Freie Universität Berlin

Diskussionsbeiträge des Fachbereichs Wirtschaftswissenschaft
der Freien Universität Berlin

Volkswirtschaftliche Reihe

2006/5

Family-Type Subsistence Incomes

Christos Koulovatianos, Carsten Schröder und Ulrich Schmidt

ISBN 3-938369-31-0

Family-Type Subsistence Incomes

Christos Koulovatianos[a,*], Carsten Schröder[b], Ulrich Schmidt[c]

February 8, 2006

Abstract

Different family types may have a fixed flow of consumption costs, related to subsistence needs. We use a survey method in order to identify and estimate such a fixed component of spending for different families. Our method involves making direct questions about the linkup between aggregate disposable family income and well-being for different family types. Conducting our survey in six countries, Germany, France, Cyprus, China, India and Botswana, we provide evidence that fixed costs of consumption are embedded in welfare evaluations of respondents. More precisely, we find that the formalized relationship between welfare-retaining aggregate family incomes across different family types, suggested by Donaldson and Pendakur (2005) and termed "Generalized Absolute Equivalence Scale Exactness," is prevalent and robust in our data. We use this relationship to identify subsistence needs of different family types and to calculate income inequality.

Keywords: subsistence, equivalence scales, survey method, generalized equivalence scale exactness

JEL Classification: I31, I32, C42, D31, D12, D63

[0] [a] Department of Economics, University of Vienna

[b] Department of Economics, Free University of Berlin

[c] Department of Financial Economics, University of Hannover

* Corresponding author, Department of Economics, Univ. of Vienna, Hohenstaufengasse 9, A-1010 Vienna, Austria. E-mail: christos.koulovatianos@univie.ac.at, Tel: +43-1-427737426, Fax: +43-1-42779374.
Financial support from the TMR network "Living Standards, Inequality and Taxation," contract No ERBFMRXCT980248, is gratefully acknowledged. Koulovatianos thanks the Leventis foundation and the RTN project on "The Economics of Ageing in Europe" for financial support. Schmidt acknowledges financial support from the Deutsche Forschungsgemeinschaft, contract No Schm1396/1-1. We are indebted to Lei Gao, Eric Bürger and Sukumaran Nair for outstanding research assistance.

1. Introduction

Do observed aggregate family consumption expenditures stem solely from preferences that reflect consumer "wants" or is it that, alternatively, these expenditures contain a part that reflects family-type specific "needs?" Plausibly, to set up a certain household type may require a minimum housing rent, maintenance flows of a minimum stock of durables, even subsistence needs, such as minimum calorie and heating needs. Such an aggregate component comprises a fixed consumption flow that is difficult to identify by observing consumer choices.

In recent empirical studies, Donaldson and Pendakur (2004 and 2005), and Koulovatianos, Schröder and Schmidt (2005a and 2005b) examine within-household economies of scale in consumption for several family types. Household economies of scale were found to decrease as the level of well-being of a household falls. If fixed consumption costs are present, they can provide an explanation. To cover the fixed component of consumption flows may take a large part of the disposable income of poorer households, whereas the remaining income may not be enough to contribute to the purchase of goods that contain significant sharing potential. Apart from the potential of explaining household economies of scale, the identification of fixed costs of consumption can serve the purpose of estimating family-type subsistence needs, measured in terms of income.

Family-type subsistence incomes are levels of expenditure, specific to each family type, that are just adequate to guarantee existence and sustainability of a given family type. Such subsistence incomes guarantee the survival of household members, but also the borderline sustainability of the pertinent household type. In other words, for levels of well-being greater than or equal to the level of well-being at the family-type subsistence income, expenditure functions should be in additively-separable form: they should be the sum of the family-type subsistence income level and a term that depends on the level of well-being.

In order to achieve the first goal, which is to identify fixed costs of consumption, one needs to uncover the nature of expenditure functions. Yet, as expenditure functions depend on levels of well-being, a way to convert levels of well-being to an observable economic variable is necessary. In our survey our respondents make this conversion: we ask questions of the form "which net family income level can make a household with two adults and one child as well off as a household with one adult and no children and a net family income of $1000?" Thus, we collect incomes that make the well-being of households with different family types equal, i.e. a range of *subjective equivalent incomes*. We use a single-childless adult household as a *reference household* and we ask this question for several different incomes of the reference household, i.e. for several *reference incomes*, that capture several levels of well-being. So, we obtain a range of equivalent incomes for several household types, that practically create a stepping stone for the identification of family-type fixed costs (subsistence levels): the so called, "*equivalent income functions*." Equivalent income functions contain and reflect information about the expenditure functions for the different household types they relate. This information enables us to distinguish the fixed component of expenditure functions from their variable component.

In particular, our database enables more than the identification of the fixed component of expenditure functions. It also allows for a testing of the nature of the variable component of the equivalent-income functions. This is a task of equal importance to identifying the fixed component of expenditure functions, because it serves as a guide for building models. Specifically, Donaldson and Pendakur (2005) suggest a formulation for equivalent-income functions with a fixed component and a variable component that is proportional to the reference income. This formalization is termed "Generalized Absolute Equivalence Scale Exactness" (GAESE). Our data from six countries, Germany, France, Cyprus, China, India and Botswana, indicate that GAESE is the correct specification of equivalent-expenditure functions. *A specification test for GAESE is passed for all family types, and in all countries.*

The direct estimates of the fixed component of the equivalent income functions are also direct estimates of the fixed component of the expenditure functions for all family types except from this of the single childless adult, the reference household.[1] What is crucial about our compelling evidence in favor of the GAESE formulation is that a simple parametric functional form is available and, through our parameter estimates, it can carry information easily for several applications. One of these applications is the identification of family-type subsistence incomes. As we mentioned above, the available functional form reveals the fixed-cost of consumption for each family type directly. The key is that this fixed cost is linked with within-household economies of scale in consumption. Household economies of scale are logically related to the sustainability of a household type, or at least with how rational it is to form a particular household type given an available household income. We follow the convention that whenever economies of scale become zero, a household type is not (at least rationally) sustainable. By our convention, the income that corresponds to zero economies of scale is the family-type subsistence income. We report estimates of significantly positive family-type subsistence incomes for all six countries.

Another important application of an available parametric equivalent income function is the fact that we can use our estimated parameters to convert the family-income distributions of a heterogeneous family-type population into income distributions of single equivalent adults. Concerning this application we emphasize that the GAESE formulation and our

[1] As the reference household serves the purpose of defining levels of well-being through the assignment of reference incomes, our respondents cannot provide any insights for the fixed component of the expenditure function of the reference household. The fact that this information cannot be obtained is the only shortcoming compared to other methods of estimation, such as these of estimating a demand system (see Donaldson and Pendakur (2005)). Yet, for the latter approach one needs to specify a structure for a demand system, whereas our method has the advantage of obtaining non-parametric estimates.

estimates imply household economies of scale that increase with the level of well-being. In other words, according to our estimates, the poor have a lower ability to share their chosen consumption goods. This contrasts sharply the usual hypothesis of "Independence of Base" (IB), as it was coined by Lewbel (1989), or equivalently this of "Equivalence Scale Exactness" (ESE), as it was also named by Blackorby and Donaldson (1991 and 1993), according to which rich and poor have exactly the same ability to share their chosen goods. We use the LIS data on the 2000 German income distribution and we apply our estimates of equivalent incomes. We show that, taking into account the disadvantage of the poor to share goods, the Gini coefficient is significantly higher compared to using our closest adjusted estimates that produce equivalent income functions consistent with IB/ESE. Moreover, according to our GAESE estimates, the Gini coefficient is higher compared to using the standard OECD numbers for equivalent income functions that are also consistent with IB/ESE.

Our study differs from Donaldson and Pendakur (2005) in that we suggest a way of quantitatively estimating/measuring subjective equivalent incomes and equivalent income functions, whereas Donaldson and Pendakur (2005) build a model of consumer behavior that both estimates these functions and provides an explanation for them. The ultimate desired goal should be, of course, to both estimate and understand equivalent income functions. However, the econometric approach of Donaldson and Pendakur (2005) and, potentially of any approach that uses a behavioral theory of consumer choice, needs a confidence in a structural form of consumer preferences or in a general formulation of equivalent income functions, like the GAESE property is. On the contrary, our survey approach is essentially non-parametric (with the sole requirement to assign family types, a reference household and reference incomes), enabling the explicit testing of structural formulations of equivalent income functions such as the GAESE property. In this sense, our approach can complement research efforts to model consumer behavior, at least by qualitatively testing key assumptions on structural formulations. In addition, our findings can provide a "roadmap" for matching quantitatively simulation based equivalent income functions that stem from models with our etimates as well.

The testing of crucial assumptions behind general models or theories lies beyond the boundaries of standard research methods. In other words, assumptions lie in the superstructure of applied models and tests of their suitability are a key complement to rational-behavior modeling. The broad logic of rational-choice models depends on the proviso that households are well-informed about their choice options, prices and economic environment. Our questionnaire uses this sole working hypothesis, inherent in the confidence that respondents' assessments reflect their "expert" opinion on linkages between aggregate disposable household income and well-being. After all, respondents are "well-trained" and experienced in making such assessments through their past real-world consumption choices and planning on achieving certain career-long aggregate-income flows.

In Section 2, we discuss our methodology and sampling. In Section 3 we explain how the concept of equivalent income functions is related to the identification of family-type subsistence levels, and, in particular, how the GAESE formulation of Donaldson and Pendakur (2005) contributes to this end. In Section 4 we present specification tests of the GAESE functional form for equivalent income functions. In Section 5 we present our estimates of family-type subsistence needs. In Section 6 we measure the Gini coefficient of the after-tax/transfer income distribution of Germany in 2000, and in Section 7 we provide our conclusions.

2. Methodology and data

2.1 Questionnaire and samples

The survey was conducted in six countries, Germany in 1999, Cyprus in 2000, France in 2002, China in 2004, India and Botswana in 2005. The complete questionnaire appears in Appendix A.1 of Koulovatianos, Schröder and Schmidt (2005a, pp. 993-4). In the first part we gave a table with eight family types, ranging from a single childless adult to a two-adult household with three children (all setups with one or two adults with a number of children ranging from zero to three). We used the single childless adult as *reference household* and provided a net monthly income for this family type (reference income). We then asked the respondents to provide the net family incomes that bring the remaining seven household types to the same level of well-being as this of the single childless adult. This task was repeated for five different reference incomes.[2]

The second part of the questionnaire asked for the respondents' personal characteristics. A list of these characteristics and our sample frequences for Germany and France appear in Table 1 of Koulovatianos, Schröder and Schmidt (2005a, p. 972) and for Cyprus in Table A.1 in Koulovatianos, Schröder and Schmidt (2005b, pp. 25-6). In the three developing countries that are appearing in this study for the first time, we requested some additional respondent personal characteristics that could possibly be important in affecting respondents' evaluations of well-being. All characteristics and sample frequencies appear in Table 1. An important new feature is the "living area" variable that distinguishes between rural

[2] In Botswana the questionnaire consisted of questions about three reference incomes instead of five. This was because several languages (mainly Setswana and Kalanga, but also Sekgalagadi) are used and this required that interviewers had to resort to oral interviews. The response rate with five reference incomes was low and given our planned budget and time constraints we modified the questionnaire so as to increase the response rate. For the purpose of testing the income dependence of equivalence scales three reference incomes serve this task very well. For the main focus of this paper, which is to test the GAESE hypothesis, three reference incomes are marginally sufficient for such a test. Nevertheless, we include this country in this study as complementary information.

and urban residence of the respondent.

The sample sizes of respondents for Germany, France and Cyprus are, 167, 223 and 130. As it can be seen from Table 1, the sample sizes for China, India and Botswana are, 196, 214 and 159. Although these samples seem "small," given the fact that each respondent provides 35 answers, we obtain enough observations to run our tests.[3]

The sampling region in China was the urban area of Hangzhou and several towns in the province of Zhejiang. In India the data were collected from cities and villages of three states of south India, Tamil Nadu, Andhra Pradesh and Karnataka. The cities where our respondents were found are Chennai (Madras) in Tamil Nadu, Hyderabad (Andhra Pradesh) and Bangalore in Karnataka. The questionnaire was provided in the dialects of Tamil (Tamil Nadu), Telegu (Andhra Pradesh), in the English language (respondents from Karnataka preferred English instead of our questionnaires provided in the dialect Kannada) and elderly respondents were given the option of a questionnaire in Hindi. In Botswana sampling was from the capital Gaborone and villages around it. Apart from questionnaires provided in English, a large part of the respondents were interviewed orally mainly in the languages Setswana and Kalanga.

In India a distinct social feature about household types is that, typically, three or more generations may live in the same household (extended families).[4] This has motivated us to include the variable "number of adults in the household," that appears in Table 1.[5] Moreover, since the family-income distribution in India is very skewed and fat-tailed, due to the presence of very large households, we have split the top quintile into two subcategories (with 11500 Indian Rupies being the low bound of the highest category), which explains the

[3] In Botswana it is 21 answers (see footnote 1 above).

[4] For example, in many regions of India it is customary that after marriage a wife is expected to move to the household of the husband and live along with his parents.

[5] For example, in our sample there was a respondent from a 19-member household (15 adults and 4 children).

presence of the sixth family after-tax income category in Table 1.

2.2 Comments on the methodology

The objective of the survey is to obtain subjective estimates of equivalent-income functions at several levels of well-being. We do not use auxilliary questions, such as questions on consumption expenditures in order to construct equivalent-income functions through a theory or model. Instead, we ask directly about equivalent incomes for several different family setups. We use this type of questions based on the confidence that people are familiar with linking up aggregate family incomes with overall household well-being. Respondents are "well-trained" experts in making such linkages, since they have been planning on their overall budget allocations, often keeping their home balance sheets, routinely in their everyday lives.

The questionnaire leaves the respondent free to think about potential chosen consumer baskets, even education decisions for children, for a given economic environment, prices and quality of goods in a certain location. The only proviso for eliciting credible information through these questionnaires is that respondents are rational and well-informed, the basic assumption underlying rational-choice models. Thus, it is important to stress that subjective equivalent income functions do not uncover structural features of preferences (utility functions) of households directly, but they are estimates of *value functions*.

Yet, we ask respondents to compare the well-being of hypothetical household setups that typically differ from their own and often from the history of household setups they have belonged to in the past. In Koulovatianos, Schröder and Schmidt (2005a, p. 989), for Germany and France, we have tested the ability of respondents to provide comparisons among family types with living standards different from their own, and we have found that respondents perform this task satisfactorily well.

3. The structure of equivalent-income functions with family-type subsistence income levels

3.1 Preliminary concepts

An equivalent-income function relates incomes of different family types that provide the same level of well-being for the members of these family types. Using a single childless adult as a reference household, for a given reference income, y^r, an equivalent-income function is given by,

$$y^h = \Phi\left(V\left(y^r\right)\right) \ , \tag{1}$$

where y^h is the equivalent income of household type "h," $V\left(y^r\right)$ is the value function of the single childless adult and Φ is the inverse of the value function of household type h. Notice that we have ignored the price vector, given that we collect subjective evaluations of equivalent incomes at a particular point in time, so the price vector has no variation in our database.

We define a *family-type subsistence income level* as the minimum expenditure requirement that guarantees a borderline formation and sustainability of a certain family type living as a household. At such a level, according to (1), there is a minimum reference income of the single childless adult, that is a function of the household type h, namely $\underline{y}^r\left(h\right)$, such that,

$$\underline{y}^h = \Phi\left(V\left(\underline{y}^r\left(h\right)\right)\right) \equiv b^h \ , \tag{2}$$

where $\underline{y}^h$, is the family-type subsistence income of family h, denoted as b^h from hence and on. It is important to comment on the fact that the minimum reference income of the single childless adult, $\underline{y}^r\left(h\right)$, is a function of the household type h. Different family types can benefit from different within-household economies of scale in consumption. This is important for defining the level of family type basic subsistence needs. For example, housing and heating facilities contain a high sharing potential. Most likely, the per-capita income needed to be at the subsistence level is lower for larger family types. For this reason, it is plausible to allow for the minimum reference income of the single childless adult that corresponds to the subsistence level of a family type to be a function of the family type, namely $\underline{y}^r(h)$. Of course, if $\underline{y}^r(h)$ varies with h, then the well-being of family members at the subsistence level is different in different family types. This is not an implausible statement. At the same time, this complicates the task of identifying family-type subsistence levels, b^h. As we will stress below, the identification of equivalent income functions is the key to capturing correctly the family-type subsistence levels, b^h, but also a conventional theory of family-type marginal sustainability at subsistence is necessary. We therefore continue with the prerequisite task of discussing the identification of equivalent-income functions.

Combining (1) and (2), we can write a candidate equivalent-income function as,

$$y^h = b^h + f\left(V\left(y^r\right)\right) \ , \qquad \text{with } y^r \in \left[\underline{y}^r(h), \infty\right) \ , \tag{3}$$

where

$$f\left(V\left(y^r\right)\right) \equiv \Phi\left(V\left(y^r\right)\right) - \Phi\left(V\left(\underline{y}^r(h)\right)\right) \ .$$

So, the equivalent-income function given by (3), is written in an additively separable form with two components, (i) the family-type subsistence level, that captures a household's basic needs, and, (ii) a function that provides extra expenditures that lead to increases in well-being through household choices that involve household "wants" over non-subsistence goods.

The way we have expressed the equivalent income function of a household h in (3), calls for a test on whether family-type subsistence levels, b^h are positive, i.e. significantly different from 0. Specifically, with our survey data we can run regressions of alternative functional forms to capture $f(V(\cdot))$ and to test whether b^h is positive. To avoid, however, the endogeneity problem that arises from the fact that higher reference incomes would always lead to higher stated equivalent incomes, we can normalize the functional form given by (3), through dividing both sides by the reference income, y^r, i.e.,

$$\frac{y^h}{y^r} = \frac{b^h}{y^r} + \frac{f(V(y^r))}{y^r} , \qquad \text{with } y^r \in \left[\underline{y}^r(h), \infty\right) , \tag{4}$$

where the ratio y^h/y^r is, by definition, the *relative equivalence scale* of household type h, at the reference income level y^r. To the extent that a robust specification test on a functional form testing (4) includes a significant positive estimate for b^h, family-type subsistence levels are present and affect consumption planning.

3.2 GAESE and identification of family-type subsistence levels

In a recent study, Donaldson and Pendakur (2005) suggested a particular functional form for equivalent-income functions, namely

$$y^h = A^h + R^h y^r . \tag{5}$$

The property that equivalent income functions comply with the specific functional form given by (5) was termed "Generalized Absolute Equivalence Scale Exactness" (GAESE) for reasons explained in Donaldson and Pendakur (2005, pp. 6-8). If the general equivalent-income function given by (3) complies with GAESE, then it should be that,

$$f(V(y^r)) = -\phi^h + R^h y^r , \qquad \text{with } y^r \in \left[\underline{y}^r(h), \infty\right) , \tag{6}$$

so,

$$A^h = b^h - \phi^h ,$$

and

$$\phi^h = R^h \underline{y}^r(h) .$$

It is important to stress that the parameter $A^h = b^h - \phi^h$ captures the fixed costs of consumption expenditures. It is the additive component of the expenditure function of household type h. This must be contrasted to the family-type subsistence income, b^h, which is a cutoff income level for sustainability of household type h.

If GAESE holds, in order to identify the family-type subsistence level, b^h, it is necessary to follow a conventional concept of household formation/dissolution. We can think of household economies of scale as a key factor that allows a household-type to be formed under the principle of rationality with respect to maximizing utility from consumption of economic goods. When economies of scale disappear, we may assume that the household dissolves. This is consistent with the rational trend in family economics that pervades marriage-decision models: that marriage is driven by an effort to benefit from within-household economies of scale in consumption. Theoretically, under the additional convention that each family member (adults or children) have the same subsistence needs, this would mean that if a household type, h, has n^h family members, then the relative equivalence scale, y^h/y^r, should be less than or equal to n^h. This convention of treating adults and children in the same way at subsistence is not implausible. It is plausible that calorie and nutrition needs of adults and children are similar, considering the quantity and quality of food that enables children to grow normally. Moreover, clothing, heating, and shelter *subsistence* needs must be similar among adults and children.[6]

[6] Empirically, at higher levels of well-being, children are less costly compared to an adult. Yet, in Koulovatianos, Schröder and Schmidt (2005a and 2005b) we find that as the living standards fall, children become more expensive relative to an adult (our estimate for France is 72%, 67% for Germany, and 86% for Cyprus at the well-being of the poverty line, with these figures applying after controlling for the average overall household economies of scale). So, to assume that adults and children cost about the same at the subsistence level is not far from our calculations. In Pitt, Rozenzweig and Hassan (1990, Table 1, p. 1140) evidence from Bangladesh suggests that average calorie consumption of the age group of children between 6-12 years (in our questionnaire children are between 7-11), is about 67% of this of an average adult in a sample from 15 villages. Yet, this ratio exceeds 80% when taking into account the activity levels of adults versus these of children. This sample of Pitt, Rozenzweig and Hassan (1990) does not focus on the poorest families with survival problems, although the population in the examined regions is certainly poor.

If equivalence scales are decreasing in reference income, y^r (a feature that should be present if GAESE holds and there are positive family-type subsistence income levels), then below the threshold level $\underline{y}^r(h) = b^h/n^h$, the equivalence scale y^h/y^r is greater than the number of family members, n^h. So, there are diseconomies of scale in consumption and the household type h is not rational to be formed.

These concepts are depicted in Figure 1. At the top graph we provide a relative equivalence scale that is consistent with GAESE, according to the formula

$$\frac{y^h}{y^r} = \frac{b^h - \phi^h}{y^r} + R^h \ , \tag{7}$$

which follows from (5). We place an upper bound on the relative scale value, namely the number of household members of household type h, n^h. The equivalence scale is n^h below the reference-income level $\underline{y}^r(h) = b^h/n^h$, that is the equivalent income of a single childless adult corresponding to the subsistence income level of family type h.[7] At the bottom graph we plot the equivalent-income function of h, following equation (5). Apparently, the family-type subsistence income, b^h, can be uniquely identified by the point of intersection of the equivalent-income function and the line given by $n^h y^r$, provided that the slope R^h is strictly less than n^h when $b^h - \phi^h > 0$.

With this background we are ready to test whether GAESE is a property of equivalent-income functions that is met by our survey data and to provide estimates of family-type subsistence levels. To see this, we run specification tests of the fomula given by (7).

[7] Another way to express b^h/n^h is "per-capita subsistence level of family type h." The fact that it coincides with the equivalent income of a single childless adult comes from our convention that all family members in a household (adults or children) have the same subsistence needs. Of course, due to the immediate possibility for household consumption economies of scale in multi-member families, the level $\underline{y}^r(h) = b^h/n^h$ does not coincide with the subsistence level of a single-childless-adult household. For example, the minimum expenditure for shelter and heating, that contain significant sharing possibilities, should be borne solely by a single childless adult. This means that, plausibly, single-childless-adult households should exhibit the maximum (per-capita) family-type subsistence levels.

4. Specification tests of the GAESE formulation of equivalent income functions

In Table 2 we present the average equivalence scales in the three developing countries, China, India and Botswana, that are introduced in this study.[8] The average equivalence scales in Germany and France can be found in Table 2 and Figure 1 of Koulovatianos, Schröder and Schmidt (2005a, pp. 974-5), whereas those of Cyprus in Table 1 of Koulovatianos, Schröder and Schmidt (2005b, p. 22). In all 6 countries it is transparent that, for each family type, equivalence scales fall as reference income increases, and this drop occurs at a decreasing rate. So, the functional form of equation (7) seems to be a good candidate for capturing the income-dependence pattern of equivalence scales.

It is notable that for the lowest reference incomes in India and Botswana, our respondents provided average equivalence scales for two-adult families that are slightly higher than the level of household members. This is due to the fact that the reference incomes that we provided for the lowest income class, based on features of the income distribution in India and Botswana, turn out to be "too low." In particular, according to our calculations in Section 5, these reference incomes for the single childless adults appear to be below the subsistence level that allows for a formation of a single-adult household. We return to a discussion of this point in Section 5.2.

In Tables 3a-3f we present a specification test of regressions of our respondents' stated equivalence scales against the reference income, separately for each household type. We report regressions using the specification,

$$\frac{y_i^h}{y^r} = R^h + \frac{\left(b^h - \phi^h\right)}{y^r} + a_0^h \text{Ref. Income Dummies} + a_1^h PERSONAL_i + \varepsilon_i^h \ . \tag{8}$$

[8] The symbol "A" denotes one adult, while a child is denoted by "C." So, for example, "AAC" denotes a household with two adults and one child.

By y_i^h we denote the equivalent income that was stated by respondent i about a household of type h, for a given reference income, y^r. Therefore, the endogenous variable, the ratio y_i^h/y^r is the relative equivalence scale for h, stated by respondent i. The variable y^r takes the values $y^A \cdot Y^r$, where y^A is the lowest monetary value assigned to the single childless adult (lowest reference income) in PPP-adjusted 2004 US dollars, and Y^r is a vector indicating how many multiples of y^A correspond to the reference incomes provided to the respondents in each country, so as to capture features of the income distribution in these countries. For the three developed countries of our data, Germany, France and Cyprus, $Y^r = [1, 2.5, 4, 5.5, 7]^T$, whereas as it can be seen from Table 2, Y^r varies in the three developing countries. In particular, $Y^r = [1, 2, 4, 8, 16]^T$ in China, $Y^r = [1, 4, 7, 10, 13]^T$ in India, and $Y^r = [1, 2.5, 4]^T$ in Botswana. The assigned values for y^A in PPP-adjusted 2004 US dollars are, $y^A = 568.18$ in Germany, $y^A = 587.12$ in France, $y^A = 346.24$ in Cyprus, $y^A = 277.78$ in China, $y^A = 154.47$ in India, and $y^A = 170.58$ in Botswana.

"Ref. Income Dummies" is a set of dummy variables that assigns 1 whenever reference income is equal to the corresponding reference income given in a question, and 0 otherwise. So, if the functional form given by (7) is not sufficient to explain the variation in our data, the additional variation will be captured by these reference income dummies. Thus, a test for inclusion of these dummies is our specification test for the GAESE formulation. Since the term $\left(b^h - \phi^h\right)/y^r$ together with the constant term, R^h, are perfectly correlated with all income dummies, we exclude the dummy that corresponds to the highest income class.

None of the personal characteristics ("$PERSONAL_i$") of our respondents appeared as robust. In rare cases coefficients on personal characteristics appeared as significant. Significant personal characteristics in some regressions were either non-significant in alternative family types, or with a different sign. Thus, we only report the estimators of parameters

R^h, $\left(b^h - \phi^h\right)$ and a_0^h, but in all regressions these coefficients are controlled for all available personal characteristics. All regressions that corespond to (8) and include the income dummies are called "unrestricted," and they are presented in columns having the symbol "U" throughout Tables 3a-3f. The regressions of the form (8) under the restriction that $a_0^h = 0$, are presented in columns named "R" in the same tables.

At the bottom of each household type regression, and in between columns "U" and "R," we report the F-test statistic on exclusion of reference income dummies. Underneath these F-test statistics, the level of significance of the test appears in brackets. With the highest value of the F-test statistic being 1.78, it is transparent that *in all 42 cases examined the GAESE formulation passes the specification test.*

5. Estimates of Family-type Subsistence Incomes

5.1 Results and cross-country differences

Given the ample evidence presented above (Tables 3a-3f) in favor of the GAESE formulation, we proceed to identify estimates of family-type subsistence levels. According to our convention that a household type is formed solely on the basis of rational consumer-choice advantages (ignoring a possibly strong cultural background behind household formation, that is beyond the scope of our analysis), these subsistence incomes, captured by parameter b^h, can be identified by the bottom graph of Figure 1, explained in Subsection 3.2 above. The algebraic formula corresponding to the graphical identification of b^h in Figure 1 is,

$$b^h = \frac{n^h A^h}{n^h - R^h} = \frac{n^h \left(b^h - \phi^h\right)}{n^h - R^h} \ . \tag{9}$$

Based on our estimates of $A^h = \left(b^h - \phi^h\right)$ and R^h from the columns "U" of Tables 3a-3f, we provide our estimates of family-type subsistence incomes in Table 4. All numbers are net monthly incomes in 2004 PPP-adjusted US dollars. Underneath each number in Table

4, the per-capita family-type subsistence level, b^h/n^h, appears in brackets.

In principle, these subsistence levels are higher in countries with higher per-capita GDP. Germany exhibits the highest of all. This might be due to the additional heating needs due to the German climate. Nevertheless, perceptions of respondents may also be different from country to country. These differences in perceptions may stem, for instance, from relative-price differences, or even from the fact that the most commonly observed living standards can differ from country to country and practices of the poor for dealing with everyday needs can be perhaps more transparent to the average respondent in poorer countries.

5.2 Estimates of subsistence incomes that are higher than the lowest provided reference incomes

Another important remark is that in India and Botswana our per-capita family-type subsistence incomes for two-adult families are above the lowest reference incomes that we provided to our respondents for single-childless adults (154.47 USD for India and 170.58 for Botswana - see our discussion in footnote 7 above about why these numbers should be below the subsistence level of a single childless adult as well). Our estimates of subsistence levels for the poorer countries of our sample, and especially for India, are often significantly higher than the officially stated poverty lines.

Our chosen reference incomes were consistent with features of the income distribution in both countries, where a significant fraction of their populations lives below the poverty line. In Section 4 above we noted that, on average, respondents suggested equivalent incomes that yield equivalence scales higher than the number of adults in a household for the lowest reference income. This possibly reflected a form of "objection" by respondents, that one cannot form a household at such a low reference income. Yet, in developing countries a significant fraction of the poor is homeless. At the same time, our convention of applying *solely* the principle of rational consumer choice for the formation of a household (and ignoring cultural factors), may also be responsible for a discrepancy between observed incomes and our identified family-type subsistence levels.

Another explanation for the high equivalence scales for the poor, is that respondents could feel sympathetic towards the poor and try to compensate by "inflating" their stated equivalent incomes for different family types. Yet, in Koulovatianos, Schröder and Schmidt (2005a, pp. 982-7) we have provided a test for framing effects of our survey method, using the largest family type as the reference household and asking respondents to subtract amounts in order to give equivalent incomes. If respondents are reluctant to give additional amounts to the poor, their hesitation to subtract high amounts from the poor (that would express the same feeling of sympathy) would result to low equivalence scales for the poor. Following our analysis in in Koulovatianos, Schröder and Schmidt (2005a, pp. 982-7), we conclude that such an effect tends to be present, but not as strongly as to have a sizable quantitative impact on our conclusions. Moreover, subtracting numbers is more difficult than adding them while filling out the questionnaire. This is a disadvantage of applying the alternative survey presented in Koulovatianos, Schröder and Schmidt (2005a, pp. 982-7), and extracting estimates from it.

6. Measurement of Gini coefficients

An advantage of having a robust specification of the equivalent income function at hand is that one can apply the functional form and the estimates in other databases for several purposes. One direct extension is to see what the GAESE formulation and our estimates have to say about the Gini coefficient of the after-tax/transfer income distribution. An appropriate, detailed and reliable database of the income distribution is the LIS database, provided by the Luxembourg study group. The only two countries that appear in the LIS database and overlap with our samples are Germany and France. Yet, the most recent available data for France are from 1994, and this year is far from our 2002 sample in France. Thus, we applied our estimates only to Germany, were we used the 2000 available data.

Our results for the per-capita after-tax/transfer monthly income distribution appear in Table 5. In all our calculations we used only the eight family types of our survey (the equivalence scale for single-childless adults is, of course, equal to 1). Moreover, in all our calculations, we used our family-type subsistence levels provided by Table 4, and for all observations below the family-type subsistence levels we used an equivalence scale equal to the number of adults. Despite the fact that our estimations imply that households below the subsistence level exhibit diseconomies of scale, we assumed the minimum bound of zero economies of scale.

Compared to using the standard income-independent OECD scales, the Gini coefficient climbs from 26.38% to 30.44%, a 13.45% rise in the Gini coefficient. Moreover, using the income distribution features of the LIS sample, we calculated the average scales for each family type, stated at the notes of Table 5. The fact that some scales for households with single adults and children are high (and significantly higher than the OECD scales), comes from the fact that most families with single parents are poor, while our scales for poor families are high. Compared to our income-dependent scales, our corresponding income-independent scales imply a drop of 11.38% of the Gini coefficient.

Our income-dependent scales reflect the low sharing abilities of the poorest and the significant household economies of scale for the rich. Not implausibly, this has lead to a significantly higher Gini coefficient (13.45% relative rise, absolute rise of about 4 percentage points). It is also notable that if we had not bound economies of scale to be zero at the lowest, the Gini coefficient would have been even higher.

7. Conclusion

Using a survey method we provided subjective estimates of equivalent incomes across several family types (incomes that retain the same living standard across all family types) in 6 countries, Germany, France, Cyprus, China, India and Botswana. Our survey targeted the estimation of subjective equivalent incomes for different levels of well-being in each country. Thus, our database enabled us to test for a particular formulation of equivalent-income functions, depending on living standard. Specifically, we tested the formulation provided by Donaldson and Pendakur (2005), and termed "Generalized Absolute Equivalence Scale Exactness (GAESE)." One key feature of the GAESE formulation is that it takes into account family-type fixed costs of characteristics, and that it provides a way to identify family-type subsistence levels of consumption/income. We ran 42 specification tests of the GAESE formulation and we found that GAESE passes the test in all these cases.

The implication of this finding is important for several purposes. First, it provides confidence to using the GAESE formulation in other applied approaches to consumer choice such as this of Donaldson and Pendakur (2005). Second, it shows that family-type subsistence needs must be a significant part of the explanation on the finding of Donaldson and Pendakur (2004 and 2005) and Koulovatianos, Schröder and Schmidt (2005a and 2005b) that within-household economies of scale that increase with the level of well-being. Third, the fact that the GAESE formulation is a robust functional specification for equivalent-income functions, provides convenience to any purposes of projecting the estimated functional forms to, (i) chosen limit points of within-household economies of scale through a theoretical convention in order to identify family-type subsistence levels, and, (ii) other samples providing income-distribution information, so as to calculate the after-tax/transfer income inequality per person.

Using our regression-coefficient estimates and the convention that family-type subsistence incomes are defined by the point where within-household economies of scale are zero, we provided estimates of family-type subsistence levels of income. Moreover, we applied the GAESE formulation in the measurement of the 2000 Gini coefficient of the monthly after-tax/transfer income in Germany. As the presence of sizeable family-type substistence incomes implies low within-household economies of scale of consumption for the poor (equivalence scales that drop with rising living standards), the Gini coefficient rose by 13.45% relatively to the classic Gini coefficient measure that uses income-indepentend OECD equivalence scales. Thus, apart from the fact that family-type subsistence incomes seem to be strongly present in subjective evaluations, they also seem to have an important impact on inequality measurement. As a suggested extension, to include family-type subsistence levels in calibrated numerical models of heterogeneous dynamically optimizing consumers, seems to be a very plausible step and quite likely to replicate the finding of previous microeconometric studies that the poor exhibit a higher average and marginal propensity to consume.

REFERENCES

Blackorby, C., Donaldson, D. (1991): "Adult-equivalence scales, interpersonal comparisons of well-being, and applied welfare economics." In: Elster, J., Roemer, J. (Eds.), Interpersonal Comparisons and Distributive Justice. Cambridge University Press, Cambridge, pp. 164-199.

Blackorby, C., Donaldson, D. (1993): "Adult-equivalence scales and the economic implementation of interpersonal comparisons of well-being." Social Choice and Welfare 10, 335-361.

Donaldson, D. and K. Pendakur (2004): "Equivalent Income Functions and Income-Dependent Equivalence Scales," Journal of Public Economics, 88, pp. 175-208.

Donaldson, D., Pendakur, K. (2005): "The Identification of Fixed Costs from Consumer Behaviour," forthcoming, Journal of Business and Economic Statistics.

Koulovatianos, C., Scröder, C., Schmidt, U. (2005a): "On the Income Dependence of Equivalence Scales," Journal of Public Economics 89, 967-996.

Koulovatianos, C., Scröder, C., Schmidt, U. (2005b): "Properties of Equivalence Scales in Different Countries," Journal of Economics 86, 19-27

Lewbel, A. (1989): "Household equivalence scales and welfare comparisons." Journal of Public Economics 39, 377-391.

Pitt, M., Rozenzweig M. R., Hassan N. (1990): "Productivity, Health and Inequality in the Intrahousehold Distribution of Food in Low income Countries," American Economic Review, 80(5), pp. 1139-1156.

Table 1 - Breakdown of the samples in China, India, and Botswana

		Botswana		China		India	
		Sample: 159 obs.		Sample: 196 obs.		Sample: 214 obs.	
		N	%	N	%	N	%
Gender	Male	70	44.03	130	66.33	136	63.55
	Female	89	55.97	66	33.67	78	36.45
Partner in the household	Yes	89	55.97	146	74.49	---	---
	No	70	44.03	50	25.51	---	---
Number of adults in the household	1	---	---	---	---	12	5.61
	2	---	---	---	---	73	34.11
	3	---	---	---	---	35	16.36
	4	---	---	---	---	56	26.17
	5	---	---	---	---	22	10.28
	6	---	---	---	---	10	4.67
	7 or more	---	---	---	---	6	2.80
Number of children in the household	0	48	30.19	159	81.12	74	34.58
	1	26	16.35	27	13.78	48	22.43
	2	40	25.16	7	3.57	62	28.97
	3 or more	45	28.30	3	1.53	30[a]	14.02
Family after-tax income class	1	10	6.29	42	21.43	4	1.87
	2	18	11.32	47	23.98	22	10.28
	3	48	30.19	56	28.57	24	11.21
	4	42	26.42	32	16.33	39	18.22
	5	41	25.79	19	9.69	37	17.29
	6	---	---	---	---	88	41.12
Occupational group	Welfare recipient or unemployed	30	18.87	4	2.04	8	3.74
	Blue-collar worker	19	11.95	11	5.61	26	12.15
	White-collar worker	24	15.09	5	2.55	41	19.16
	Civil servant	53	33.33	5	2.55	23	10.75
	Pupil, student, trainee	15	9.43	140	71.43	54	25.23
	Self-employed	13	8.18	28	14.29	42	19.63
	Pensioner	2	1.26	0	0.00	9	4.21
	Housewife, -man	3	1.89	3	1.53	8	3.74
	Farmer	---	---	---	---	3	1.40
Education	No schooling	---	---	4	2.04	1	0.47
	Basic schooling	5	3.14	16	8.16	3	1.40
	Completed primary school	7	4.40	9	4.59	15	7.01
	Completed Junior High School	21	13.21	13	6.63	44	20.56
	Completed High School	39	24.53	147	75.00	93	43.46
	Compl. University/Technical school or above	87	54.72	7	3.57	58	27.10
Number of siblings during childhood	0	31	19.50	71	36.22	33	15.42
	1	20	12.58	58	29.59	52	24.30
	2	27	16.98	35	17.86	47	21.96
	3 or more	81	50.94	32	16.33	82	38.32
Age group	Less than 20	---	---	---	---	49	22.90
	Between 20 and 40	---	---	---	---	127	59.35
	40 or more	---	---	---	---	38	17.76
Living area	Urban	107	67.30	104	53.06	190	88.79
	Rural	52	32.70	92	46.94	24	11.21

Note. The threshold of the first “family-after tax income class” is the country-specific poverty line for a single childless adult. Then, we add increments such that the mean of the third income class is about the mean household income in the respective country.

[a] In India, 8 households have 4 children, 2 households have 5 children, and 3 households have 6 or more children.

Table 2 - Average equivalence scales for China, India, and Botswana (standard errors in parentheses)

Country	y_r	AC	ACC	ACCC	AA	AAC	AACC	AACCC
China	1	1.84	2.73	3.59	1.90	2.80	3.74	4.65
		(0.43)	(0.97)	(1.44)	(0.38)	(0.76)	(1.28)	(1.99)
	2	1.58	2.14	2.72	1.76	2.32	2.87	3.41
		(0.32)	(0.63)	(1.02)	(0.35)	(0.55)	(0.88)	(1.16)
	4	1.42	1.79	2.16	1.66	2.03	2.41	2.81
		(0.25)	(0.47)	(0.69)	(0.35)	(0.50)	(0.71)	(0.95)
	8	1.35	1.67	1.98	1.60	1.91	2.22	2.58
		(0.27)	(0.52)	(0.76)	(0.35)	(0.52)	(0.76)	(1.06)
	16	1.31	1.61	2.04	1.60	1.94	2.28	2.65
		(0.28)	(0.54)	(1.25)	(0.38)	(0.56)	(0.78)	(1.03)
India	1	1.95	2.72	3.60	2.26	3.18	4.11	5.04
		(0.94)	(1.30)	(1.98)	(0.94)	(1.40)	(1.92)	(2.54)
	4	1.33	1.62	1.91	1.54	1.85	2.15	2.48
		(0.28)	(0.46)	(0.70)	(0.38)	(0.53)	(0.73)	(0.99)
	7	1.24	1.45	1.66	1.41	1.63	1.86	2.10
		(0.23)	(0.42)	(0.59)	(0.35)	(0.50)	(0.66)	(0.83)
	10	1.23	1.42	1.61	1.40	1.59	1.79	2.00
		(0.24)	(0.41)	(0.57)	(0.33)	(0.46)	(0.63)	(0.81)
	13	1.21	1.37	1.54	1.37	1.54	1.72	1.92
		(0.26)	(0.40)	(0.55)	(0.35)	(0.49)	(0.64)	(0.81)
Botswana	1	1.99	2.98	3.98	2.33	3.39	4.50	5.62
		(0.53)	(1.07)	(1.68)	(0.98)	(1.26)	(1.79)	(2.42)
	2.5	1.57	2.12	2.69	1.86	2.43	3.01	3.56
		(0.35)	(0.68)	(1.05)	(0.46)	(0.63)	(0.92)	(1.27)
	4	1.42	1.83	2.25	1.73	2.17	2.59	3.03
		(0.34)	(0.62)	(0.93)	(0.44)	(0.64)	(0.90)	(1.24)

Note. y_r =1 describes the lowest living standard in the three countries. It is 2004 PPP adjusted US$ 277.78 in China, 154.47 in India, and 170.58 in Botswana. So, for example, y_r = 7 in India means that the reference income is 7x154.74=1081.29 PPP adjusted US$.

Table 3a - F-tests for the GAESE specification, Germany (1999)

Regressions for each different family type
Endogenous variable: equivalence scales stated by respondents
Number of observations: 835 (Germany)
White's Heteroskedasticity correction for covariance matrix
Standard Errors in parentheses
p-values of F-tests in brackets

Number of adults		Number of Children							
		0		1		2		3	
1				AC		ACC		ACCC	
				U	R	U	R	U	R
	Constant			0.99*** (0.02)	0.99*** (0.02)	1.03*** (0.03)	1.02*** (0.03)	1.09*** (0.05)	1.09*** (0.05)
	$\frac{1}{y_r}$			303.38*** (12.54)	303.72*** (12.53)	540.18*** (21.53)	541.11*** (21.57)	781.36*** (32.81)	782.01*** (33.17)
	Dummy Inc Class 2			-0.01 (0.01)		-0.01 (0.02)		-0.02 (0.03)	
	Dummy Inc Class 3			0.01 (0.01)		0.01 (0.02)		0.01 (0.02)	
	Dummy Inc Class 4			-0.01 (0.01)		-0.01 (0.02)		-0.01 (0.02)	
	$\overline{R}^2$			0.61	0.61	0.63	0.63	0.62	0.62
	F			0.30 [0.83]		0.30 [0.82]		0.22 [0.88]	
2		AA		AAC		AACC		AACCC	
		U	R	U	R	U	R	U	R
	Constant	1.27*** (0.05)	1.27*** (0.04)	1.26*** (0.06)	1.26*** (0.05)	1.30*** (0.07)	1.30*** (0.06)	1.36*** (0.08)	1.36*** (0.08)
	$\frac{1}{y_r}$	241.22*** (17.38)	241.64*** (14.27)	514.62*** (23.28)	515.82*** (20.37)	754.65*** (31.62)	756.02*** (29.21)	992.01*** (43.80)	992.80*** (42.28)
	Dummy Inc Class 2	-0.01 (0.03)		-0.01 (0.03)		-0.01 (0.04)		-0.01 (0.05)	
	Dummy Inc Class 3	0.03 (0.03)		0.02 (0.03)		0.03 (0.04)		0.02 (0.04)	
	Dummy Inc Class 4	-0.02 (0.03)		-0.02 (0.03)		-0.02 (0.04)		-0.02 (0.04)	
	$\overline{R}^2$	0.24	0.24	0.46	0.46	0.53	0.53	0.54	0.54
	F	0.87 [0.46]		0.54 [0.66]		0.46 [0.71]		0.22 [0.89]	

Table 3b - F-tests for the GAESE specification, France (2002)

Regressions for each different family type
Endogenous variable: equivalence scales stated by respondents
Number of observations: 1115 (France)
White's Heteroskedasticity correction for covariance matrix
Standard Errors in parentheses
p-values of F-tests in brackets

Number of adults		**Number of Children**							
		0		**1**		**2**		**3**	
1				**AC**		**ACC**		**ACCC**	
				U	**R**	**U**	**R**	**U**	**R**
	Constant			1.03*** (0.03)	1.03*** (0.03)	1.07*** (0.05)	1.07*** (0.05)	1.08*** (0.07)	1.08*** (0.07)
	$\frac{1}{y_r}$			262.12*** (13.98)	261.28*** (13.28)	489.66*** (24.18)	487.80*** (23.29)	694.65*** (34.21)	694.25*** (32.94)
	Dummy Inc Class 2			-0.01 (0.01)		-0.02 (0.02)		-0.02 (0.03)	
	Dummy Inc Class 3			0.01 (0.01)		0.01 (0.02)		0.01 (0.03)	
	Dummy Inc Class 4			-0.00 (0.01)		-0.00 (0.02)		-0.01 (0.03)	
	$\bar{R}^2$			0.38	0.38	0.42	0.42	0.43	0.44
	F			0.43 [0.73]		0.36 [0.78]		0.26 [0.85]	
2		**AA**		**AAC**		**AACC**		**AACCC**	
		U	**R**	**U**	**R**	**U**	**R**	**U**	**R**
	Constant	1.26*** (0.04)	1.25*** (0.04)	1.26*** (0.06)	1.26*** (0.05)	1.25*** (0.08)	1.25*** (0.07)	1.24*** (0.10)	1.23*** (0.10)
	$\frac{1}{y_r}$	226.55*** (17.59)	231.14*** (15.26)	459.99*** (24.43)	463.71*** (21.87)	675.66*** (34.51)	679.43*** (31.99)	879.98*** (46.17)	885.16*** (43.57)
	Dummy Inc Class 2	0.00 (0.02)		0.01 (0.03)		0.00 (0.04)		-0.01 (0.05)	
	Dummy Inc Class 3	-0.00 (0.02)		-0.00 (0.03)		-0.00 (0.04)		-0.00 (0.05)	
	Dummy Inc Class 4	-0.02 (0.02)		-0.01 (0.03)		-0.01 (0.04)		-0.02 (0.05)	
	$\bar{R}^2$	0.20	0.20	0.35	0.36	0.39	0.40	0.40	0.40
	F	0.21 [0.89]		0.16 [0.92]		0.05 [0.98]		0.04 [0.99]	

Table 3c - F-tests for the GAESE specification, Cyprus (2000)

Regressions for each different family type
Endogenous variable: equivalence scales stated by respondents
Number of observations: 650 (Cyprus)
White's Heteroskedasticity correction for covariance matrix
Standard Errors in parentheses
p-values of F-tests in brackets

Number of adults		**Number of Children**							
		0		**1**		**2**		**3**	
1				**AC**		**ACC**		**ACCC**	
				U	**R**	**U**	**R**	**U**	**R**
	Constant			1.08*** (0.05)	1.08*** (0.05)	1.19*** (0.09)	1.19*** (0.08)	1.28*** (0.12)	1.28*** (0.12)
	$\frac{1}{y_r}$			215.53*** (13.17)	214.46*** (12.84)	393.48*** (22.53)	390.05*** (22.17)	581.40*** (34.82)	578.16*** (34.65)
	Dummy Inc Class 2			-0.03 (0.02)		-0.04 (0.03)		-0.07 (0.05)	
	Dummy Inc Class 3			-0.00 (0.02)		0.00 (0.03)		-0.00 (0.05)	
	Dummy Inc Class 4			0.01 (0.02)		0.02 (0.03)		0.02 (0.05)	
	$\bar{R}^2$			0.49	0.48	0.51	0.51	0.50	0.50
	F			0.76 [0.52]		0.73 [0.53]		0.76 [0.52]	
2		**AA**		**AAC**		**AACC**		**AACCC**	
		U	**R**	**U**	**R**	**U**	**R**	**U**	**R**
	Constant	1.24*** (0.08)	1.25*** (0.08)	1.31*** (0.10)	1.31*** (0.10)	1.43*** (0.14)	1.44*** (0.13)	1.52*** (0.17)	1.52*** (0.16)
	$\frac{1}{y_r}$	188.68*** (14.63)	184.22*** (13.13)	371.17*** (21.67)	367.15*** (19.90)	558.18*** (31.64)	552.92*** (30.16)	739.57*** (40.37)	734.88*** (39.09)
	Dummy Inc Class 2	0.01 (0.03)		-0.02 (0.04)		-0.03 (0.05)		-0.06 (0.06)	
	Dummy Inc Class 3	0.02 (0.03)		0.01 (0.04)		0.01 (0.05)		0.01 (0.06)	
	Dummy Inc Class 4	0.02 (0.03)		0.02 (0.04)		0.03 (0.05)		-0.03 (0.07)	
	$\bar{R}^2$	0.30	0.30	0.45	0.45	0.49	0.49	0.52	0.52
	F	0.15 [0.93]		0.26 [0.85]		0.30 [0.82]		0.40 [0.75]	

Table 3d - F-tests for the GAESE specification, China (2004)

Regressions for each different family type
Endogenous variable: equivalence scales stated by respondents
Number of observations: 980
White's Heteroskedasticity correction for covariance matrix
Standard Errors in parentheses
p-values of F-tests in brackets

Number of adults		**Number of Children**							
		0		**1**		**2**		**3**	
1				**AC**		**ACC**		**ACCC**	
				U	**R**	**U**	**R**	**U**	**R**
	Constant			1.49*** (0.10)	1.49*** (0.10)	1.67*** (0.19)	1.65*** (0.05)	1.93*** (0.28)	1.82*** (0.28)
	$\frac{1}{y_r}$			155.91*** (10.71)	156.61*** (9.79)	330.90*** (23.32)	336.32*** (21.76)	461.89*** (39.83)	491.53*** (23.91)
	Dummy Inc Class 2			0.03 (0.03)		0.01 (0.06)		-0.04 (0.10)	
	Dummy Inc Class 3			0.01 (0.02)		-0.05 (0.025)		-0.19** (0.09)	
	Dummy Inc Class 4			0.00 (0.03)		-0.02 (0.05)		-0.16 (0.10)	
	$\bar{R}^2$			0.31	0.31	0.32	0.32	0.27	0.27
	F			0.32 [0.81]		0.28 [0.84]		1.47 [0.22]	
2		**AA**		**AAC**		**AACC**		**AACCC**	
		U	**R**	**U**	**R**	**U**	**R**	**U**	**R**
	Constant	1.49*** (0.12)	1.48*** (0.12)	1.82*** (0.21)	1.76*** (0.20)	2.17*** (0.32)	2.05*** (0.31)	2.72*** (0.53)	2.56*** (0.53)
	$\frac{1}{y_r}$	87.72*** (11.00)	92.92*** (9.44)	254.80*** (19.43)	269.46*** (17.42)	422.54*** (31.09)	458.84*** (28.79)	592.07*** (46.80)	623.64*** (44.06)
	Dummy Inc Class 2	0.02 (0.03)		-0.21 (0.05)		-0.09 (0.08)		-0.17 (0.11)	
	Dummy Inc Class 3	-0.01 (0.03)		-0.08 (0.05)		-0.16** (0.07)		-0.23** (0.09)	
	Dummy Inc Class 4	-0.03 (0.03)		-0.09* (0.05)		-0.16** (0.07)		-0.28*** (0.08)	
	$\bar{R}^2$	0.14	0.15	0.29	0.29	0.31	0.31	0.29	0.29
	F	0.56 [0.64]		1.10 [0.35]		1.78 [0.15]		1.78 [0.15]	

Table 3e - F-tests for the GAESE specification, India (2005)

Regressions for each different family type
Endogenous variable: equivalence scales stated by respondents
Number of observations: 1070
White's Heteroskedasticity correction for covariance matrix
Standard Errors in parentheses
p-values of F-tests in brackets

Number of adults		**Number of Children**							
		0		**1**		**2**		**3**	
1				**AC**		**ACC**		**ACCC**	
				U	**R**	**U**	**R**	**U**	**R**
	Constant			0.92*** (0.14)	0.91*** (0.14)	0.97*** (0.18)	0.97*** (0.17)	0.93*** (0.25)	0.92*** (0.24)
	$\frac{1}{y_r}$			123.77*** (10.84)	124.42*** (10.97)	224.74*** (15.06)	224.96*** (15.13)	344.95*** (22.75)	345.41*** (23.02)
	Dummy Inc Class 2			-0.01 (0.03)		-0.01 (0.04)		-0.02 (0.06)	
	Dummy Inc Class 3			-0.02 (0.02)		-0.02 (0.04)		-0.03 (0.06)	
	Dummy Inc Class 4			0.01 (0.02)		0.01 (0.04)		0.02 (0.06)	
	$\bar{R}^2$			0.28	0.28	0.38	0.38	0.39	0.39
	F			0.15 [0.93]		0.07 [0.97]		0.08 [0.97]	
2		**AA**		**AAC**		**AACC**		**AACCC**	
		U	**R**	**U**	**R**	**U**	**R**	**U**	**R**
	Constant	1.06*** (0.15)	1.06*** (0.15)	0.93*** (0.21)	0.93*** (0.20)	0.87*** (0.26)	0.85*** (0.26)	0.64*** (0.32)	0.63*** (0.31)
	$\frac{1}{y_r}$	150.01*** (11.30)	150.04*** (11.24)	274.25*** (16.50)	274.82*** (16.46)	399.76*** (22.21)	401.07*** (22.20)	523.44*** (29.27)	524.95*** (29.35)
	Dummy Inc Class 2	0.01 (0.03)		-0.00 (0.05)		-0.02 (0.06)		-0.02 (0.09)	
	Dummy Inc Class 3	-0.02 (0.03)		-0.02 (0.05)		-0.03 (0.06)		-0.04 (0.08)	
	Dummy Inc Class 4	0.01 (0.03)		0.01 (0.05)		0.01 (0.06)		0.01 (0.08)	
	$\bar{R}^2$	0.31	0.32	0.42	0.42	0.46	0.47	0.47	0.47
	F	0.15 [0.93]		0.07 [0.98]		0.09 [0.96]		0.05 [0.99]	

Table 3f - F-tests for the GAESE specification, Botswana (2005)

Regressions for each different family type
Endogenous variable: equivalence scales stated by respondents
Number of observations: 477
White's Heteroskedasticity correction for covariance matrix
Standard Errors in parentheses
p-values of F-tests in brackets

Number of adults		**Number of Children**							
		0		**1**		**2**		**3**	
1				**AC**		**ACC**		**ACCC**	
				U	**R**	**U**	**R**	**U**	**R**
	Constant			1.50*** (0.13)	1.52*** (0.13)	1.75*** (0.25)	1.79*** (0.25)	1.95*** (0.37)	2.01*** (0.37)
	$\frac{1}{y_r}$			129.59*** (10.91)	126.83*** (10.95)	260.64*** (21.48)	256.27*** (21.88)	393.24*** (33.25)	385.25*** (33.94)
	Dummy Inc Class 2			0.03 (0.03)		0.07 (0.06)		0.10 (0.10)	
	$\bar{R}^2$			0.31	0.31	0.32	0.32	0.32	0.32
	F			0.69 [0.41]		0.68 [0.41]		0.63 [0.43]	
2		**AA**		**AAC**		**AACC**		**AACCC**	
		U	**R**	**U**	**R**	**U**	**R**	**U**	**R**
	Constant	1.34*** (0.21)	1.34*** (0.21)	1.78*** (0.28)	1.78*** (0.27)	2.08*** (0.39)	2.10*** (0.39)	2.39*** (0.52)	2.40*** (0.51)
	$\frac{1}{y_r}$	136.54*** (18.82)	135.90*** (19.43)	278.58*** (24.32)	277.51*** (24.91)	434.35*** (34.06)	431.60*** (34.88)	590.06*** (46.07)	588.85*** (47.12)
	Dummy Inc Class 2	0.01 (0.05)		0.01 (0.06)		0.03 (0.09)		0.01 (0.12)	
	$\bar{R}^2$	0.18	0.19	0.33	0.33	0.38	0.38	0.38	0.38
	F	0.01 [0.91]		0.02 [0.88]		0.08 [0.78]		0.01 [0.93]	

Table 4 - Household and per-capita monthly subsistence incomes (b^h, b^h/n^h)

	Germany	France	Cyprus	China	India	Botswana
AC	604	538	470	586	228	514
	[302]	[269]	[235]	[293]	[114]	[257]
ACC	822	762	654	741	333	630
	[274]	[254]	[218]	[247]	[111]	[210]
ACCC	1076	952	856	888	448	768
	[269]	[238]	[214]	[222]	[112]	[192]
AA	658	610	494	346	318	410
	[329]	[305]	[247]	[173]	[159]	[205]
AAC	888	792	657	639	399	684
	[296]	[264]	[219]	[213]	[133]	[228]
AACC	1120	984	868	928	512	904
	[280]	[246]	[217]	[232]	[128]	[226]
AACCC	1365	1170	1060	1280	600	1130
	[273]	[234]	[212]	[256]	[120]	[226]

Note. Numbers in brackets give per-capita subsistence incomes for each household type (US$ PPP adjusted 2004).

Table 5 – After-tax/transfer income Gini coefficients for Germany (LIS, 2000)

Type of Equivalence scale	Gini (in %)
Income dependent	30.44
Average of income dependent	27.33
OECD	26.83

Notes: The income dependent scale corresponds to the estimates as presented in Table 3a. The averages of the income dependent scale are 1.3414 for household type AC, 2.0409 for ACC, 2.2049 for ACCC, 1.4304 for AA, 1.5871 for AAC, 1.7977 for AACC, and 2.2040 for AACCC. The OECD equivalence scale is 1.0 for a single childless adult, and it assigns weights of 0.5 for each additional adult and 0.3 for each child.

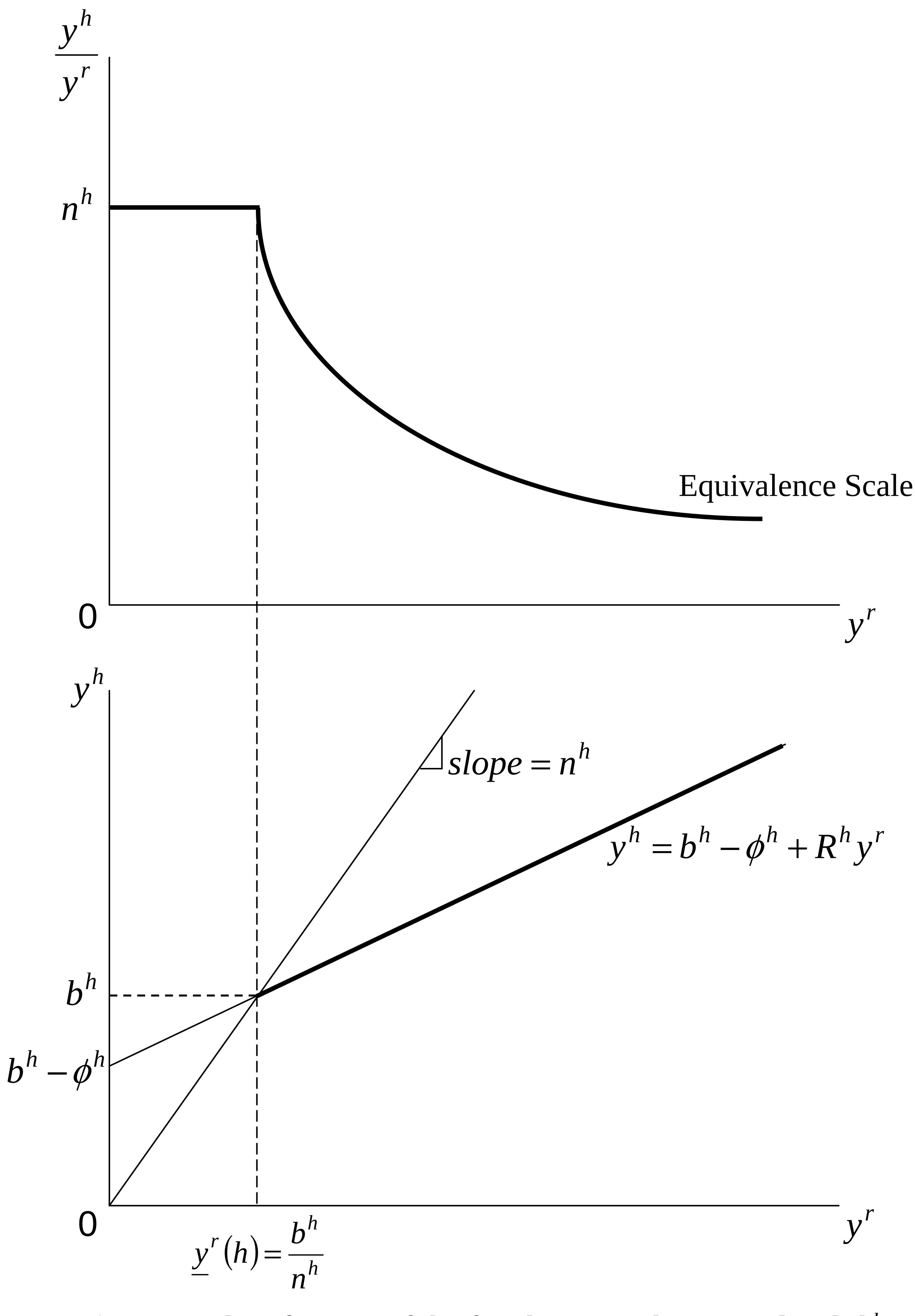

Figure 1 Identification of the family-type subsistence level, b^h

Diskussionsbeiträge
des Fachbereichs Wirtschaftswissenschaft
der Freien Universität Berlin

2006

2006/1	BERGER, Helge / Jakob de HAAN / Jan-Egbert STURM Does Money Matter in the ECB Strategy? New Evidence Based on ECB Communication. 25 S. *Volkswirtschaftliche Reihe*
2006/2	BERGER, Helge / Carsten HEFEKER Does Financial Integration Make Banks Act More Prudential? Regulation, Foreign Owned Banks, and the Lender-of-Last Resort. 31 S. *Volkswirtschaftliche Reihe*
2006/3	BÖNKE, Timm / Giacomo CORNEO Was hätte man sonst machen können? Alternativszenarien zur rot-grünen Einkommensteuerreform. 28 S. *Volkswirtschaftliche Reihe*
2006/4	WOLF, Nikolaus Was Germany ever united? Borders and Domestic Trade, 1885 – 1933 *Volkswirtschaftliche Reihe*