction the present survey has been preceded by a similar survey among the members of the Belgian Consumer Union [4]. In this section we shall compare the results of both surveys.

In table 6 the main findings of both surveys have been listed. The average welfare sensitivities in both countries do not seem to differ significantly. This is in line with the findings from both surveys that the σ is "genuinely individual", i.e. rather independent of personal and social circumstances. In other words, although the circumstances between both countries may differ considerably, the people do not.

The natural units show a difference which can largely be explained by the fact that μ depends on the chosen money unit. In Belgium the money unit was 10,000 B.frs. which corresponds with about 730 Dutch guilders (exchange rates of December 1969[5]), so we expect the Dutch $\bar{\mu}$ ($\bar{\mu}_D$) to be $\ln(730) = 6.59$ higher than the Belgian $\bar{\mu}$ ($\bar{\mu}_B$). Moreover there is a timespan of twenty months between both surveys. During that time inflation went on. Consequently the following relation will hold:

$$\bar{\mu}_D = \bar{\mu}_B + \ln 730 + \ln \alpha + \gamma,$$

where α is the factor by which prices increased during the twenty months between both surveys and where γ is the "real" difference.

[5] Statistical Yearbook 1970, United Nations, New York, 1971.

Table 7
Dutch and Belgian subgroups and their characteristics.

Belgium					The Netherlands				
Subgroup	number	σ	β_2	β_1	Subgroup	number	σ	β_2	β_1
Housewife working					*Wife's activities*				
For 0%	1508	0.51	0.25	0.29	Not at all	1764	0.50	0.70	0.14
For 100%	745	0.53	0.13	0.31	Full-time	401	0.55	0.65	0.20
For 50%	273	0.52	0.12	0.26	Part-time	376	0.53	0.51	0.15
					Incidental	209	0.51	0.59	0.05
Job – father					*Job-type*				
Ouvrier non-qualifié	24	0.37	0.37	0.07	Unskilled labor	11	0.42	0.59	0.18
Ouvrier qualifié	142	0.44	0.07	0.17	Skilled labor	140	0.43	0.42	0.10
Kaderbediende	442	0.45	0.11	0.23	Administrative personnel	294	0.49	0.44	0.18
Cadre moyen	640	0.53	0.15	0.24	Lower and middle executives	399	0.48	0.72	0.13
					Non-civic army/police personnel	112	0.48	0.83	0.09
Cadre supérieur	1011	0.51	0.25	0.27	Instructors, teachers, etc.	424	0.53	0.52	0.17
					Professional experts	915	0.51	0.63	0.12
Industriel	193	0.63	0.22	0.16	The professions	362	0.58	0.64	0.06
Autre prof. liberale	239	0.62	0.08	0.41	Commercial professions	128	0.57	0.56	0.07
Agriculteur	12	0.52	0.63	0.39	Agrarians	15	0.58	0.78	−0.08
Retraite	70	0.59	0.31	0.29	Retired	54	0.49	0.57	0.02
					Without profession	118	0.56	0.34	0.43
Stability and growth of income					*Working environment*				
Stable, no growth	1632	0.51	0.22	0.29	Civil service	955	0.52	0.70	0.11
Stable, 10% growth	701	0.54	0.23	0.23	Non-profit organisation	463	0.50	0.58	0.13
Variable, 10% growth	53	0.67	0.16	0.38	Private enterprise	1281	0.50	0.65	0.13
Variable, no growth	76	0.59	0.17	0.30	Independent	130	0.61	0.52	0.11
					Not working	135	0.54	0.54	0.21

Assuming that the exchange rate of December 1969 reflected the ratio of purchasing powers in both countries, we took the Dutch inflation rate as an estimate of α, because the chosen exchange rate was that of the moment of the Belgian survey. We specify therefore:

$$\ln \alpha = \ln \left(\frac{113.1}{100.8}\right) = 0.11^{6},$$

and find $\gamma = -0.18$. In other words after correction for exchange rate and inflation the average natural unit in Belgium is about 18% higher than in The Netherlands. This difference has to be explained. Of course, our computation is rough and can be criticized on theoretical grounds as well. The samples are not representative for the Dutch and Belgian populations and the exchange rate is a doubtful measure to compare the purchasing powers of 10,000 B.frs. and 1 Dutch guilder. Nevertheless, it is interesting to observe that the difference between $\bar{\mu}_D$ and $\bar{\mu}_B$ can be explained partly by the corresponding difference of the log-incomes in both samples. When we use a procedure similar to that used by the comparison of the μ's, we find that the Belgian average log-income is 0.13 higher than the Dutch average. When we compare this figure with the value of $\gamma(0.18)$, we may assume that part of the differences between μ_B and μ_D may be explained by the difference 0.13 between the log-incomes.

Now let us turn to the values of the *preference drift* and the *family size elasticity*. The preference drift in The Netherlands is three times as high as in Belgium. The rather striking difference between the two parts of the Low Countries invites further analysis.

The family size elasticity β_1 is in Belgium considerably higher than in The Netherlands. Actually, the preference drift and the family size elasticity can be seen as two sides of one medal. Both are a reflection of the individual's ability to adapt to varying circumstances, integrating them into his own position.

For, the individual who smoothly accepts the changes of his situation caused by an income change and adapts himself to the new situation as normal, reacts also smoothly to a change in family size. Those people have flexible standards, i.e., they take their own circumstances as standard.[7] So we may expect that an individual with rather high preference

[6] The index number of the prices of household consumption in The Netherlands increased from 100.8 to 113.1 between December 1969 and September 1971. C.B.S. Maandschrift van het C.B.S., maart 1972, Staatsuitgeverij, The Hague.

[7] In a following paper, we plan to treat this effect quantitatively.

drift has a small family size elasticity and inversely. This would lead to the interpretation that the Dutch are accepting more automatically changes in their external conditions than their Belgian neighbors.

Finally we compare the findings for the social classes in both countries. However, the classifications differ too much for a strict comparison. Therefore, we give in table 7 only those classifications which show at least a slight resemblance.

6.1. Wife's activities

When considering "0%", "100%" and "50%" for the Belgian survey and "not at all", "full-time" and "part-time" for the Dutch survey as roughly equivalent we see that the rankings of μ and β_2 coincide. The ranking of β_1 coincides partly (full-time versus remainder).

6.2. Job – father

This classification is rather different between both samples. It has been given for the sake of completeness. We note a rather strong similarity for the skilled laborers and a dissimilarity for the agrarians and non-skilled laborers. These last classes contain a very small number of observations.

6.3. Stability and growth / working environment

These classifications have been listed only for a comparison of the preference drift. In section 5 it has been argued that for persons with a less stable income, i.e. a relatively small permanent income, the measured preference drift will tend downwards. From the viewpoint of stability we rank intuitively in order of increasing instability as follows: civil service, private enterprise, nonprofit organisation, independent. This corresponds with a decrease of β_2. In the Belgian survey the stability of income has been questioned directly. We see a marked difference between the stable and variable incomes, which is completely in line with the Dutch findings.

The overall impression of the comparison is, that the results of both surveys agree. Especially the agreement of the average welfare sensitivities in both countries is striking. On the other hand the differences between the regression coefficients seem to be considerable. With respect to those differences more analysis is needed.

7. Conclusion

In this paper we have supplied additional evidence for the following theses:
(1) The individual welfare function is an operational concept.
(2) It is approximately lognormal.
(3) The natural unit depends on $\ln(y)$ and $\ln(fs)$.
(4) The coefficient of $\ln(y)$ estimates the *preference drift*. On the average it is about 0.6 in The Netherlands.
(5) The coefficient of $\ln(fs)$ estimates the *family size elasticity*; it is about 0.13 in The Netherlands.
(6) Both coefficients vary between the social subgroups.
(7) The welfare sensitivity does not depend on income nor on family size. There is a slight correlation between σ and education.
(8) The welfare sensitivities in Belgium and The Netherlands are about equal to each other.

Appendix

Adjusted correlation coefficients and standard deviations of the regression equations for the marginal classifications.

a) *Wife's activities*	s.d. (β_1)	s.d. (β_2)	R^2
(1) full-time	0.034	0.027	0.627
(2) part-time	0.031	0.032	0.501
(3) incidental	0.052	0.042	0.507
(4) not at all	0.018	0.015	0.601
b) *Education*			
(1) primary education	0.046	0.063	0.450
(2) ext. primary education	0.027	0.032	0.594
(3) primary vocat. educ.	0.053	0.079	0.229
(4) secondary education	0.025	0.027	0.666
(5) secondary vocat. educ.	0.028	0.036	0.537
(6) higher vocat. educ.	0.018	0.022	0.494
(7) university education	0.028	0.024	0.631
c) *Working environment*			
(1) civil service	0.019	0.022	0.581
(2) non-profit organisation	0.024	0.033	0.551
(3) private enterprise	0.016	0.016	0.624
(4) independent	0.059	0.051	0.485
(5) not working	0.067	0.053	0.545

d) *Job type*	s.d. (β_1)	s.d. (β_2)	R^2
(1) unskilled labor	0.107	0.125	0.801
(2) skilled labor	0.037	0.064	0.287
(3) administrative personnel	0.025	0.037	0.478
(4) lower and middle executives	0.028	0.029	0.634
(5) non-civic army/police pers.	0.086	0.095	0.464
(6) instructors, teachers, etc.	0.027	0.034	0.501
(7) professional experts	0.017	0.022	0.551
(8) the professions	0.041	0.041	0.427
(9) commercial professions	0.041	0.048	0.574
(10) agrarians	0.207	0.108	0.808
(11) retired	0.124	0.088	0.486
(12) "without profession"	0.081	0.077	0.495
(13) (temporarily) unemployed	–	–	–

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