Luxembourg Income Study Working Paper Series

Working Paper No. 75

Household Structure and the Measurement of Poverty

Robert Wright

May 1992

(scanned copy)

Luxembourg Income Study (LIS), asbl

Household Structure and the Measurement of Poverty

by

Robert E. Wright

Department of Political Economy
Adam Smith Building
University of Glasgow
Glasgow, Scotland
G12 8RT

and

Centre for Economic Policy Research
25-28 Old Burlington Street
London, England
W1X 1LB

May 1992

An earlier version of this paper was presented at the "Family and Household Changes" seminar organised by Eva Lelievre of the Applied Population Research Unit, University of Glasgow, January 24, 1992. The support of the *Luxembourg Income Study* is gratefully acknowledged. Of course, full responsibility for all errors and shortcomings rests entirely with the author.

Abstract. This paper proposes a method for controlling for compositional factors in the measurement of poverty. The method is based on the notion of "direct standardisation", used extensively in the field of demography. The method is consistent with Sen's influential axiomatic approach to poverty measurement and is based on an important class of poverty measures proposed by Foster, Greer and Thorbecke. This measure is one of the few summary poverty measures that can be directly standardised *and* also meet Sen's requirements. With this class of standardised measures, it possible to examine underlying differences in poverty while controlling for compositional factors known to be correlated with the incidence and intensity of poverty. The method is illustrated by examining the relationship between household structure and poverty in seven European countries: France, Germany, Italy, Luxembourg, Netherlands, Poland and Great Britain. The data are centered around 1985 and form part of the *Luxembourg Income Study*. The empirical analysis demonstrates the potential importance of controlling for compositional effects in the measurement of poverty.

Household Structure and Poverty

I. Introduction

There is much debate concerning how one measures poverty. To arrive at an estimate of poverty, a series of difficult and often problematic measurement choices must be made. Is poverty a relative or absolute concept? What is the appropriate poverty line? What is the appropriate unit of analysis: the household, the family or the individual? What is the best proxy measure of well-being? What equivalence scales should be used? What summary measures of poverty should be calculated?[1] However, one problem that has gone relatively unnoticed in this debate is the effect of compositional factors on the measurement of poverty. More specifically, the level of poverty however defined, is affected by the composition of the population for which it is measured. For the purposes of comparing poverty across different populations (or over time), it would be useful to be able to measure differences in poverty as if there were no differences in compositional factors.

This problem of compositional factors in the measurement of poverty is easily illustrated by reference to the most basic summary measure of poverty — the "head-count ratio" — which is simply the percentage of individuals (or households or families)

---

1. See Jenkins (1991) for a thorough discussion of these choices.

in a population who are poor. If we divide two populations, "i" and "j", into "K" mutually exclusive and exhaustive groups, we may express the head-count ratios for each of these populations as:

$$\%Poor_i = \sum_{k=1}^{K} (n_k/n)_i \cdot \%Poor_{ik} \text{ and}$$

$$\%Poor_j = \sum_{k=1}^{K} (n_k/n)_j \cdot \%Poor_{jk} ,$$

where:

$$\sum_{k=1}^{K} (n_k/n)_i = \sum_{k=1}^{K} (n_k/n)_j = 1 .$$

From these simple identities it is easy to see that the difference in the head-count ratio between these two populations, (e.g. $\%Poor_i$-$\%Poor_j$), will be determined by both differences in the head-count ratios of each of the groups (i.e. $\%Poor_{ik}$-$\%Poor_{jk}$) and by differences in the relative population shares of the groups [i.e. $(n_k/n)_i$-$(n_k/n)_j$]. In many analyses of poverty, researchers are primarily interested in differences in poverty after the effect of differences in population composition have been eliminated. Aggregate or summary poverty measures, such as the head-count ratio, unfortunately confound these two effects, making it difficult to interpret observed differences in

the incidence and intensity of poverty.

One problem that likely hampers the inter-country comparison of poverty is the interaction between household composition and poverty. It is well known that poverty rates differ by household type. It is also well known that the relative distribution of households by type differs across countries (e.g. the share of one-parent households). Therefore, differences in aggregate poverty measures, such as the head-count ratio, between countries confound differences in household structure with differences in poverty. Put another way, even if there were no differences in poverty rates across different household types in two countries, summary poverty measures could reveal a difference in the "average" level of poverty simply because of differences in household composition.

With this in mind, this paper proposes a method for controlling for compositional factors in the measurement of poverty. The method is based on the notion of "direct standardisation", used extensively in the field of demography (Shryock and Siegal, 1976). The method is consistent with Sen's (1976) influential axiomatic approach to poverty measurement and is based on an important class of poverty measures proposed by Foster, Greer and Thorbecke (1984). This measure is one of the few summary poverty measures that can be directly standardised *and* also meet Sen's requirements. With this class of standardised measures, it possible to examine underlying differences in poverty while controlling for compositional factors known to be

correlated with the incidence and intensity of poverty. The method is illustrated by examining the relationship between household structure and poverty in seven European countries: France, Germany, Italy, Luxembourg, Netherlands, Poland and Great Britain. The data are centered around 1985 and form part of the *Luxembourg Income Study*.

II. A Class of Standardised Poverty Measures

The basic idea of standardisation is simple. The aim is to allow a more meaningful comparison of two or more rates by holding constant the effect of compositional factors. Direct standardisation, as it is known in demography, involves selecting a compositional distribution from a "standard population". This distribution is then applied to the specific rates of the populations being compared. This exercise generates the number of "expected" events, which can be compared to the number of "actual" events, with the ratio of "expected to actual" being the standardised rate. More specifically, a directly standardised rate is a weighted average, where the weights are the population shares from the standard population. In this sense, standardisation requires that the measure must be *additively decomposable with population share weights*. Measures that do not possess this property cannot be directly standardised.[2]

---

2. For a detailed discussion of methods of demographic standardisation see Shryock and Siegal (1976).

Turning to the measurement of poverty, Sen (1976) described three properties that a good summary measure of poverty should possess. The first is the measure should be sensitive to the relative number of poor, capturing the *incidence of poverty*. The second is that the measure should be sensitive to the average level of income of poor, indicating their *average deprivation*. The third is the measure should capture the distribution of income among the poor, indicating their degree of *relative deprivation*.[3]

Most measures of poverty that incorporate Sen's axiomatic requirements (including Sen's own measure) cannot be directly standardised (see Hagenaars, 1987). As mentioned above, standardisation requires that a measure be additively decomposable with population share weights. One poverty measure that possesses this property, and meet Sen's requirements, is the class of measures proposed by Foster, Greer and Thorbecke (1984). This measure may be defined (with respect to households for example) as:

$$P(\alpha) = (1/n) \sum_{i=1}^{q} \left[\frac{(y^* - y_i)}{y^*} \right]^{\alpha} , \qquad [1]$$

---

3. It is important to note that the term "deprivation" is used here to denote the degree of income shortfall or disadvantage below the poverty line. It should not be confused with Townsend's (1987) notion of deprivation, which has a much broader social and economic basis.

where: y^* is the poverty line; y_i is the income of household i; q is the number of poor households (i.e. with $y_i < y^*$); and n is the total number of households in the population. α is a parameter which takes on a value greater than or equal to zero ($\alpha \geq 0$). As α gets larger, the measure becomes more sensitive to the income circumstances of the "poorest poor". This measure is bounded by the unit interval, with a value of "0" representing the situation of "no poverty" (i.e. no one is poor) and the value of "1" representing the situation of "total poverty" (i.e. everyone is poor).

Three values of α are particularly meaningful in terms of Sen's requirements. If $\alpha=0$ then:

$$P(0) = H = q/n. \qquad [1a]$$

When $\alpha=0$, the Foster-Greer-Thorbecke (FGT) measure reduces to the "head-count ratio", which is simply the proportion of a population who have income below the poverty line (i.e. the *incidence* of poverty). If $\alpha=1$ then:

$$P(1) = H \cdot I , \qquad [1b]$$

where:

$$I = (y^* - \bar{y}_p)/y^* ,$$

and $\bar{y}_p$ is the average income of the poor. This is a re-normalisation of the "income-gap ratio", which captures the average income shortfall of the poor (i.e. the *average deprivation* of poor measured by average income from the poverty line). Finally, if $\alpha=2$ then:

$$P(2) = H\cdot[I^2+(1 - I)^2C_q^2] , \qquad [1c]$$

where C_q is the coefficient of variation of income among the poor. Since C_q is a commonly used measure of income inequality, its inclusion in the measure captures the *relative deprivation* of the poor.

Since the FGT measure is additively decomposable with population share weights, it may be written:

$$P(\alpha) = \sum_{k=1}^{K} (n_k/n)\cdot P(\alpha)_k , \qquad [2]$$

where the subscript k denotes a set of mutually exclusive and exhaustive groups. If we think of $P(\alpha)$ as being a measure of the "total" amount of poverty in the population, then each groups share in total poverty is:

$$S(\alpha)_k = [(n_k/n)\cdot P(\alpha)_k]/P(\alpha) . \qquad [3]$$

These poverty shares have many useful applications. For example, they describe what may be termed the "distribution of poverty". If the poverty burden is shared equally across all the population groups, then $S(\alpha)_k=(n_k/n)$ for all k. That is, each population group's share of total poverty equals its relative population share. If this is not the case and $S(\alpha)_k > (n_k/n)$, then that group may be said to be "over-represented" in the ranks of the poor.

Finally, we may write the standardised version of the FGT poverty measure as:

$$P(\alpha)^* = \sum_{k=1}^{K} (n_k/n)^* \cdot P(\alpha)_k \ , \qquad [4]$$

where $(n_k/n)^*$ is a set of K population shares (or weights) from the population selected to be the standard. Therefore, in the construction of the standardised rates, the actual (observed) population distribution is replaced by the one from the standard population being used. Then all the subsequent poverty rates are calculated with this implied distribution.

It must be remembered that this standardised FGT poverty measure has no direct meaning, despite the fact that it incorporates Sen's important requirements. This is a property of all directly standardised rates. Standardised rates are hypothetical rates in the sense that they are only meaningful when they are compared to other similarly computed rates.

Therefore, since their strength lies in comparison, it is common to focus on relative differences between them. By calculating directly standardised poverty rates, where the effect of compositional factors are controlled for, one gets a clearer summary picture of underlying differences in poverty rates.

III. Household Structure and Poverty in Europe

Data

In this section, standardised FGT poverty measures are calculated in order to examine the relationship between household structure and poverty in seven European countries. The countries studied include six countries in the *European Economic Community*: France, Germany, Italy, Luxembourg, Netherlands, and Great Britain and one country from Eastern Europe: Poland. The data are centered around 1985 and form part of the *Luxembourg Income Study (LIS)*. The *LIS* makes available to researchers a data-base of micro-level surveys for a large number of industrialised countries. One of the main aims of the project is to foster cross-country comparisons of income-related variables. All data-sets contain detailed variables describing income, along with a variety of socio-economic, demographic and household structure variables. The data-base is housed at the *Center for Poverty, Population and Policy Studies, Walferdange, Luxembourg* and may be conveniently accessed through the BITNET electronic

Table 1
The Luxembourg Income Study Databases Used in the Analysis

Country	*Year*	*Data Source*	*Sample Size*
France	1984	*French Income Study of Taxes*	12,693
West Germany	1984	*German Panel Survey Wave 2*	5,111
Italy	1986	*Bank of Italy Income Survey*	8,022
Luxembourg	1985	*Luxembourg Household Panel Study*	2,012
Netherlands	1987	*Survey of Income and Program Users*	4,190
Poland	1986	*Polish Household Budget Survey*	10,646
Great Britain	1986	*Family Expenditure Survey*	7,178

Notes: Sample size is the actual number of households surveyed.

mail service.[4] Table 1 contains a brief overview of the data-sets used: country, year, source and (unweighted) sample size.

< < < < *Table 1 About Here* > > > >

Identifying the Poor

If we define economic well-being as the ratio of economic resources to need, then a household is "poor" if its available economic resources do not meet its needs at some minimum level. Like most empirical studies of poverty, we employ *disposable equivalent household income* as the empirical counterpart to economic well-being. The household's economic resources are assumed to be determined by it's total disposable income, which is equal to the gross yearly income of all household members from all sources *minus* income taxes and other mandatory deductions.

It is clear that there are economies of scale in consumption related to household size. Likewise, there are differences in consumption patterns between children and adults. Disposable income should be adjusted to reflect these differences. Therefore the household's needs are assumed to be a function of the number and age of its members. In keeping with most empirical studies of poverty, disposable income is adjusted using "equivalence scales". The equivalence scales used are the weights recommended by the OECD in its work on *Social Indicators*. That is, the first adult in the household has a weight of 1.0; each other adult has

---

4. Further details concerning the project can be found in Smeeding, O'Higgins and Rainwater (1990, pp. 172-181).

a weight of 0.7; and each child has a weight of 0.5.

A household is "poor" if it's equivalent disposable income, y_i, is below the "poverty line", y^*. Unfortunately, there are no well defined rules for selecting the most appropriate poverty line (see Hagenaars and van Praag, 1985). In this paper, the so-called "households below average income" (HBAI) approach is used.[5] In this approach, the poverty line is set at a fraction, ρ, of the mean level of equivalent income. That is:

$$y^* = \rho \cdot \bar{y}. \qquad [5]$$

Therefore, a household is poor if it's income is below this level. An individual is poor, therefore, if he or she is a member of a poor household. The poverty estimates presented in this paper are all based on an poverty line set at 50 per cent of the mean level of equivalent income in each of the countries. Therefore, the poverty line is a relative poverty threshold, not an absolute threshold, since no adjustment is made for differences in the price level across these countries. This is one of the poverty lines used in the OECD's *First European Poverty Programme* (see O'Higgins and Jenkins, 1992).[6]

---

5. For a detailed discussion of the advantages of the HBAI approach to the measurement of poverty see Atkinson (1987).

6. Poverty rates based on poverty lines of 40 and 60 per cent of mean income were also calculated (i.e. ρ = 0.4 and 0.6). These estimates support our overall conclusions and for brevity are not presented.

Defining Household Types

In order to calculate the standardised FGT poverty measures, the data must be broken down into different types of households. Four criteria, which are related to the incidence and intensity of poverty, are used to define the different households types. They are: (1) Age of the household head; (2) Sex of the household head; (3) Marital status of the household head; (4) Presence of children in the household; and (5) Presence of "additional" adults in the household. Combining these criteria resulted in a breakdown of 20 different household types. Table 2 provides detailed definitions for each household type. Essentially these households fall into three broad groups: (1) *One-person households*; (2) *Married couples with dependent children*; and (3) *"Other" types of households*. It is well known that direct standardisation is more effective the more detailed the breakdown of the data (i.e. the larger the number of groups). However, the distribution of households used here is more detailed than used in most studies that examine differences in poverty across different types of household. A more detailed breakdown was not feasible because of extremely small sample sizes in some groups. Nevertheless, it is very unlikely that our conclusions would change with a more detailed breakdown.

< < < < *Table 2 About Here* > > > >

Table 3 shows the distribution of households by type for each of the seven countries (i.e. the unit of analysis is the

Table 2
Definitions of Household Types

k	*Definition of Household Type*
(a)	*One-Person:*
1.	Male under age 65.
2.	Female under age 65.
3.	Male age 65 or older.
4.	Female age 65 or older.
(b)	*Married Couples with Children:*
5.	Husband-wife couple, head under age 65, with one or more children under 18, and no other members over age 18.
6.	Husband-wife couple, head under age 65, with one or more children under 18, and other members over age 18.
7.	Husband-wife couple, head age 65 or older, with one or more children under 18, and no other members over age 18.
8.	Husband-wife couple, head age 65 or older, with one or more children under 18, and other members over age 18.
9.	Husband-wife couple, head under age 65, with no other members.
10.	Husband-wife couple, head under age 65, with other members over age of 18.
11.	Husband-wife couple, head age 65 or older, with no other members.
12.	Husband-wife couple, head age 65 or older, with other members over age of 18.
(c)	*Other Types:*
13.	Unmarried male, head under age 65, with one or more children under age 18, and no other members age 18 or older.
14.	Unmarried male, head under age 65, with one or more children under age 18, and other members age 18 or older.
15.	Unmarried female, head under age 65, with one or more children under age 18, and no other members age 18 or older.
16.	Unmarried female, head under age 65, with one or more children under age 18, and other members age 18 or older.
17.	Other non husband-wife households, head age 65 and older with children under age 18, and no other members age 18 or older.
18.	Other non husband-wife households, head age 65 and older with children under age 18, and other members age 18 or older.
19.	Other non husband-wife households, head under age 65, with no children under age 18.
20.	Other non husband-wife households, head age 65 or older, with no children under age 18.

household).[7] Examination of this table reveals that there are significant differences in household composition across these countries. A few notable differences are worth pointing out. For example, in Germany, 32.2 per cent of all households are one-person households while in Italy the share is only 13.2 per cent. Likewise, in Italy, 77.3 per cent of all households are married couples with children while in Poland this group makes up only 54.3 per cent of total. Finally, in Germany and the Netherlands, 6.3 per cent of households fall into our "other" types of household group; in Poland, the share is 32.2 per cent — over a five-fold difference.

< < < < *Table 3 About Here* > > > >

In an attempt to summarise more precisely the degree of difference between these distributions, the Duncan index of dissimilarity has been calculated for each country, with France being the common point of comparison.[8] This index reveals that the distributions are quite similar in Germany, Luxembourg, the

---

7. All estimates are weighted (if required) in order to reflect population totals.

8. $I(d) = 0.5 \cdot \sum_{k=1}^{K} |z_{Fk} - z_{Jk}|$, where z_{Fk} is the population share in household group k in France and z_{Jk} is the population share in household group k in the other country involved in the comparison. $I(d)=0$ implies that the distributions are identical; increasing values of $I(d)$ imply an increasing degree of difference; and $I(d)=0$ implies that the two distributions are "totally" different. (i.e. concentration in a single k group but the group is different for the two populations). For further details see Duncan and Duncan (1955).

Table 3
The Distribution of Households by Type
(Percentages)

Type (k)	*France 1984*	*Germany 1984*	*Italy 1986*	*Luxembourg 1985*	*Netherlands 1987*	*Poland 1986*	*Great Britain 1986*
(a)	*One-Person:*						
1	6.5	8.8	1.8	5.4	10.4	1.0	6.0
2	7.0	9.1	3.4	5.9	11.0	5.2	5.7
3	2.1	2.2	1.5	2.0	2.6	1.1	3.1
4	9.7	12.0	6.4	8.9	7.9	6.2	9.4
All	25.3	32.2	13.2	22.1	32.0	13.5	24.3
(b)	*Married Couples with Children:*						
5	27.8	19.8	27.8	27.0	25.5	31.9	25.0
6	6.4	6.4	11.6	7.6	4.4	2.0	4.5
7	0.1	0.0	0.1	0.0	0.1	0.1	0.1
8	0.1	0.1	0.5	0.1	0.0	0.0	0.1
9	15.4	15.5	9.8	17.5	16.8	11.4	16.0
10	7.6	9.3	15.2	9.1	6.1	1.3	6.2
11	7.8	9.1	8.6	7.0	8.1	7.4	9.8
12	1.7	1.3	3.8	1.1	0.7	0.1	1.0
All	66.9	61.5	77.3	69.5	61.7	54.3	62.7
(c)	*Other Types:*						
13	0.8	0.2	0.1	0.1	0.2	0.1	0.4
14	0.1	0.1	0.2	0.3	0.1	10.3	0.4
15	2.0	1.2	0.9	1.5	2.7	3.5	4.1
16	0.7	0.5	0.7	1.1	0.5	3.8	0.9
17	0.0	0.0	0.0	0.0	0.0	0.1	0.0
18	0.0	0.1	0.4	0.2	0.0	0.3	0.1
19	3.4	2.8	4.9	3.3	2.1	12.8	5.0
20	0.9	1.4	2.3	1.7	0.7	1.3	2.1
All	7.8	6.3	9.5	8.3	6.3	32.2	13.1
Total	100	100	100	100	100	100	100
I(d)	--	0.11	0.19	0.07	0.11	0.29	0.09

Notes: Household type definitions (*k*) are given in Table 2.
I(d) is the Duncan index of dissimilarity.

Source: *Luxembourg Income Study* database.

Netherlands and Great Britain and quite different (relative to these four countries) in France, Italy and especially Poland (see Table 3).

Table 4 shows the household distributions given in Table 4 weighted by the number of individuals (adults and children) in each type of household. Therefore, these distributions are the distributions of individuals by household type (i.e. the unit of analysis is the individual *not* the household). Again there are significant differences across these countries. For example, in Germany, 13.5 per cent of individuals live in one-person households, while in Poland the share is only 4.2 per cent (and only 4.3 per cent in Italy). In Italy, 87.4 per cent of all individuals reside in married couples with children households, while in Poland the share is only 56.4 per cent. Finally, in Germany, 6.4 per cent (and 6.7 per cent in the Netherlands) of all individuals live in "other" types of households, while in Poland the corresponding figure is 39.3 per cent — almost a seven-fold difference. Finally, the Duncan index of dissimilarity reveals that these weighted distributions are again quite similar in Germany, Luxembourg, the Netherlands and Great Britain and quite different in France, Italy and Poland (see Table 4).

< < < < *Table 4 About Here* > > > >

Unstandardised Poverty Estimates

Table 5 reports the unstandardised FGT poverty measures for

Table 4
The Distribution of Individuals by Household Type
(Percentages)

Type (k)	*France 1984*	*Germany 1984*	*Italy 1986*	*Luxembourg 1985*	*Netherlands 1987*	*Poland 1986*	*Great Britain 1986*
(a) One-Person:							
1	2.4	3.7	0.6	2.0	4.3	0.3	2.4
2	2.6	3.8	1.1	2.2	4.5	1.6	2.2
3	0.8	0.9	0.5	0.7	1.1	0.3	1.2
4	3.7	5.1	2.1	3.3	3.3	1.9	3.7
All	9.5	13.5	4.3	8.2	13.2	4.2	9.5
(b) Married Couples with Children:							
5	40.8	30.9	33.8	37.8	41.4	40.2	38.8
6	12.4	13.0	18.3	14.1	8.5	3.0	8.6
7	0.1	0.0	0.1	0.1	0.1	0.1	0.1
8	0.2	0.1	0.8	0.3	0.0	0.0	0.2
9	11.6	13.0	6.4	13.0	13.8	7.1	12.5
10	9.6	13.5	18.2	11.8	8.7	1.3	8.1
11	5.9	7.7	5.6	5.2	6.7	4.6	7.7
12	2.1	1.8	4.2	1.3	0.9	0.1	1.3
All	82.8	80.1	87.4	83.6	80.1	56.4	77.4
(c) Other Types:							
13	0.9	0.2	0.0	0.1	0.2	0.1	0.4
14	0.2	0.2	0.2	0.4	0.3	17.3	0.6
15	2.0	1.1	0.8	1.5	2.8	2.9	4.4
16	1.0	0.7	0.9	1.5	0.8	5.5	1.4
17	0.0	0.0	0.0	0.1	0.0	0.1	0.0
18	0.0	0.1	0.6	0.4	0.0	0.4	0.2
19	2.9	2.8	4.1	2.9	2.1	12.0	4.3
20	0.7	1.3	1.7	1.4	0.6	1.0	1.8
All	7.7	6.4	8.3	8.3	6.7	39.3	13.1
Total	100	100	100	100	100	100	100
I(d)	--	0.12	0.20	0.07	0.09	0.32	0.09

Notes: Household type definitions (*k*) are given in Table 2.
I(d) is the Duncan index of dissimilarity.

Source: *Luxembourg Income Study* database.

the seven countries.[9] Since we are primarily interested in comparing the unstandardised and standardised versions of the FGT index, the estimates are only presented for the three broader household groups discussed above (i.e. one-person; married couples with children; and "other" types of households).[10] The upper panel of this table are the estimates of *P(0)* — the head-count ratio. The middle panel gives the estimates of *P(1)* — the measure that incorporates information about the income shortfall of the poor. The lower panel shows the estimates of *P(2)* — the measure that incorporates information about the distribution of income among the poor. It is important to point out that these poverty estimates refer to individuals not households. For example, $P(0)_k$ is the percentage of individuals in household type k who are poor — *not* the percentage of poor households of type k.[11]

< < < < *Table 5 About Here* > > > >

With respect to the "incidence" of poverty, the *P(0)* estimates suggest that relative poverty is highest in Italy (18.2 per cent) and lowest in Luxembourg (9 per cent). However, there is significant variation across different household groups in each of the countries. With the exception of Poland, "other"

---

9. The estimates of *P(0)* have been scaled by a factor of 100. The estimates of *P(1)* and *P(2)* have been scaled by a factor of 1,000.

10. Tables of the poverty rates for each of 20 different household types are available from the author.

11. Tables of "household poverty rates" are available from the author.

Table 5
Poverty Rates by Household Type

Type (k)	*France 1984*	*Germany 1984*	*Italy 1986*	*Luxembourg 1985*	*Netherlands 1987*	*Poland 1986*	*Great Britain 1986*
Measure is P(0):							
(a) One-Person:	9.1	11.2	14.9	8.3	10.1	10.5	7.2
(b) Married Couples with Children:	16.1	10.2	18.3	9.0	11.8	13.3	16.1
(c) Other Types:	22.1	20.5	18.9	10.0	24.0	9.9	18.9
All	15.9	11.0	18.2	9.0	12.4	11.8	15.6
Measure is P(1):							
(a) One-Person:	45.3	22.5	23.9	22.6	83.3	15.1	24.6
(b) Married Couples with Children:	43.4	19.9	48.4	16.3	29.8	31.8	53.3
(c) Other Types:	66.1	54.8	60.6	18.2	67.2	22.7	45.4
All	45.3	22.5	48.4	17.0	39.4	27.5	49.6
Measure is P(2):							
(a) One-Person:	32.7	7.3	8.1	15.2	80.3	4.1	18.6
(b) Married Couples with Children:	21.9	6.9	20.8	5.6	15.2	12.3	33.0
(c) Other Types.	30.5	22.2	27.7	5.0	37.8	8.4	22.2
All	23.6	8.0	20.9	6.3	25.3	10.4	30.2

Notes: *P(0)* is scaled by a factor of 100;
P(1) and *P(2)* are scaled by a factor of 1,000.
Estimates weighted by individuals in each household type (see text).

Source: *Luxembourg Income Study* database.

types of households have the highest poverty rates, ranging from 24.0 per cent in the Netherlands to 10.0 per cent in Luxembourg. Again with the exception of Poland, one-person households have the lowest poverty rates, ranging from 8.3 per cent in Luxembourg to 14.9 per cent in Italy. The poverty rates of married couples with children households fall in an intermediate position, ranging from 9.0 per cent in Luxembourg to 18.2 per cent in Italy. In Poland, the exception to this pattern, poverty rates are highest in married couples with children households (13.3 per cent), followed by one-person (10.5 per cent) and "other" types of households (9.9 per cent), respectively.

Turning to the estimates of *P(1)*, the measure that incorporates information describing the *average deprivation* of the poor, relative poverty appears to be highest in Great Britain (49.6) and lowest in Luxembourg (17.0). There is significant variation in *P(1)* across the different types of households, but there is less consistency than what is observed for *P(0)*. For example, in France (66.1), Germany (54.8) and Italy (60.6), poverty is highest in "other" types of households. However, despite this agreement, in France (43.4) and Germany (19.9), poverty is lowest in married couples with children households while in Italy (23.9) it is lowest in one-person households. In Luxembourg (22.6) and the Netherlands (83.3), on the other hand, poverty is highest in one-person households and lowest in married couples with children households (i.e. 16.3 in Luxembourg and 29.8 in the Netherlands). Finally, in Poland (31.8) and Great

Britain (53.3), poverty is highest in married couples with children households and lowest in one-person households (i.e. 15.1 in Poland and 24.6 in Great Britain).

When the estimates of *P(2)* are considered, the picture of poverty in these seven countries changes even more. When information about the *relative deprivation* of the poor is included in the measurement of poverty, relative poverty is highest in Great Britain (30.2) and lowest in Luxembourg (6.3). There is little consistency across the different types of households. In France (32.7), the Netherlands (80.3) and Luxembourg (15.2), poverty is highest in one-person households; in Poland (12.3) and Great Britain (33.0) in married couples with children households; and in Germany (22.2) and Italy (27.7) in "other" types of households. The lowest poverty rates are observed in one-person households in Italy (8.1), Poland (4.1) and Great Britain (18.6); in married couples with children households in France (21.9), Germany (6.9) and the Netherlands (15.2); and in "other" types of households in Luxembourg (5.0).

Table 6 shows the ranking of these seven countries in terms of relative poverty based the three poverty measures. (This table also shows the "standardised rankings" which are discussed below). What is immediately clear from this table is that the rankings are dependent on the particular poverty measured used to do the ordering. Even though the positions of Poland, Germany and Luxembourg remain unchanged across the three measures, the positions of Italy, France, Great Britain and the Netherlands

Table 6
Descending Relative Poverty Rankings

Country	Rank					
	P(0)	*P(0)**	*P(1)*	*P(1)**	*P(2)*	*P(2)**
Italy	1	1	2	3	4	4
France	2	2	3	2	3	2
Great Britain	3	3	1	1	1	1
Netherlands	4	4	4	4	2	3
Poland	5	5	5	5	5	5
West Germany	6	6	6	6	6	6
Luxembourg	7	7	7	7	7	7

change considerably. For example, Italy is ranked *first* in terms of the incidence of poverty [i.e. when *P(0)* is used] but only *fourth* in terms of the relative deprivation of poverty [i.e. when *P(2)* is used].

< < < < *Table 6 About Here* > > > >

These different rankings point to the problem of relying too heavily on a single measure of poverty to make even simple summary statements about differences in poverty across countries. The problem becomes even more serious if one wants to make statements concerning relative differences in poverty. For example, based on *P(0)*, poverty is about two times higher in Italy compared to Luxembourg (i.e. 18.2 and 9.0 per cent of all individuals, respectively, see Table 5). However, according to the estimates of *P(1)*, poverty is almost three times higher in Italy compared to Luxembourg (i.e. 48.4 versus 17.0). In turn, if *P(2)* is used to address the difference, poverty is over three times higher in Italy compared to Luxembourg (i.e. 20.9 versus 6.3).

Standardised Poverty Estimates

The unstandardised and standardised FGT measures are shown in Table 7. In the calculation of the standardised rates, France is used as the standard population.[12] As a general remark, the

12. The use of other countries as the standard did not qualitatively change our findings. However, this may not always be the case (see Shryock and Siegal, 1976)

poverty rates change little after being standardised for differences in household composition. Some rates increase slightly while others decrease slightly, but there are no major changes. For example, *P(0)* in Italy decreases from 18.2 to 16.9 per cent. In the Netherlands, *P(0)* increases from 11.8 to 12.6 per cent. As Table 7 shows, equally small changes are observed for the other two poverty measures.

< < < < *Table 7 About Here* > > > >

Do the rankings of the countries in terms of relative poverty change when the standardised poverty rates are used to perform the ordering? As Table 6 shows, the rankings do not change much as a result of the standardisation procedure. When *P(0)* is used as the ordering variable, the rank-order is completely unchanged. When $P(1)^*$ is used, Italy and France trade places in the order, but the rest of ordering is unchanged. Likewise, when $P(2)^*$ is used, only France and the Netherlands change places. This suggests that differences in household structure across the seven countries are not "large" enough to affect the ranking of each in terms of relative poverty.

In order to explore further the consequences of the standardisation of these poverty measures, four inequality indexes have been calculated for the standardised and unstandardised poverty rates. These indexes were calculated separately for each of the six sets of seven poverty estimates given in Table 7. These indexes are all *smaller* for the standardised rates compared to the unstandardised rates (see

Table 7
Unstandardised and Standardised Poverty Rates

		Poverty Index					
Country	*Year*	*P(0)*	*P(0)**	*P(1)*	*P(1)**	*P(2)*	*P(2)**
France	*1984*	15.9	15.9	45.3	45.3	23.6	23.6
West Germany	*1984*	11.0	11.3	22.5	23.1	8.0	8.2
Italy	*1986*	18.2	16.9	48.4	44.2	20.9	19.0
Luxembourg	*1985*	9.0	9.3	17.0	17.1	6.3	6.3
Netherlands	*1987*	12.4	13.3	39.4	38.3	25.3	22.3
Poland	*1986*	11.8	12.6	27.5	28.6	10.4	11.0
Great Britain	*1986*	15.6	15.4	49.6	50.5	30.2	31.3
Mean		13.4	13.5	35.7	35.3	17.8	17.4
CV		0.223	0.186	0.344	0.329	0.491	0.490
lnVar		0.052	0.039	0.157	0.143	0.360	0.330
RMD		0.201	0.160	0.321	0.300	0.461	0.438
Gini		0.125	0.050	0.192	0.186	0.274	0.275

Notes: *P(0)* and *P(0)** are scaled by a factor of 100.
P(1), *P(1)**, *P(2)* and *P(2)** are scaled by a factor of 1,000.
CV = coefficient of variation
lnVar = logarithmic variance
RMD = relative mean deviation
Gini = Gini coefficient

Source: *Luxembourg Income Study* database.

Table 7). This suggests that when these seven countries are considered as a group, the distribution or overall difference in relative poverty is *smaller* after differences in household composition are controlled for. Put slightly differently, the failure to control for differences in household structure in the cross-country comparison may lead to an over-estimate of underlying relative poverty difference.

IV. Concluding Comments

In this paper a method for controlling for compositional factors in the measurement of poverty was proposed. The method is based on the demographic technique of direct standardization. It is consistent with Sen's influential axiomatic approach to poverty measurement and is based on the important class of poverty measures proposed by Foster, Greer and Thorbecke. With this method, it possible to examine the underlying differences in poverty while controlling for compositional factors known to be correlated with the incidence and intensity of poverty.

The method was illustrated by examining the interaction between household structure and relative poverty in seven European countries, using data from the *Luxembourg Income Study*. The estimated poverty rates differed only slightly after being standardised for differences in household composition. Overall the analysis suggests that the failure to control for differences in household structure is likely not a serious problem in

comparing poverty rates across industrialised countries. At the very least, it is hoped that this paper has demonstrated the potential importance of controlling for compositional factors in the measurement of poverty.

References

Atkinson, A., On the Measurement of Poverty, *Econometrica*, 55, 749-764, 1987.

Duncan, O. and B. Duncan, A Methodological Analysis of Segregation Indexes, *American Sociological Review*, 20, 210-217, 1955.

Foster, J., J. Greer and E. Thorbecke, A Class of Decomposable Poverty Measures, *Econometrica*, 52, 761-766, 1984.

Hagenaars, A., A Class of Poverty Indices, *International Economic Review*, 28, 583-607, 1987.

Hagenaars, A. and B. van Praag, A Synthesis of Poverty Line Definitions, *Review of Income and Wealth*, 31, 139-153, 1985.

Jenkins, S., Poverty Measurement and the Within-Household Distribution: Agenda for Action, *Journal of Social Policy*, 20, 457-483, 1991.

O'Higgins, M. and S. Jenkins, *Poverty in the EC: 1975, 1980, 1985*, Unpublished manuscript, Department of Economics, University College of Swansea, Wales, 1992.

Sen, A., Poverty: An Ordinal Approach to Measurement, *Econometrica*, 44, 219-231, 1976.

Shryock, H. and J. Siegal, *The Methods and Materials of Demography*, Academic Press, New York, 1976.

Smeeding, T. M. O'Higgins and L. Rainwater, (eds.), *Poverty, Inequality and Income Distribution in Comparative Perspective*, Harvester Wheatsheaf, London, 1990.

Townsend, P., Deprivation, *Journal of Social Policy*, 16, 125-146, 1987.