



**The impact of the reference period  
on measures of household income  
from surveys**

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B E R I C H T E N

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## 1. Introduction

One of the many issues in empirical research on poverty and income inequality is the choice of accounting period: a week, a month, a year, or an even longer period. The Expert Group on Household Income Statistics (Canberra Group, 2001) recommends that the accounting period to be used for income distribution analyses should be one year. However, they also note that 'different accounting periods may suit different types of analysis' (Expert Group on Household Income Statistics, 2001: 32). Further it is noted that:

'If income data are collected by means of household surveys, wage and salary income and any regular transfers received will normally be reported more easily and more accurately if information is only sought with respect to the previous week or month' (Expert Group on Household Income Statistics, p.31).

This passage makes clear that if household surveys are used, measurement issues are an important aspect of this decision. In contrast to administrative sources, surveys generally do not allow the collection of complete income information for a whole year period. Therefore, survey researchers have devised various approaches to the construction of measures of annual household income, which differ in the amount and nature of survey information required, and thus in the demands made on survey respondents.

In this paper, we compare two measures of household income, viz. current monthly income and annual income in the previous year. We profit from a unique opportunity created by a change in the income question modules in the Belgian Panel Study of Belgian Households (PSBH, source of the Belgian data in the European Community Household Panel, or ECHP). In 1993 survey respondents were asked about their incomes in the previous month, while in 1994, the same (panel) respondents faced questions probing for their incomes in the previous calendar year, viz. 1993. This implies that we have for the same representative sample of persons and households two different measures of household income, which refer to the same period, but in measurement terms are independent of each other (i.e. are unlikely to be spuriously correlated due to memory effects).

The paper is organized as follows. In the next section, we review the (limited) literature on the accounting period, and discuss some survey measures of annual household income. In the third section we describe our data. The fourth section presents descriptive results about both income measures. In contrast to expectations, the distribution of our measure of annual income turns out to be more dispersed than that of current monthly income. In section 5, we look at some indicators of data quality for the monthly and annual income measures. Section 6 is about a specific but important problem: the mismatch in time between the income information and the household size and composition variables in the annual income measures used here. In section 7 we use correlations of the income measures with other indicators of the standard of living to assess the validity of the former. Section 8 looks at some published aggregate results from the Dutch Socio-Economic Panel on the same issue, which to some extent corroborate our findings. Section 9 concludes.

## 2. Previous studies

In most economic literature, the issue of the reference period is narrowed to that of the accounting period: the length of time over which income is assessed: a week, a month, a year or even a longer period. Studies look at the effect of various accounting periods on measures of income inequality and poverty, and discuss which accounting period best reflects households actual socio-economic position and welfare. If administrative data are used, these are indeed the relevant questions. However, if the source of data is a household survey, data quality, i.e. the validity and reliability of the income information is a crucial, yet neglected issue. Researchers have devised various ways to measure annual income in surveys. In this section, we will first review the literature on the first set of questions (about the accounting period), and then discuss the issues involved in using survey measures of household income.

### 2.1. Accounting period, inequality and poverty

The theoretical basis for the expectation that longer-term income will be distributed less unequally than short-term income seems to be provided by a fairly simple permanent income model, where current income consists of a permanent part and a transitory component (Friedman, 1957). If it can be assumed that the transitory component is random, uncorrelated with permanent income, and, most importantly, that its variance is constant over time, it follows that the dispersion of income will be lower, the longer the accounting period. (see also Böheim and Jenkins, 2000, Shorrocks, 1978, Atkinson, 1975) The most comprehensive theoretical analysis is perhaps the one provided by Shorrocks (1978). He demonstrates for a broad class of inequality measures that inequality will be lower during a multi-year period than in any single year, provided inequality is constant across years. However, one must keep in mind that if the assumptions are not met, it is perfectly possible for inequality in a *specific* short period to be lower than over a longer span of time.

Empirical research confirms the theoretical expectations, although the observed effects are usually modest or very modest. Shorrocks refers to a study by Soltow (1965), who determined income inequality among a sample of Norwegians over a period of 33 years (1928-1960). The Gini index for the entire 33 years amounted to .134 as compared to an annual average of .183 (a reduction by 27%). Kohen et al (1975) found for the US that among young men (16-24 years), that relative to single-year figures, the Gini-coefficient for household income and earned income declined by respectively 9.2% and 10.8% when aggregated over 3 years. Also for the US, Benus et al (1975) found that, depending on the data source, the Gini-coefficient declined in comparison with the base year by 3 to 7% when measured over four years.

Nolan (1987) compared the inequality of distributions of current (monthly) income and annual income<sup>1</sup> using 1977 UK Family Expenditure Survey data. He found that inequality was smaller for annual gross income than for current gross income, but the differences were relatively small. The share of the first income decile group was 2.19 percent in the current gross income definition and 2.28 percent in the annual gross income definition. The coefficient of variation was 0.73 for current gross income and 0.70 for annual gross income. Slemrod (1992), using data from the Internal Revenue Service for the period 1979, concludes that inequality rates do not decrease if one considers income over the entire period. However,

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<sup>1</sup> Annual income is constructed using retrospective recall data about employment and receipt of major social security benefits.

he also finds that the share in total income of the lowest decile increases substantially (from 0.93% to 1.83%). Ruggles (1990) also compared results based on annual income with results based on monthly income, but focuses on poverty<sup>1</sup>. He found that the poverty rate for persons was 11% using annual income, and the average of the monthly poverty rates was 13.7%.

The study of Böheim and Jenkins (2000) is the most recent in this field and it is also the most similar to ours. It compares inequality and poverty estimates based on annual and monthly survey data from the British Household Panel Survey (BHPS). Inequality is lower for annual income than for current income, but the exact figures are sensitive with respect to the inequality measure used. 'According to the middle-sensitive Gini-coefficient, the difference is only a matter of one percentage point, but slightly more according to the p90/p10 ratio, for which there is a maximum difference of some five percent in wave 7' (Böheim and Jenkins, 2000). The difference in low income incidence is very small. For most waves used in the study, the percentage of low incomes is the same for both methods, or is at maximum 1 percentage-point lower for annual income. The study concludes that the BHPS current and annual income measures provide very similar pictures of the income distribution and of inequality and poverty. However, the authors note that some features might explain the small differences observed. First, and perhaps most importantly, the BHPS current income is not fully 'current': the employment earnings refers to 'usual' earnings rather than the last amount received. This means that some smoothening may already be built into the 'current' income definition. Secondly, the measures are not independent by construction, as the information used for 'current' income is also used for constructing the annual income measure (see the next section for a description of the BHPS annual income measure).

These empirical findings do not give an answer to the question which accounting period to choose. As discussed by Atkinson (1975), in poverty research the choice of the income concept will depend on the assumptions made regarding the effect of short-term income fluctuations on the economic well-being of individuals and households. Some households will be able to maintain their consumption level during short spells of lower income by using their savings, by borrowing or postponing some expenditure. However, this is likely to be more problematic for households at the lower end of the income scale. There are empirical indications that persons whose income in a given month is below the poverty line have a limited capacity to dissave. Ruggles and Williams observe in the United States that "the majority of those with sub-annual spells of poverty are in fact unlikely to be able to maintain their consumption levels, even though their poverty spells may be quite short" (Ruggles, Williams, 1989). For Belgium, Van den Bosch (1998) found that income poor households have few other assets apart from their own home. These observations suggest that monthly income might be a relevant indicator for measuring poverty. On the other hand, if the distribution of income over the total population is the research focus, annual income may be the preferred income concept, assuming that for a large majority it is possible to spread income more or less evenly within the space of a year.

## ***2.2. The reference period in survey measures of household income***

If administrative data were used, or if survey participants had perfect memories and unlimited patience for answering survey questions, the issues discussed above would be the only relevant ones. As it is, however, common sense suggests and survey experience shows that

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<sup>1</sup> Data from the US Survey of Income and Program Participation were used.

extracting income information from survey respondents is no easy matter and that the difficulties will be greater for annual income than for monthly or weekly income. For most people, a single question about total household income during the last calendar year will not do. In terms of the classification of knowledge of Beatty and Herrmann (2002), annual income will at best be 'generatable', i.e. the requested information is not exactly known, but it may be estimated using other information in the memory of the respondent.

Given this situation, different approaches are possible to measure annual income. They differ, among other aspects, in the timing of the accounting period relative to the survey moment. The accounting period can be specified as the calendar year previous to the year of the survey (sometimes denoted as the N-1 method), or it can be the last twelve months prior to the moment of the survey (or to a fixed month around the fieldwork period). More generally, they differ in the amount and nature of survey information required, and thus in the demands made on survey respondents.

A first method is to ask respondents to consult a copy of their tax return. This method doesn't rely on the memory of the respondent, but on his/her willingness to look for and ability to actually find tax returns or other documents. In the Belgian case little is known about this. Also, in Belgium the tax definition of before and after tax income does not correspond to disposable household income.

A second method is implemented in the European Community Household Panel survey (ECHP). Here respondents are asked to report their 'usual' monthly income from different sources (employment, transfer, ...) during the previous calendar year and the number of months these incomes were received<sup>1</sup> (Eurostat, 1994). Some income components are collected directly on an annual basis (e.g. self-employment income). Although respondents do not have to calculate their annual income themselves, this method still relies heavily on the memory and numeric abilities of the respondent. This is problematic for two reasons. Firstly, it is well-known that retrospective information is more difficult to obtain than current or recent information. Converse and Presser (1986) note:

'If researchers were guided entirely by a concern for valid descriptive data, they would focus on the *current, the specific, the real* (Turner and Martin, 1984, I:229); it is increasingly apparent that memory questions in general tend to be difficult'.

Secondly, respondents are expected to report on their 'usual' or 'normal' monthly income, which requires some mental effort, especially for people whose income, activity status, job or other circumstances changed recently.

A third possibility is the 'current modified income'-approach, which Atkinson et. al. (2002) describe as the sum of:

'annualized current regular income components (wages, regular social benefits, pensions multiplied by 12 if paid monthly) and, for irregular components or those best collected on an annual basis, figures for the most recent and appropriate period (e.g. self employment income, capital income, annual bonuses'.

The current modified income approach corresponds better with received wisdom on good survey questioning. The different income components are collected with reference to the

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<sup>1</sup> It is interesting to note that respondents were also given the possibility to report their annual income directly, but in Belgium only a few cases make use of this opportunity.

period they are received by the respondents. The downside is of course that it does not capture all income within a year, and may therefore be more subject to transitory variations than previous year income (Atkinson et. al., 2002).

A fourth method, which could be seen as a variant of the current modified approach, is implemented in the British Household Panel Survey (BHPS). In addition to information on income (from each source) currently received at this year's interview, it also uses data on incomes received at 1 September of last year, as well as information about the types of income received, and about (un)employment, in each month between the current interview and 1 September of the previous year. Moreover, external information about benefit values and their uprating etc. is utilized. The time period covered by the annual income variables consists therefore of the twelve months up to the 1<sup>st</sup> of September of the year of the current interview wave (Böheim and Jenkins, 2000).

It is clear that this method increases interview burden compared with the current modified income approach. Furthermore, the introduction of external information on transfer incomes ignores the fact that, e.g. due to non-take-up, administrative errors, etc., 'social reality' may deviate from the 'administrative reality'. On the other hand the method meets many of the objections against the current modified income approach. An important advantage of this method is that 'current modified' income can also be calculated on the basis of the information collected.

Below, we will compare two of the four methods discussed above. Our measure of monthly income can be regarded as a version of the current modified income method. Secondly, we consider the ECHP annual income measure.

### **3. The data**

We use data from the Panel Study on Belgian Households (PSBH). This is a national survey, based on a probability sample of Belgian private households. The first wave was held in 1992, with a size of 4439 households. The survey involves a household questionnaire and an individual questionnaire for all household members of 16 years or older. Both questionnaires contain detailed income questions, which cover all income sources. Besides income, the questionnaire contains modules on employment, activity, relationships, health, care, as well as year-specific modules (see Jacobs and Marynissen, 1992, 1993 and 1994, for a general description).

In this paper we use waves 2 (1993) and 3 (1994). These waves are interesting as the income concept was changed between the two from monthly income to annual income<sup>1</sup>. In 1993 respondents were asked to report the income from the previous calendar month while in 1994 the same respondents were asked to report their 'normal' monthly income in 1993 and the number of months they received this income, following the ECHP method as described above. This means that for a large sample of Belgian persons and households, we have two income measures referring to the same year (1993). Yet, the measures are independent of each other in the sense that they were carried out at different points in time and may therefore be assumed not to have been correlated due to memory effects and the like. This allows a

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<sup>1</sup> This change was due to the integration of the PSBH in the European Community Household Panel (ECHP), a panel survey in most of the EU-member states, directed by Eurostat.

detailed comparison of the current (modified) monthly income method and the ECHP approach to the measurement of annual income.

In the 1993-wave 3900 households and 7505 persons (16+) were interviewed. In the 1994-wave 3497 households were interviewed and 6715 persons. 6546 adults are present in both waves. All analyses are based on respondents present in both waves, unless indicated otherwise.

Actually, we present results for *two* measures of annual income based on the PSBH wave of 1994. The first one is calculated by Eurostat, and released in the so-called UDB (User Data Base) on DATUM. However, the procedures and methods used by Eurostat were not very well documented at the time, and serious questions can be asked about the results (Van Hoorebeeck et. al., 2000). Therefore, we present also results for a measure of annual income constructed by the authors on the basis of the original PSBH data. Therefore, we present also results for a measure of annual income constructed by the authors on the basis of the original PSBH data. Below, we will refer to the former as ECHP1994, and the latter as PSBH1994, while our measure of current monthly income will be called PSBH1993.

The PSBH93 and PSBH94 missing income data were imputed by the authors. Both socio-demographic and labour market data are used as auxiliary variables. For most income components imputations were executed at a fairly detailed component level. Some components were imputed at a more aggregated level, e.g. pensions. In order not to underestimate the dispersion of the income variables, various stochastic imputation procedures were used. For the PSBH93 data, the most important income components were imputed via regression models, with a random component based on the residuals. For missing pensions, information from the '92 wave was used (corrected for inflation) if available. The PSBH94 data were mainly imputed through a sequential hot-deck procedure. Both in the PSBH93 and PSBH94 data a mean value imputation was used for some income components with a limited number of recipients. For the ECHP94 data, Eurostat uses a multivariate model involving a multiple regression sequence, using IVE software. The income variables are imputed sequentially, starting with the variables with the smallest proportion of missing values. Once a variable is imputed it is used as an auxiliary variable to impute the other variables (Eurostat, 2003).

## **4. Descriptive results: levels and distributions**

### ***4.1. Levels and distribution of household incomes***

Our current monthly and annual income measures yield fairly similar average and median income levels (table 1). It is remarkable that the two estimates of annual income differ more from each other than from current monthly income. None of the differences between the two measures of annual income and current monthly income exceeds three percent.

The indicators of income inequality show clear differences. Contrary to theoretical expectations and most previous studies, both annual income method result in higher income inequality. The Gini-coefficient of equivalent disposable household income is about 7% to 10% higher. The p90/p10-ratio and the Theil-coefficient lead to the same conclusion. The p90/p50-ratio, however, reveals smaller differences. This finding suggests that the differences between the two methods are mainly situated in the lower income regions.



Important differences between monthly and annual income are revealed when we consider poverty/low-income indicators. If the poverty line is set at 60% of median equivalent household income, the annual poverty rate, among respondents present in both waves, is about 50% higher than the poverty rates based on current monthly income. The relative difference is even larger when lower thresholds are used, and, conversely, it is smaller when higher ones are used. This again points at differences in the lower tail of the income distribution.

**Table 1. Income levels (in BEF), poverty and income inequality among respondents present in both waves (N=6546).**

	Psbh93	Psbh94*	Echp94*
Mean			
- disposable household income	90029	88338	92364
- Equivalent disposable household income.	47179	46442	48758
Median			
- disposable household income	81509	79448	84066
- Equivalent disposable household income.	43214	43017	44622
Poverty/low income**			
- 40% of median eq. income	2.3	5.1	5.2
- 50% of median eq. income	5.3	9.6	9.3
- 60% of median eq. income	10.2	14.9	14.7
- 70% of median eq. income	17.7	23.0	23.2
GINI-coefficient (eq. household income)	.260	.277	.286
THEIL-coefficient (eq. household income)	.129	.135	.152
P90/p10 ratio	3.03	3.43	3.54
P90/p50 ratio	1.67	1.68	1.76

\* annual income/12.

\*\* poverty status of persons based on complete 1993 cq. 1994 files.

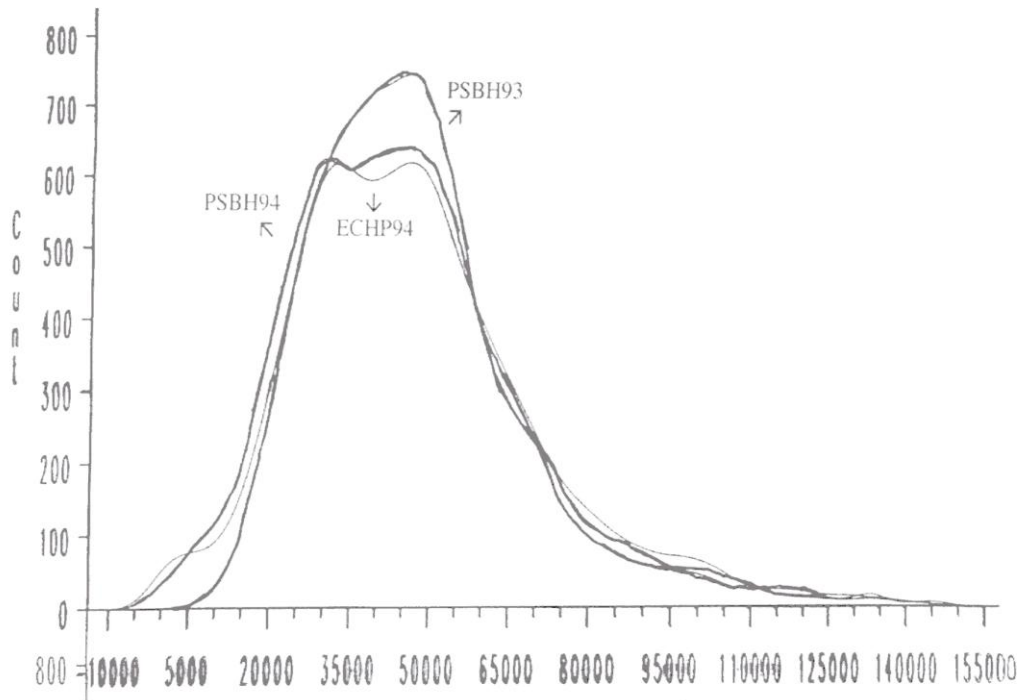
A graphical representation of the income distributions can give a clearer picture of the differences. Kernel density analysis indicates that there are clear differences in terms of medium and low incomes: the annual income measure is characterized by more very low and slightly more medium-high incomes, as well as a lower central peak, i.e. fewer incomes around the centre of the distribution (Figure 1)<sup>1</sup>.

In the context of research into the extent of poverty, the finding of a greater incidence of extremely low incomes in the annual income measure is, of course, very important. Both in PSBH94 and in ECHP94, the proportion of persons with a standardised income below BEF 13,000 (i.e. about 30% of the median) is 3.5% (n=230). In PSBH93, this proportion is 1.5% (n=84). The overlap between these two groups of very low incomes is very small: only 20

<sup>1</sup> In Figure 1, the distribution has been truncated at the upper end (to BEF 250,000 for standardised income and to BEF 300,000 for disposable income). However, the findings reported is robust and also applies if one uses the entire distribution. Further, it is independent from the specification of the Kernel function and the chosen bandwidth. The number of very high incomes (> BEF 300,000 a month) is roughly the same for the three measures. The number of extremely high incomes (> BEF 500,000 a month) is about the same in PSBH93 (n=18) and ECHP93 (n=15), but lower in PSBH94 (n=6).

respondents (0.3%). Interestingly, median monthly household income of persons with very low annual incomes is BEF 35,000 (43% of overall median income), while, conversely, persons whose monthly income is below the threshold have a median annual household income of only BEF 24,000 (30% of overall median income).

**Figure 1. Kernel Density analysis of equivalent household income, PSBH93, PSBH94, ECHP94 (equivalent income limited to 250,000 BEF).**

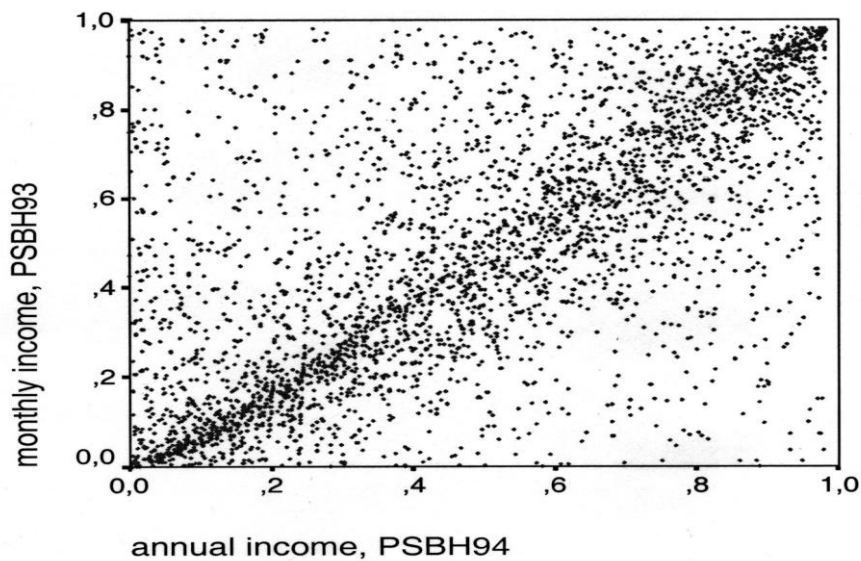


We also compare the position of persons in the income distribution according to the different income measures. In figure 2 a scatter plot of the normalised rankings<sup>1</sup> of individuals in the PSBH93 and PSBH94 income distribution is shown. If the two methods would assign the same position to each respondent, everybody would be on the 45° line. This is not the case. Instead, there is much dispersion, indicating that the income measures are often in great disagreement about the income positions. The correlation coefficient between the two rankings is only .64. The correlation between rankings in PSBH93 and ECHP94 is .61<sup>2</sup>. The frequency of inconsistent rankings is much higher than in the study by Böheim and Jenkins (2000) comparing BHPS annual and current income. However, their income measures were, by construct, not independent of each other.

<sup>1</sup> Position of a respondent in the income distribution divided by the total number of cases (6546).

<sup>2</sup> It is interesting to note that the correlation between the rankings in PSBH94 and ECHP94 is higher, but still far from perfect (.77).

**Figure 2. Scatterplot of normalised ranks in the annual and current monthly income distributions, PSBH93, PSBH94.**



Comparing the poverty status of respondents on the basis of the monthly and annual measures (using the 60% of median equivalent income threshold), we find that 19% of all respondents present in both waves are poor according to at least one of these. However, only 6% are poor according to both methods.

#### ***4.2. Levels and distribution of individual income components***

The analyses above used aggregate household level. Below, we will look at the level, distribution and number of recipients that are observed for some principal income components. For the sake of comparison, we shall divide the annual income by 12 in the case of PSBH93 and ECHP94<sup>1</sup>.

It appears that both the averages and the proportion of recipients are, for each component, very nearly the same across income measures. Consequently, the three methods capture a quasi-identical total income mass. The annual income method measures slightly more respondents with an income from employment, the current monthly income method on the other hand results in somewhat more pension incomes. According to both methods, about 81% of all respondents have some kind of personal income. This is surprising as one would expect that a larger proportion of persons would report an income on an annual basis than on a monthly one. The standard deviations are substantially higher in the annual income method, indicating more dispersion than is found in the monthly income amounts. It should be noted that substantial differences also exist between the two annual income measures (e.g. for pension incomes and sickness and invalidity allowances).

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<sup>1</sup> These observations are based on imputed datasets. Restricting the analysis to cases with no imputations results in the same conclusions.

**Table 2. Measurement of individual income components in PSBH93, PSBH94 and ECHP94.**

	PSBH93	PSBH94	ECHP94
<b>(self-)employment income*</b>			
- mean	49475	50651	49083
- st. dev.	29720	37479	40910
- % with income	53.0	53.9	55.2
<b>Wages and salaries**</b>			
- mean	48537	50579	52837
- st. dev.	22042	25062	25866
<b>Unemployment all.</b>			
- mean	14930	13329	12093
- st. dev.	9230	10151	10030
- % with income	9.8	11.3	10.6
<b>Pension</b>			
- mean	32359	33177	37748
- st. dev.	16183	15975	30718
- % with income	21.9	20.3	20.6
<b>Sickness/invalidity</b>			
- mean	20863	16283	16918
- st. dev.	18066	15972	31541
- % with income	5.7	5.9	6.7
<b>Total of the above incomes</b>			
- mean	44254	45771	45904
- st. dev.	28952	33766	38923
- % with income	81.6	79.8	81.2

\* wages and self-employment income are taken together because a significant number of respondents (about 5%) reports his/her income as self-employment income in '93 and as employment income in '94. It is not clear why this is done. Question wording effects could play a role here.

\*\* Only respondents who report their income as wage or salary in both waves.

### **4.3. A comparison of current monthly and 'usual' monthly incomes**

The dispersion of annual income, as measured in our survey, can be influenced by three different factors: firstly, dispersion in the reported 'usual' monthly amounts, secondly, dispersion due to variation in the number of months, and thirdly, the cumulation of earnings and benefits over the year. We would expect that usual monthly incomes are less dispersed than current monthly incomes, because in the former, short-term income fluctuations are averaged out. There is no reason to expect a difference in average level. Annual individual incomes by source may be more dispersed than 'usual' or current monthly incomes, because of variation in the number of months. On the other hand, the dispersion of total annual personal incomes should be less than that of monthly personal incomes, because, for any individual, there is likely to be a negative correlation between earnings and social benefits across months of the year.

These expectations are not borne out. Table 9 shows that 'usual income' is for most income sources somewhat higher than income from the previous month. More surprisingly, usual monthly incomes are significantly more dispersed than incomes from the previous month. However, these results are strongly influenced by a few outliers. When we exclude cases with a labour income (in the annual income method) of half a million BEF and more (on a monthly basis), usual earnings have the same dispersion than earnings from previous month. Incapacity allowances are also strongly influenced by one outlier. In general, for earnings and benefits we find that the usual monthly amount during last calendar year has about the same dispersion as the amount of the previous calendar month. The annual amounts are somewhat more dispersed than the usual monthly amounts. Adding all personal sources of income does not result in lower dispersion in the annual measure, compared to the monthly one. In this context it is important to note that for all income components, the number of respondents reporting such income is about the same in the monthly income method and in the annual income method.

**Table 3. Comparison of monthly income, 'usual' monthly income and annual income for several income components\*.**

	Monthly income	'usual' monthly income in annual income method	Annual income
<b>Wages and salaries</b>			
- mean	47559	47667 (47088)	540103 (532624)
- coefficient of variation	.49	.64 (.51)	.72 (.57)
<b>Unemployment income</b>			
- mean	15096	17825	154772
- coefficient of variation	.60	.61	.74
<b>Pensions</b>			
- mean	31558	33282	344772
- coefficient of variation	.51	.47	.61
<b>Labour incapacity allowance</b>			
- mean	20465	26549	223507 (203019)
- coefficient of variation	.88	1.6	1.83 (1.02)
<b>Total income from the above sources</b>			
- mean	41481	-	476805 (471782)
- coefficient of variation	.55	-	.77 (.65)

\* Data for observations with exact amounts in both waves on income component.

(between brackets): results without extreme values on wages and salaries (3 cases >500000/month) and labour incapacity allowance (1 case >=600000).

## 5. Some observations on the quality of the answers on the survey income questions

Our findings on the dispersion of current monthly and annual income do not confirm expectations based on theory and previous studies. A possible explanation of this finding is measurement error. In section 2 it was already argued that the ECHP annual income approach is rather demanding for the respondent, implying a heightened risk of inadequate response. In this section, we examine the hypothesis of measurement error. First, we consider the non-response on income questions. Subsequently, we shall look at the degree of consistency

between answers in 1993 and in 1994 to the filter questions asking whether an income component is received at all. In the third subsection, we shall analyse the consistency between current and usual income amounts for respondents who reported an exact amount in both years.

### 5.1. *Manifest non-response*

A first, obvious, indicator of the quality of the income measurement is the item (non-) response. This is recorded when persons answer positively to the filter question asking whether an income component is received at all, but fail to give an income amount, or, in the case of yearly incomes, either the amount or the number of months. Table 4 shows that, for most income components (except self-employment), non-response is much higher for yearly incomes than for monthly incomes. Except for wages and salaries, item non-response is primarily due to respondent's failure to indicate during how many months the income was received.

**Table 4. Non-response for various income sources\* in the monthly and yearly income measurements, PSBH data waves 1993 and 1994.**

	Monthly		Annual	
		Amount missing	No. of months missing	Amount and/or no. of months missing
Wages and salaries	3,8	6.6	6.2	10,3
Self-employment inc.	24,8	-	-	26,1
Unemployment benefit	8,2	7.1	22.7	24,8
Survivors pension	19,5	8.2	28.0	29,6
Old-age pension	14,4	6.3	27.4	29,3
All pension**	9,9	5.9	26.9	28,5
Sickness and disability allowances	12,3	9.2	26.4	34,4

\* Percentages within groups answering positively to filter questions about the income source.

\*\* Including early retirement pensions.

### 5.2. *Non - reported incomes: invisible non-response*

Consistency requires that a respondent who reports reception of a certain income source for a certain month in the PSBH93-survey should also mention this income source in the PSBH94/ECHP94-survey. Conversely, a respondent who says in 1994 that he received income from a certain source throughout 1993 should have mentioned this in the 1993 survey. Table 5 shows the extent of such inconsistencies in respondent's answers. In relative terms, the degree of inconsistency in answers regarding earnings than for social transfers is smaller. However, the absolute number of cases involved is in fact much larger than for any of the other income components. About 9 percent of the respondents forget to report earnings or an allowance.

The income amounts that are undetected in the PSBH 1994 survey due to these inconsistencies are not negligible. The 1993 monthly income amounts that were 'forgotten' in

1994 are, on average, only slightly smaller than those for all respondents. Likewise, in the case of respondents who reported a particular income in 1994 but failed to do so in 1993, the 'forgotten' amounts are smaller than the corresponding average amounts for respondents without inconsistencies, though here the differences are slightly greater.

**Table 5. Inconsistencies in income reporting: percentage of adults who report an income in one method but not in the other method, PSBH data waves 1993 and 1994.**

	Income <b>not</b> reported in annual method, reported in monthly method		Income <b>not</b> reported in monthly method, reported in annual method*	
	(1)	(2)	(3)	(4)
Earnings	5,2%	2,7%	1,7%	0,7%
Unemployment allowance	15,2%	1,5%	8,7%	0,4%
Pensions	13,2%	2,9%	4,7%	0,7%
Disability allowance	31,8%	1,8%	13,2%	0,4%

\* Consistency could only be checked for cases who report in 1994 that they received the income for 12 months.

- (1) % of all respondents reporting this income in the monthly income method.
- (2) % of all respondents.
- (3) % of all respondents reporting this income in the annual income method.
- (4) % of all respondents.

### 5.3. *Inconsistencies in reported incomes*

In this subsection we examine the consistency of the answers of respondents who report an income from a particular source in both years. For this comparison, we only looked at data of persons stating an exact amount in both surveys<sup>1</sup>. This implies that we excluded the (rather large) group of persons who did not give an amount, but merely indicated an income bracket. Of course, differences between these income measures need not necessarily point at measurement error: the income in a particular month can be higher or lower than the 'usual' amount across the year as a whole. To have some criterion to evaluate the degree of consistency found between current and normal '93 income, we compared these results with the consistency between current income from PSBH93 with current income from PSBH92<sup>2</sup>. We expect to find that differences between current and normal 1993-income are smaller than those between current 92-income and current 93-income.

Table 6 , column 2 shows that only 17 percent of respondents indicated exactly the same amount; in 30 percent of all cases, the amounts given diverge by more than BEF 5000, while in 15 percent of all cases, the difference exceeds BEF 10000. In the other columns of table 6, the analysis is narrowed down to subgroups where the probability of changes and fluctuations in income is likely to be smaller: i.e. those working full-time in 1993 and 1994, and in particular tenured civil servants working full time both years. Even among the latter group, the differences are significant: in 21 percent of these cases, the difference exceeds BEF 5000.

<sup>1</sup> It should be noted that for this subgroup, as for all persons present in both waves, average income levels and dispersion are about the same in the current and the annual income method.

<sup>2</sup> In 1992, like in the '93 wave, only current income was asked.

Table 7 indicates that similar differences were recorded for unemployment benefits and for pensions. The comparison between wages and salaries in the previous month in 1993 and in 1992 results in fewer cases where there is no difference, and more cases where the difference exceeds BEF 20000 (though the correlation coefficients virtually are the same). For unemployment and pension benefits the pattern of differences is the same, whether current monthly 1993 income is compared with 'usual' 1993 income, or with current monthly 1992 income. Yet, the correlation between current 92 and 93 incomes is much higher between current 93 and 'normal' 93 incomes. The RMSE (Root Mean Square Error, which can be interpreted as a measure of the average difference) that current 1993 monthly earnings are slightly more similar to current 1992 earnings than to 'normal' 1993 earnings. For unemployment benefits and pensions, the RMSE confirms the conclusions based on the correlation coefficient.

**Table 6. Individual differences in wages and salaries between current income and 'normal earnings in 1993\*.**

Difference in BEF	All cases		Respondents working full time in both waves		Tenured civil servants working full time in both waves	
	Current vs. normal 93-income	Current 93-vs. current 92-income	Current vs. normal 93-income	Current 93 vs. current 92-income	Current vs. normal 93-income	Current 93-vs. current 92-income
0	15.7	10.5	20.1	11.6	13.1	7.1
1-4999	51.5	53.7	62.5	52.5	59.6	59.9
5000-9999	15.6	20.0	10.0	21.0	13.8	17.0
10000-19999	10.5	9.3	4.6	9.0	9.2	7.6
>=20000	6.7	6.5	2.8	5.9	4.3	8.5
RMSE	12796	11605	11419	10705	12135	11349
Correlation coefficient	.83	.83	.85	.84	.88	.89
Number of cases	1518	1131	949	747	282	212

\* Only cases that report exact amounts (no income bracket-answers) in both waves.

**Table 7. Individual differences in unemployment benefits and pensions between two measurement methods.**

Difference in BEF	Unemployment benefits		Pensions	
	Current vs. normal 93-income	Current 93- vs. current 92-income	Current vs. normal 93-income	Current 93- vs. current 92-income
0	20.1	18.5	18.3	17.9
1-4999	62.5	65.6	60.3	61.9
5000-9999	10.0	11.7	12.1	11.9
10000-19999	4.6	3.4	5.4	4.5
>=20000	2.8	0.7	4.0	3.8
RMSE	7565	4353	8810	7545
Correlation coefficient	.70	.87	.84	.88
Number of cases	472	410	1102	1164



In this section we saw that the ECHP annual income method results in higher item non-response and a significant higher incidence of non-reported income presented. Also, for those respondents providing exact amounts to both the 'current monthly' question in 1993 and the 'usual' income question in 1994, we found rather large differences between the two answers. We see this as evidence supportive of the hypothesis that this approach is more subject to measurement error than the current monthly income method, possibly because the annual income method demands a higher effort from the respondent.

## **6. Mismatch in time between household composition and household income**

Another cause of error in the measurement of equivalent household income in the annual income method is the fact that there is a mismatch between the reference period of income on the one hand and that of other household characteristics on the other hand. Income is measured retrospectively for the last calendar year, while the measurement of other characteristics refers to the moment of the survey. In the PSBH/ECHP survey the time gap between the two ranges from 4 to 11 months. Atkinson et. al. (2002) note that this disturbs the relation between income and other variables.

But perhaps more problematic is the mismatch between family composition and income for the determination of household income, equivalent income and poverty status. Consider David, who last year was a student, and living with his parents, but who this year has found a job and is living on his own. Suppose he is surveyed and asked to report his personal income in year N-1. But in year N-1 he was supported by his parents and had no personal income. Survey data will therefore seem to show that he has zero income, and is extremely poor. Consider also his parents, who last year received family allowances and other government benefits, in respect of David. The survey estimate of their living standard will be distorted upward, as they will report those incomes, without there being a dependent child to support. Finally, consider Mary, who last year was a non-working housewife, but now has divorced, and is living on her own, holding a part-time job and receiving government support. As in the case of David, measuring income in the previous year will result in a rather misleading zero estimate for her household income.

In general, in survey year N, the household income is computed as the sum of the individual incomes in year N-1 of all persons who are household member at the moment of the survey. This necessarily leads to distorted estimates in (equivalent) household income for persons who experienced a change in household composition. This is especially problematic, since events such as leaving or entering a household are often associated with changes in labor market status, and will in many cases also affect eligibility for social security benefits (as the examples in the previous paragraph illustrate)<sup>1</sup>. A useful distinction can be made between two situations. First, for households who 'gain' or 'lose' a person without personal income, this method results in incorrect equivalence factors. For households who 'gained' or 'lost' a person with a personal income since the last calendar year, this method leads to both incorrect

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<sup>1</sup> We assume that, following the ECHP annual income method, all variables which are based on income (such as equivalent income, poverty status) are supposed to refer to year N-1. Under that assumption, household composition changes are a problem. Alternatively, one might assume that all income-based variables refer to year N, in which case household composition changes are no problem, and only income changes produce distortion. However, income changes are obviously more prevalent than household composition changes, so this alternative assumption is not very attractive.

estimates of household income and incorrect equivalence factors. In this section we examine the impact of these features of the annual income method.

First, household composition changes in the space of one year are not a marginal phenomenon. Our results indicate that 14 percent of all persons present in both waves experience a change in household composition between the two waves. People without income joining a household represent half of these cases. People without an income leaving the household happens for only about 1.2% of all respondents. In 3% of cases a person (or persons) with an income left the household. People with an income joining the household is also a fairly rare event, occurring for about 1.2% of all respondents. Almost 2 percent of the respondents experience a combination of the above household changes.

Table 8 presents mean and median figures for disposable and median income of persons who experienced various household composition changes, using results for persons who experienced no such changes as the reference situation. For these households we find only small differences between methods. Households who loose a member with an income are clearly less well off according to the annual income method than according to the monthly income method. Disposable income here is only half of the amount produced by the monthly income method, while equivalent income is 15% to 26% lower. Gaining a household member with a personal income naturally has the opposite effect, though again, the difference for disposable income is larger than for equivalent income. Loosing a household member without an income has (somewhat surprisingly) a substantial effect on disposable income, but virtually no impact on equivalent income. Gaining a household member without a personal income results (on average) in a higher disposable income, but due to the larger family size, in the same level of equivalent income. For split-off households, the two methods produce entirely different results. For these cases the annual income method strongly underestimates the household income of the previous calendar year.

**Table 8. Comparison of mean and median (equivalent) disposable household income in 1993 for persons whose household composition changed between the two waves, only persons present in both waves.**

		PSBH93***	PSBH94	ECHP94
<b>Persons living in an original* household without change in composition</b>	(n)	4902	4809	4889
- disposable household income	mean	84718	89120	90393
	median	78045	81000	82850
- equivalent household income	mean	46990	48591	49826
	median	43289	45000	45000
<b>Persons living in an original household* which lost at least one person with an income</b>	(n)	165	167	163
- disposable household income	mean	127102	79710	89589
	median	125925	76850	79764
- equivalent household income	mean	54113	43938	49706
	median	51166	42620	44047
<b>Persons living in an original household* with at least one new member with an income</b>	(n)	91	97	91
- disposable household income	mean	85063	114837	108103
	median	55600	100750	99221
- equivalent household income	mean	50245	56150	53595
	median	37750	50833	50347
<b>Persons living in an original household* which lost at least one person without a personal income</b>		87	89	82
- disposable household income	mean	120334	85882	86878
	median	108000	76006	80273
- equivalent household income	mean	47673	47008	47833
	median	40000	46583	44975
<b>Persons living in an original* household with at least one new member without personal income</b>	(n)	274	278	268
- disposable household income	mean	81555	100266	99702
	median	78500	91000	91974
- equivalent household income	mean	48198	48541	47896
	median	44390	45550	44974
<b>Persons living in a split-off household** without new persons with an income</b>	(n)	48	49	46
- disposable household income	mean	104088	45229	55100
	median	96650	40583	42371
- equivalent household income	mean	46811	34745	40028
	median	40333	28528	33375

\*\* 'split-off households' are households formed by a panel member who leaves an original households and starts his/her own household.

\*\*\* Results for PSBH93 differ somewhat according to whether the comparison is with PSBH94 or with ECHP94. The figures presented here are based on the comparison PSBH93-ECHP94.

In this section we saw that the mismatch in the ECHP annual income method between the income reference period (previous year), and the household composition information produces large distortions in the estimates of disposable and equivalent income of in cases where people had left or joined households recently. In itself these distortions are obviously problematic for poverty research, and, moreover, they are concentrated within specific population categories, e.g. young single persons and divorced people. Also, they may cause spurious transitions into and out of poverty.

## 7. Reliability and validity issues

### 7.1. Reliability of the income measures

Traditionally, the quality of the measurement of a certain characteristic is assessed in terms of its reliability and validity. Reliability is defined as stability of the measurement or as the absence of error variance<sup>1</sup>. If there are two parallel measurements of the same characteristic, the correlation coefficient between the two can be interpreted as an estimate of the reliability of these measures. The prerequisite for two measures to be regarded parallel is that they have the same 'true score' and that they have equal variances. Our three income measures satisfy neither of these requirements. Current and annual income have different true scores and different variances. Nevertheless it is interesting to look at the correlation between the two. The correlation coefficient between equivalent household income in PSBH93 and PSBH94 is low: .51, and the correlation between PSBH93 and ECHP94 is still lower, only .44. Unless one would assume that 'true' monthly and annual incomes are rather weakly correlated, correlations this low seem to indicate that at least one of the income measures has rather low reliability.

### 7.2. Validity of the income measures

Validity refers to the degree to which the empirical variable covers the theoretical concept. In our case: does the annual income measure cover 'true' annual income? One way to assess the validity of a measure is to compare it with other, related, measures. In the literature this is called 'construct validity'. Carmines and Zeller (1979) define construct validity in the following way:

'Construct validity is concerned with the extent to which a measure relates to other measures consistent with theoretically derived hypotheses concerning the concepts that are being measured'.

In the PSBH 93 wave data were collected on the following indicators of the living standard of households:

- Possession of a range of durables: refrigerator, washing machine, vacuum cleaner, separate freezer, dishwasher, drier, micro-wave oven, telephone, colour-TV, radio, stereo installation, video recorder, personal computer.
- Whether the household could, or could not afford a holiday away from home for at least a week because of financial reasons

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<sup>1</sup> In classic test theory reliability is formally defined as follows (See Carmines and Zeller, 1979). If X is the observed variable, T is the 'true score' of the observed variable and e is random error, reliability can formally be defined as follows

$$V(X) = V(T + e) \quad (4)$$

$$= V(T) + 2COV(T,e) + V(e) \quad (5)$$

By assumption the expected error score is zero ( $E(e)=0$ ) and the correlation between T and e is zero ( $\rho(t,e)=0$ ). Thus, (5) can be reduced to

$$V(x) = V(t)+V(e) \quad (6)$$

The reliability of X as a measure of T can be defined as:

$$R_x = V(T) / V(X) \quad (7)$$

If there are two parallel measures available (X1 and X2), reliability can be estimated as

$$COV(X1,X2) / SD(X1) SD(X2) \quad (8)$$

Where SD is the standard deviation. This is equal to the correlation coefficient.

- Whether the household is able or not able to save regularly some income because of financial reasons
- Number of cars
- Whether the household is able to make ends meet with great difficulty, with difficulty with some difficulty, rather easily, easily, very easily (subjective income evaluation)
- Home tenure: owner or tenant.

Assuming that these living standard indicators reflect the longer-term income positions of household (rather than month-by-month fluctuations), one would expect them to be stronger correlated with annual household income than with current monthly income.

In general our results reveal rather low correlations for both current and annual income; the differences between the three measures are limited in this respect(see table 9). The most important finding is that current monthly income does not score consistently lower than the annual income measures. On the contrary, the coefficients for current income and for PSBH94 are almost identical, while the coefficients for ECHP94 are consistently below the other two. If we use the logarithm of the three income measures to reduce the effect of extremely high incomes, current monthly income has consistently the highest validity coefficient. If our hypothesis that these living standard indicators should be stronger related to longer term income than to current income is correct, these findings indicate validity problems for our annual income measures .

Moreover, further analysis shows there are interesting differences according to family situation (see table 10). For persons whose family situation changed between 1993 and 1994 the correlations of both annual income measures are consistently below those of the current monthly income measure. The differences are largest for persons where the household lost members between 1993 and 1994. On the other hand, for per persons living alone in both years the annual measures perform better than current income. For other persons where the household did not change in size the hypothesis the current income correlations are mostly about the same as those for PSBH94 and higher than those for ECHP94<sup>1</sup>.

**Table 9. Validity of current and annual income measures: correlations with some indicators of the standard of living\*.**

	PSBH93	PSBH94	ECHP94
Number of durables	.26 (.30)	.28 (.25)	.24 (.24)
Number of cars	.25 (.27)	.24 (.21)	.19 (.18)
Ability to go on holiday	.14 (.15)	.14 (.14)	.12 (.13)
Ability to save	.21 (.24)	.21 (.21)	.19 (.20)
Subjective income evaluation	.28 (.29)	.28 (.29)	.25 (.26)
Home tenure	.06 (.09)	.06 (.07)	.04 (.06)

\* Correlations based on ln(income) between brackets.

<sup>1</sup> We also computed the correlations for different age groups and educational levels but found no substantial differences in the results across these categories.

**Table 10. Validity of current and annual income measures: correlations with some indicators of the standard of living, by household situation\*.**

	Increase in household size 93 - 94			Decrease in household size 93 - 94			Single in 93 and 94			Same size in 93 and 94, not single		
	PSBH93	PSBH94	ECHP94	PSBH93	PSBH94	ECHP94	PSBH93	PSBH94	ECHP94	PSBH93	PSBH94	ECHP94
Number of items	.34 (.36)	.32 (.20)	.30 (.21)	.23 (.26)	.28 (.24)	.15 (.12)	.23 (.24)	.32 (.33)	.28 (.21)	.26 (.28)	.27 (.25)	.22 (.22)
Number of cars	.37 (.40)	.33 (.31)	.23 (.20)	.29 (.37)	.21 (.22)	.07 (.06)	.24 (.35)	.41 (.43)	.42 (.30)	.26 (.24)	.24 (.20)	.18 (-.17)
Ability to go on holiday	-.21 (-.28)	-.10 (-.05)	-.12 (-.10)	-.21 (-.31)	-.21 (-.17)	-.13 (-.11)	-.12 (-.10)	-.13 (-.14)	-.10 (-.05)	-.12 (-.14)	-.14 (-.14)	-.12 (-.14)
Ability to save	-.30 (-.34)	-.16 (-.11)	-.16 (-.15)	-.18 (-.24)	-.19 (-.16)	-.14 (-.14)	-.19 (-.23)	-.26 (-.31)	-.21 (-.13)	-.20 (-.23)	-.20 (-.07)	-.19 (-.04)
Subjective income eval.	.27 (.31)	.16 (.12)	.08 (.05)	.33 (.36)	.25 (.21)	.22 (.21)	.24 (.23)	.30 (.35)	.26 (.20)	.28 (.29)	.29 (.28)	.26 (.29)
Home tenure	-.22 (-.24)	-.15 (-.11)	-.03 (-.05)	-.10 (-.05)	-.10 (-.08)	-.02 (-.01)	-.04 (-.09)	-.03 (-.06)	-.05 (-.06)	-.04 (-.06)	-.05 (-.07)	-.03 (-.04)

Between brackets: correlations based on ln(income).

### 7.3. *Validity of poverty/low income measurement*

It is clear that low reliability and validity of the income measures may cause misclassification of respondents as poor or non-poor. In section 4 we showed that our (equivalent) income measures have about the same median income level, implying that the poverty line is the same. (The poverty line is defined as 60% of median equivalent income.) Nevertheless, the number of persons classified as poor is substantially higher in the annual income method (15%, compared with 10% on the basis of current monthly income). At the same time it was noted that there was rather limited overlap between the groups classified as poor. To check the validity of the poverty measures we classified respondents into four categories, based on their score on the PSBH93 and PSBH94 poverty indicators, and looked at the living standard indicators for each of these groups (Table 11).

It appears that persons classified as poor in both methods are clearly least well off, followed by persons with current income below the poverty line, but annual income above it. Persons classified as poor by the annual income method but not by the current income method resemble the unambiguously non-poor on some indicators (durables, possession of a car and, at some distance, home ownership) but still have a clearly lower living standard according to other indicators (holiday, saving, making ends meet). These findings point at the surprising conclusion that the current monthly income method is better at identifying persons with a really low living standard than the annual income measure.

These findings may be linked to those reported in the previous sections, as table 12 shows. The incidence of family changes is larger in the two categories with inconsistent poverty status. Moreover, respondents who failed to report an income in 1994 they said they had had in 1993, are concentrated in the group with persons who are classified as poor by the annual income measure but not by the current monthly income measure. This is another indication that for many persons, seemingly low annual income does not reflect their true income.

**Table 11. Living standard indicators by poverty status based on annual (PSBH94) and current monthly (PSBH93) income measures.**

	PSBH93 poor, PSBH94 poor	PSBH93 poor, PSBH94 not poor	PSBH93 not poor, PSBH94 poor	PSBH93 not poor, PSBH94 not poor
Number of durables	7.6	8.3	9.1	9.5
% cannot afford holiday	26.3	23.1	16.5	9.1
% not able to save regularly	58.8	43.5	35.1	19.7
% owner of home	52.7	58.1	66.7	72.2
% making ends meet with (great difficulty)	41.7	30.5	21.1	8.0
% no car	25.4	8.3	4.8	4.6
Number of cases	404	258	571	5290

**Table 12. Possible reasons for differences between poverty statuses based on monthly income and on annual income.**

	PSBH93 poor, PSBH94 poor	PSBH93 poor, PSBH94 not poor	PSBH93 not poor, PSBH94 poor	PSBH93 not poor, PSBH94 not poor
% change in family composition	7.7	16.3	14.2	11.2
% not reporting an income	8.7	4.7	19.3	6.8

## 8. The Dutch experience

In this paper we have taken advantage of a change in the income questions in the Panel Study of Belgian Households between 1992 and 1993 to compare a monthly income measure with annual income according to the ECHP method. We saw that the latter results in higher estimates of income inequality and poverty. A similar change happened in 1989 in the Dutch Socio-Economic Panel. As table 13 shows, in this case the annual income method results in substantially higher poverty estimates, while Gini-coefficients are about the same.

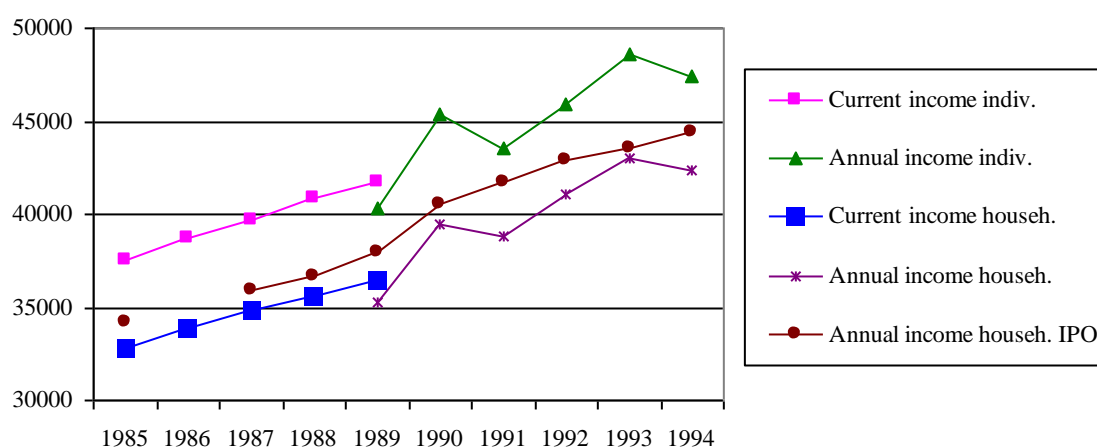
**Table 13. Income levels, poverty and income inequality, individuals, 1989, The Netherlands.**

	Monthly income	Annual income/12
Average income in Dfl.	41753	40339
% poor	10.1	13.0
Gini	.311	.315

Source: CBS, cited in Fouarge en Muffels (1998).

We do not dispose of the individual SEP data. However, published time series on average income, inequality and poverty reveal interesting patterns. Figure 5 shows that average monthly income moves much more smoothly across years than average annual income data, and, moreover is in better agreement with the evolution according the IPO income panel, which can be assumed to very close to true population values<sup>14</sup>. Also, Gini-coefficients based on annual income seem to fluctuate rather across years, a pattern not seen in the IPO results, nor in the Gini's based on monthly income. These fluctuations are also seen in the other indices of annual income inequality. On the other hand, current monthly income poverty seems to be more unstable across years than annual income poverty. However, this result may be due to the fact that in The Netherlands, a lot of households have incomes very close to the poverty line.

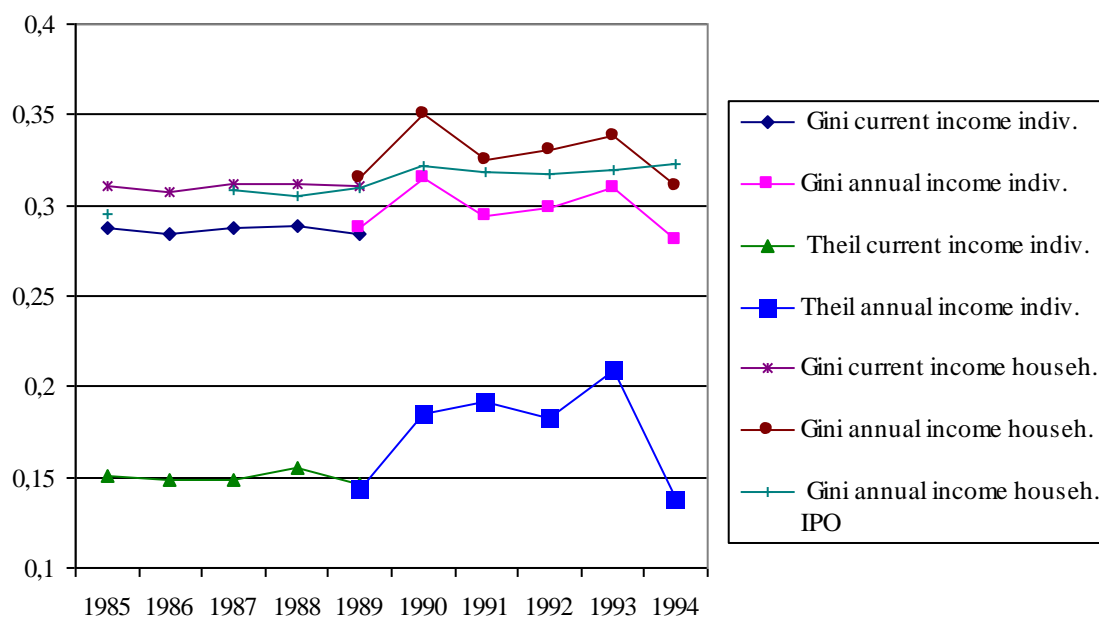
**Figure 3. Average income evolution in SEP and IPO surveys, The Netherlands.**



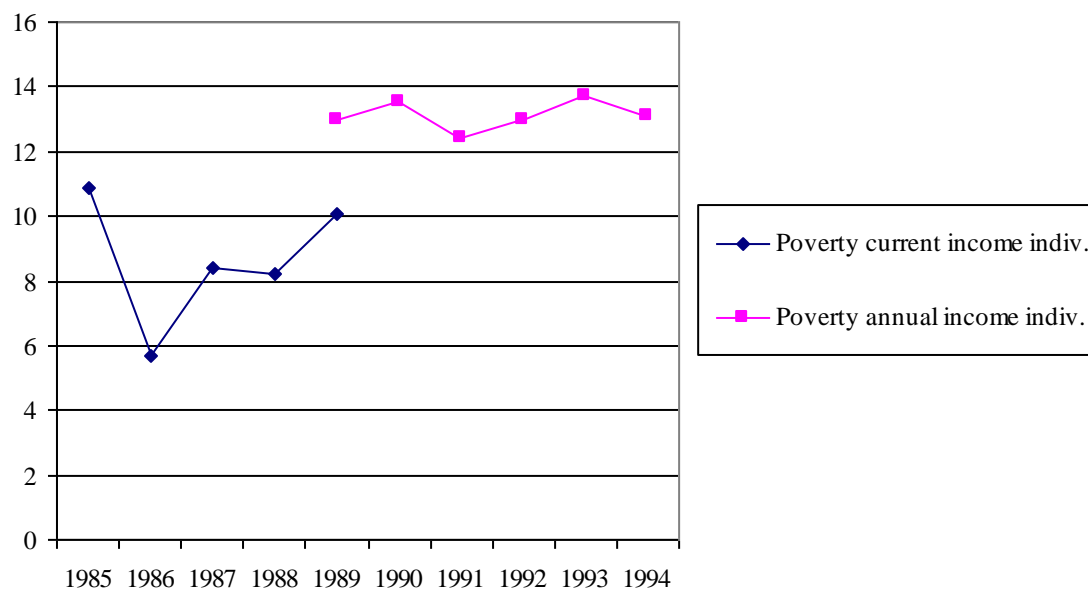
<sup>14</sup> The IPO () consists of a large sample of households, for which tax data are linked to survey data.



**Figure 4. Gini and Theil coefficients for SEP and IPO data, The Netherlands.**



**Figure 5. % poor, The Netherlands.**



## 9. Summary and conclusions

One of the many issues in empirical research on poverty and income inequality is the choice of accounting period: a week, a month, a year, or an even longer period. The Expert Group on Household Income Statistics (Canberra Group, 2001) recommends that the accounting period to be used for income distribution analyses should be one year, though they also note that different accounting periods suit different types of analysis. Previous studies comparing shorter and longer accounting periods (month vs. year, one year vs. three or four years) found rather small effects on measured income inequality and poverty.

An important, yet somewhat neglected aspect of this issue, is the validity and reliability of the income information gathered from respondents in household surveys. Gathering annual income data makes rather high demands on the memory and/or numerical abilities of respondents. As the Expert Group (2001: 32) observes, many income components will be normally be reported more easily and more accurately if information is only sought with respect to the previous week or month.

In this paper, we have tried to add to this literature by comparing two measures of household income, viz. current monthly income and annual income in the previous year. We profit from a unique opportunity created by a change in the income question modules in the Belgian Panel Study of Belgian Households (PSBH, source of the Belgian data in the European Community Household Panel, or ECHP). In 1993 survey respondents were asked about their incomes in the previous month, while in 1994, the same (panel) respondents faced questions probing for their incomes in the previous calendar year, viz. 1993.

The main results are as follows. Firstly, contrary to expectations, our measure of annual household income turns out to be more unequally distributed than monthly income. Also, the proportion of persons on low income is higher when using the annual income measure. Larger dispersion of annual income is also found at the level of personal income components; an important reason for this is that 'usual' monthly incomes by source (an input to the annual income measure) are not less dispersed than current monthly income. The correlation between monthly and annual household income is surprisingly low, only 0.51.

Secondly, the annual income measure performs worse on some indicators of data-quality than the monthly method. It results in higher item non-response (i.e. failing to give the amount of an income component), and, in addition, a significant proportion of respondents who mentioned a monthly amount for a particular income component in 1993, did not report receiving such income in 1994. Also, for those respondents providing exact amounts to both the 'current monthly' question in 1993 and the 'usual' income question in 1994, we found rather large differences between the two answers. Thirdly, a fundamental problem of the ECHP annual income method is that income is measured retrospectively for the last calendar year, while the measurement of other characteristics refers to the moment of the survey. This produces large distortions in estimates of equivalent income for the substantial number of households which recently experienced a change in composition. Fourthly, it was found that the annual income measures do not correlate better with other indicators of the living standard of households than the monthly income variable. Finally, we find some corroboration of these Belgian results in published results from the Dutch Socio-Economic Panel. After a change from a monthly to an annual income measure, figures for average income and income inequality from this source fluctuated much more across years, and were less in agreement with administrative data.

The results reported in this paper indicate that our monthly income measure performs better, in terms of reliability and validity than the two annual income variables used here. The main reasons for this appear to be of two kinds. First, measurement of annual income demands more from survey respondents, and has all the disadvantages of retrospective questioning. The remarks of the Canberra Group on this point quoted in the introduction of this paper appear to be very apt. Secondly, for households who experienced a recent change in composition, the mismatch between the reference periods of household income and household income composition the ECHP annual income method, leads to distorted estimates of household income, equivalent income and poverty status .

What recommendations for research on income distribution and poverty follow from these findings? First, in any decision on the reference period to be used for survey-based measures of household income, measurement and survey-technical issues should weigh heavily. We would argue that in many cases and for many purposes, the balance of considerations will favour monthly over annual income. Secondly, efforts should be made to improve measures of annual income based on survey data. Panel data especially would seem to offer opportunities in this regard. Combining information from several waves, following the lines of BHPS method presented in section 2, might reduce the reliance on retrospective questions, and also might make it possible to match more closely the reference periods of household income and of household composition.

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