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The Relative Needs of Single and Couple Age Pensioners

Final Report from the Project: Relative Needs across the Age Pension Population

Bruce Bradbury

Contact Information

Bruce Bradbury
Social Policy Research Centre
University of New South Wales
b.bradbury@unsw.edu.au
02 9385 7814

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Executive Summary

How much more does an Age Pension-aged couple need to spend in order to have the same living standard as a single person? The current Age Pension has a base rate of payment for a couple that is 1.67 times the single rate of pension (1.64 if utility, telephone and pharmaceutical allowances are included). This ratio is higher than many equivalence scales in common use, and most recent Australian discussion of poor living standards among the aged has focussed on the situation of singles. Does evidence on household expenditure patterns support the view that single pensioners are relatively worse off?

Previous research on consumer equivalence scales does tend to suggest that couples need relatively less (or singles more) than the Age Pension equivalence scale implies (e.g. the survey by Buhmann et al, 1988). Nonetheless, because of the extremely demanding data requirements for valid estimation, none of the estimated equivalence scales in the literature can be considered robust estimates of relative needs.

This report uses a calibration approach to calculate the relative expenditure needs of aged couples and singles. The approach is based on the Barten (1964) consumer equivalence scale model. If a household consists of a number of individuals with identical preferences, then the relative needs of larger and smaller households can be calculated as a budget-share weighted average of the relative purchase requirements for each individual commodity.

Given information on these relative purchase requirements, the budget shares of single and couple households can be used to provide upper and lower bounds on the overall relative needs (analogous to the Paasche, Laspeyres and the intermediate Fisher ideal price indices). These conclusions also hold under a more relaxed set of assumptions than the Barten assumption of equal preferences.

In this report, household expenditures are grouped into 25 different commodity categories that are likely to have similar amounts of sharing within the household. Assumptions about the degree of within-household sharing for each of these commodity groups are combined with information on expenditure patterns to estimate the relative costs of singles and couples. These assumptions are similar to those made in the Budget Standards research paradigm, except that here assumptions are made about relative rather than absolute amounts required.

Lower, upper and preferred assumptions are made about how many units of each commodity group must be purchased by a couple in order for each member to have one unit of effective consumption of that commodity. 'Private' goods that involve no sharing have a relative purchase requirement of 2. Goods that are perfectly 'public', in that both members can consume the unit, have a relative purchase requirement of 1.

Examples of private goods are clothing and tobacco. For these, the low, preferred and high relative need assumptions are all set at 2.0. Goods that are assumed close to private (but not perfectly private) include alcohol and personal food such as biscuits, fruit, processed meat, breakfast cereals, cakes, non-alcoholic drinks, dairy products

(other than milk), spreads, tea, coffee, confectionary, tinned fish, etc. Even though each unit of food is only consumed by one person, these are assumed to be not fully private because wastage means that singles need to purchase more than half the amount of couples in order to have the same consumption. For these goods, the low, preferred and high relative requirements assumptions are set at 1.8, 1.9 and 2.0 respectively.

At the other extreme, housing is assumed to be close to fully public. That is, the social norm of housing consumption for a single aged person is very close to that of a couple. It is assumed that housing is not perfectly public because it might be considered normal for members of a couple to have slightly more space to accommodate activities only undertaken by one member (e.g. a sewing room). The relative requirements for housing are assumed to be 1.00, 1.15 and 1.30 respectively.

Assumptions of this nature are made for 25 different expenditure groups. The assumptions for the other groups comprising more than 5 per cent of the budget are: prepared food (1.6, 1.75, 1.9), medical (1.9, 1.95, 2.00), vehicle fixed costs (1, 1.05, 1.1), vehicle running expenses (1.2, 1.3, 1.4), shared recreation (electronic goods, pets, holiday accommodation) (1, 1.2, 1.4), personal recreation (books, gambling, admission charges, holiday travel) (1.6, 1.75, 1.9).

Using expenditure data from the 2003-04 Household Expenditure Survey (HES) and these relative purchase requirement assumptions, estimates of the relative needs of couples are calculated to be between 1.32 and 1.60 (preferred value of 1.46). This range is below the ratio implied by the current age pension system – implying that that pension-reliant singles have lower real consumption levels than pension-reliant couples. (The relative needs of singles can be expressed as the inverse of these numbers, thus ranging from 62.4 to 75.7 per cent of the needs of couples). These estimates are for people of Age Pension age who own or are paying off their home. Estimates of the relative needs of couples who are actually receiving an income support payment (e.g. Age or Veteran's Pension) are about one percentage point higher than this (i.e. a preferred value 1.47).

The validity of these results depends crucially upon the sharing assumptions described above. However, it is argued here that the sharing assumptions that would be required to justify the current relativities are not plausible. For example, an across-the-board adjustment would mean that housing requirements for couples would be assumed to be 38 per cent higher than for singles. Nonetheless, a spreadsheet has been prepared to accompany this report to permit users to calculate results based on their own assumptions.

Across the 1988-89, 1993-94, 1998-99 and 2003-04 HES surveys, the mid-point 'preferred' ratios are 1.49, 1.48, 1.47 and 1.46, i.e. there has been a steady fall in the relative needs of couples over this 15-year period. This has been driven by falls in the budget shares of home-eaten food and clothing, together with increases in the budget shares of vehicle fixed costs and housing. (Partly offsetting this have been increases in eating out, medical and personal recreation).

A number of extensions to the basic model are also calculated. Though we cannot estimate the changes in expenditure needs with age, it is possible to test whether the

relativity between singles and couples varies as they all get older. Negligible difference in relativities is found. The relative needs for private renters, however, are quite different to those of home owners – renting couples need relatively less because housing is a larger share of the household budget. Some indicative calculations for households of two non-couple adults are also made, and the methodology for dealing with price changes (e.g. associated with energy tax changes) illustrated.

1 Introduction

What are the relative income needs of older people living alone and in couples? The Australian Age Pension has different rates of payment for singles and couples which take account of the different needs of people living in different household types. For example, the married rate of pension is less than twice the single rate because couples are assumed to share some goods. This report examines the appropriateness of these relativities by showing how they can be derived from the sharing patterns associated with each area of household expenditure. Assumptions about sharing patterns at a detailed level are combined with data on household expenditure patterns to estimate the relative needs of couple and single households of Age Pension age.

The current Age Pension has a base rate of payment for a couple that is 1.67 times the single rate of pension (1.64 if utility, telephone and pharmaceutical allowances are included).[1] This ratio is higher than many equivalence scales in common use, and most recent Australian discussion of low living standards among the aged has focussed on the situation of singles.[2] Does evidence on household expenditure patterns support the view that single pensioners are relatively worse off?

Measures of relative need are typically summarised using 'consumer equivalence scales', indexes showing the relative expenditure required by a household of one type (e.g. a couple) in order to reach the same living standard as people living in some reference household type (typically a single-person household). Previous research on consumer equivalence scales does suggest that couples need relatively less (or singles more) than the Age Pension equivalence scale implies.

Buhmann et al (1988) surveyed equivalence scales estimated across all household sizes. They found that scales based on subjective evaluations of well-being had very high economies of scale (median implied ratio for couple to single of only 1.18), while scales based on expenditure patterns or derived from official poverty lines had economies of scale of 1.32 and 1.42 respectively – still much less than the current pension ratio. Only scales arbitrarily created by statistical agencies or researchers had similar scale economies to the Age Pension scale relativity. Nonetheless, because of the extremely demanding data requirements for valid estimation, none of the equivalence scales covered in their review, or published subsequent to it, can be considered robust estimates of relative needs.

The next section of this report briefly surveys the different approaches that have been used to estimate consumer equivalence scales. Section 3 then introduces a general

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[1] As at January 2009, the Age Pension rate for a single person was $562.10 per fortnight, plus $6 Pharmaceutical Allowance, $3.54 basic Telephone Allowance, and $19.77 utilities allowance (all converted to a per-fortnight basis). The corresponding figures for couples (combined) were $939, $6, $3.54 and $19.77. In addition, eligible renters could receive up to $110.20 (single living alone) or $103.80 (couple) per fortnight in Rent Assistance.

[2] Earlier work by Barber et al (1994) and Patterson and Wolffs (1995) also presented anecdotal and focus group evidence about the perceived drop in living standards experienced by pensioners whose spouses have died.

household welfare model which includes opportunities for intra-household allocation and consumption-sharing and formally defines the equivalence scale. Section 4 then shows how the Barten equivalence scale model is a special case of this, and describes the specific calculation methods used in this paper. These do not require the estimation of a full demand system, but instead are based on price index-like weighted averages of budget shares. The implications of using the Barten simplifications are discussed. Section 5 then provides estimates of the relative needs of older couples and singles who own their own homes. A number of extensions to these estimates are presented in Section 6. These include estimates of the impact of age on the relativity between singles and couples, the relative needs of single and couple private renters, and the relative needs of two-person non-couple households. Section 7 concludes.

2   Equivalence scale estimation

There is a longstanding debate in the economics literature on whether the consumer equivalence scale is a meaningful concept. If people can choose their family size, then it makes little sense to assume that they are worse off when they make a choice to have a larger family.[3] Why should we be interested in estimating the costs but not the benefits associated with household structure, and why should policies compensate people for these costs?

One reason is that researchers and policy-makers are often interested in the living standards of people who have little choice over their living arrangements. This is relevant when considering the living standards of children, who did not choose to be brought into the world nor the number of siblings they have. It might also be considered relevant to the situation of the majority of older singles, because they have arrived in this situation via widowhood.

More generally, we might wish to apply social norms that are not automatically derived from individual behaviour.[4] These might include the right of individuals to choose their demographic status without incurring economic penalties. For example, a goal of pension policy for the elderly might be to permit both singles and couples to live in their preferred household composition while attaining the same material standard of living. Similarly, social goals of poverty alleviation are usually defined in the context of (commodity-based) consumption levels. Since social policy is typically not very effective in altering demographic choices, anti-poverty policy must take consumer equivalence scales into account in setting rates of payment.[5] This focus on commodity consumption is also a justification for not taking into account the leisure costs of various domestic arrangements.

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[3]   See for example, Pollak and Wales (1979) and Blundell and Lewbel (1991). The latter conclude that to use equivalence scales derived from demand data for welfare comparisons is 'inherently dishonest or at least uninformative' (p. 66).

[4]   In the language of welfare economics, social welfare functions may have a more restricted set of arguments than individual welfare functions (i.e. excluding preferences over demographic circumstances).

[5]   See Nelson (1993) and Bradbury (1996) for further discussion.

This report thus proceeds on the basis that equalising effective consumption levels between people in different household types is an important goal of income-support policy. Any other considerations, such as the direct benefits of household type or a need to maintain incentives for people to partner, are considered separate issues – which are not considered here.

There is a large and longstanding body of research seeking to measure the relative consumption needs of families of different compositions. See Buhmann et al (1998) and Bradbury (1997) for surveys. All of the methods used to estimate equivalence scales rely on assumptions to identify the relationship between behaviour and needs. The methods used can be grouped into three broad categories based on the key assumptions used:

Well-being indicator based

Subjective measures of economic well-being or hardship can be compared with income levels to ascertain the income level needed to maintain constant well-being across different household types.

The validity of this approach rests on the assumption that responses to these questions accurately reflect the concept of well-being that is of interest to researchers or policy-makers. This might not be the case, for example, if subjective well-being is influenced by expectations, particularly if these in turn are influenced by the living standards of people in the same household type as the respondent. If this is the case, responses might be biased so that demographic groups which are really at different standards of living actually report very similar standards of subjective well-being (Bradbury, 1989). More practically, these indicators are typically only weakly associated with income and family composition. This means that very large samples are required to get accurate estimates.

Budget standards based

Budget standards involve researchers assembling a list of consumption goods needed to attain some given living standard (e.g. 'modest but adequate'), (Saunders et al, 1998). These are then costed for different family types. Though this method produces precise estimates, it can be difficult to justify the assumptions needed to build the list of goods.

Consumption theory based

Several different approaches have been developed using data on household expenditure patterns. They employ a variety of assumptions to identify the links between expenditure and needs. These include: that the food share is an indicator of household well-being (Engel, 1857); that family composition has only an income effect on some non-shared goods (Rothbarth, 1943); that composition has only a price effect (Barten, 1964); and that the equivalence scale is constant at all income levels (Lewbel, 1989, Blackorby and Donaldson, 1991). The more sophisticated variants of these models have a strong claim to theoretical validity. However, they are very demanding of data, requiring large surveys conducted over long time periods (over which tastes must be assumed to be constant) and which also include high quality data

on detailed consumption measures (e.g. goods consumed by only one household member, such as men's clothing). Consequently, they have been of limited use in providing the detailed scales required by income-support policy.

Gorman summarised the price-like impact of household composition using the words of his schoolmaster: 'When you have a wife and a baby, a penny bun costs threepence' (Gorman 1976, p215). At the same time, when extra members enter the household there is only a small increase in the effective price of jointly-consumed goods like heating, which are thus relatively cheaper per person. If we assume that household composition influences household welfare only via these price effects, then data on variations in consumption patterns across household types and price regimes can be used to identify equivalence scales. This approach has been criticised because it ignores the different preferences of household members and the within-household distribution of income. Threepence worth of penny buns fills three stomachs, but threepence worth of beer only satisfies the beer drinkers in the household – an issue of particular relevance when considering the costs of children. Nonetheless, this model might serve as a reasonable approximation for households of multiple adults.

The estimates in this report use an approach which draws upon elements of both consumption theory and budget standards, based on Bradbury (1997). The theoretical model for the approach is drawn from the consumption theory literature (the application uses the Barten model). The estimates also draw on researcher-generated assumptions about relative needs for particular commodities in a fashion similar to the budget standards method. However, it differs from the budget standards approach in that information on actual expenditure patterns is combined with these relative expenditure requirement assumptions.

The objective of this report is thus somewhat different from the aims of most of the equivalence-scale literature. Instead of providing imprecise estimates of consumer equivalence scales based on weak assumptions, the goal here is to develop a framework for the construction of equivalence scales based on information and assumptions from a range of sources assembled in a transparent and economically consistent manner. As applied in this report, the method has modest data requirements (only a single household expenditure survey is required), and is more properly described as an economically consistent calibration rather than as an estimation of consumer equivalence scales. The rationale for this is that we can think of joint consumption in the household as a *technological* feature of consumption, a feature that can be examined using a much wider variety of methodologies than mere observations of consumption behaviour.

The next section describes a general household consumption model which incorporates intra-household allocation and preference differences between individuals, as well as consumption sharing of particular commodities. This is used as a framework to understand the implications of the simpler Barten model employed in the remainder of the paper.

3 The General Equivalence Scale Model

3.1 The Household Preference Structure

We start with an extension of the household welfare model of Samuelson (1956). Each individual j is assumed to have a stable welfare function $u_j = U_j(q_{1j}, q_{2j}, \ldots, q_{Ij})$ describing their preferences over commodities q_{ij}. If they live alone, their consumption is chosen so as to maximise u_j subject to a budget constraint $\sum_i p_i q_{ij} \leq y_j$.

In a household of J individuals, however, household consumption is chosen so as to maximise a separable function of the individual welfare levels subject to a household budget constraint. That is,

$$\max\ U(u_1, u_2, \ldots, u_J)$$

$$\text{subject to } \sum_i p_i Q_i(q_{i1}, q_{i2}, \ldots, q_{iJ}) \leq y \qquad (1)$$

The function $Q_i(q_{i1}, q_{i2}, \ldots, q_{iJ})$ represents the household purchase requirement for commodity q_i. For goods that cannot be shared, it is simply the sum of the personal consumption amounts q_{ij}. However, for goods which have some degree of joint consumption or sharing, the purchase requirement will be less than this, as described below.

The household welfare function $U(.)$ can be interpreted in several ways. Most simply, it might be considered to represent the preferences of a 'caring' but 'non-paternalistic' household head who controls household consumption. The individual welfare functions might then be the head's views on the needs of the other household members. Becker (1981) shows that this interpretation can hold even when the other individuals have some control over their own consumption.

Alternately, if $U(.)$ is additive then the first order solution to this household decision problem is identical to the outcome of a Pareto efficient allocation of consumption between the household members (Panzar and Willig, 1976). The function $U(.)$ can then be interpreted as a summary of the relative bargaining strengths of the individuals in the household. 'Bargaining strength' in this context should be interpreted broadly, including the impact of altruistic feelings for the welfare of other household members.

In general, $U(.)$ might also be a function of other variables influencing bargaining within the household such as wage rates, private incomes, and social norms of within-

household distribution. Incorporation of these would make the present model similar to that in the 'collective consumption' literature.[6]

3.2   The Joint Consumption Technology

The idea of representing the shared nature of consumption via a 'household purchase function' $Q_i(q_{i1}, q_{i2}, \ldots, q_{iJ})$ was first proposed by Lau (1985). This function describes the household purchase requirement for commodity i as a function of the personal consumption levels of that commodity. Lau proposed that the purchase function should have the following properties: equal to individual consumption when only one person consumes the commodity; non-decreasing in its arguments; symmetric; homogenous of degree 1; and convex. These assumptions imply that the quantity purchased by the household is at least as great as the amount consumed by every individual, that the sum of services received by individuals is always greater than or equal to the quantity purchased, and that $\dfrac{\partial Q_i}{\partial q_{ij}} \le 1$ (when differentiable).[7]

Denoting $\dfrac{\partial Q_i}{\partial q_{ij}}$ by s_{ij}, it is straightforward to show that in the first-order conditions for the household maximisation problem, the effective (or shadow) price of commodity i for person j in the household is now $p_i s_{ij}$. This shadow price must always be less than, or equal to, the market price. Using Euler's theorem (and assuming differentiability), the homogeneity property allows the budget constraint to be written in terms of these shadow prices as

$$y = \sum_j \left(\sum_i q_{ij} p_i s_{ij} \right) = \sum_j y_j \tag{2}$$

This provides a natural way to describe the allocation of household income amongst household members. It should be remembered, however, that the shadow prices in this expression are, in general, not fixed but vary with the consumption levels of all household members.

Some simple examples of household purchase functions for households containing J individuals include

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[6]   See for example Chiappori (1988, 1992), Browning et al (1994) and Apps and Rees (1997). One difference is that most of the collective consumption models are unable to fully recover the household income-sharing rule because they do not assume that individuals' preferences are stable across household types. Here, as in all the equivalence-scale literature, this is a necessary identifying assumption. Browning, Chiappori and Lewbel (2006), present a model very similar to that presented here.

[7]   See Bradbury (1997) for further discussion.

- Private $$q_i = \sum_j q_{ij}$$

- Public $$q_i = \max_j(q_{ij})$$

- Quasi-linear $$q_i = \max\left\{\frac{1}{1+(J-1)(1-t_i)}\sum_j q_{ij}, \max_j(q_{ij})\right\}$$

- Iso-elastic $$q_i = \begin{cases} \left(\sum_j q_{ij}^{1/e_i}\right)^{e_i} & 0 < e_i \leq 1 \\ \max_j(q_{ij}) & e_i = 0 \end{cases}$$

The first formulation is the conventional private good assumption. The second describes the situation where the good is 'public' within the household, with consumption by one member not detracting from the consumption of another. The last two expressions are different ways of describing goods that are partly shared within the household. When the scale parameters t or e equal 1, the good is private, and the household demand is simply the sum of the individual demands, whilst when t or e equal 0, the good is pure public. These functions are illustrated in Figure 1 for a two-person household (with $e = t = 0.5$).

The quasi-linear purchase function implies that a fixed fraction $(1-t_i)$ of the household purchase of a commodity is allocated to public consumption within the household, with the remainder allocated among individuals for private consumption. If personal consumption levels are sufficiently similar so that consumption is located strictly between points A or B in Figure 1 then the purchase function for commodity i is simply $q_i = \frac{1}{1+(J-1)(1-t_i)}\sum_j q_{ij}$ and the shadow price for person j is independent of the consumption levels of other household members. The assumption that consumption occurs strictly between A and B is the more likely to be unrealistic the more public is the good (i.e. in Figure 1, the diagonal portion of the budget constraint shrinks as the good becomes more public).

A simple example of this type of allocation might be a television set that is used for two hours a day. In the first hour, everyone in the household agrees that they want to watch the same program, and so consumption by one person is non-rival to that of other people (assuming there are enough seats in the TV room). In the second hour, however, everyone has a different opinion of what they want to watch. Hence the second hour of TV viewing by one person must be at the expense of someone else's consumption.

In general, however, we might expect a less discontinuous pattern of congestion externalities than implied by a quasi-linear budget constraint. For the television example, the probability of being able to watch what you want may diminish in a smooth fashion as the number of people in the household and the amount of viewing by the other people increases. In this case, the iso-elastic formulation is a more useful functional form.

Figure 1   Household consumption possibility frontiers for a single commodity

Note: The figure shows the feasible combinations of consumption of commodity i by person 1 and 2 when the household purchases a quantity q_i.

3.3   The Consumer Equivalence Scale

The separable nature of the household welfare function in (1) means that household consumption decisions can be viewed in two stages. At the upper level, the allocation of household income to each member is decided. Consumption is then allocated to each individual to maximise their individual welfare function given their available income. The optimal solution at the lower level will be found when individuals (or the household decision-maker acting on their behalf) are maximising[8]

$$U_j(q_{1j}, q_{2j}, \ldots, q_{Ij})$$
$$\text{subject to } \sum_i q_{ij} p_i s_{ij} \leq y_j \tag{3}$$

Denoting the share of household income allocated to the consumption of person j as $\Theta_j(y, p)$, the budget constraint in (3) can be written as $\sum_i q_{ij} p_i s_{ij} \leq y \, \Theta_j(y, p)$. (The income share is, in general, a function of prices and household income). The household income required for person j to reach welfare level u_j is then

$$c_j(u_j, p_j^*) / \Theta_j(y, p) \tag{4}$$

where $c_j(u_j, p_j^*)$ is the level of personal income which would enable person j to reach welfare level u_j when they face a vector of shadow prices p_j^* (with elements $p_i s_{ij}$).

The consumer equivalence scale for individual j is defined as the household income required to reach a standard of living u_j when living with other people, divided by the income required to reach the same living standard when living alone. Since shadow prices are equal to market prices when living alone, this is thus given by

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[8]   Note that the shadow price inflator, s_{ij}, is a function of the consumption of commodity i by all other household members (unless the purchase function is quasi-linear), and so this relationship only applies when the shadow prices are evaluated at the optimal household consumption vector. See Deaton and Muellbauer (1980a, pp 247-8) for a discussion of this approach to linearisation of the budget constraint.

$$m_j = c_j(u_j, p_j{}^*)\big/\big(\Theta_j(y, p)\, c_j(u_j, p_j)\big) \tag{5}$$

where $c_j(u_j, p_j)$ is the cost of reaching welfare level u_j when living alone and facing market prices. Note that neither the cost function when living alone nor the cost function when living with others has a direct dependence on household composition. Instead, the impact of household composition is channelled through the share of household income allocated to the consumption of the person and through the effect of joint consumption on shadow prices. In other words, this framework defines welfare only in terms of commodity consumption and not upon preferences with respect to family composition per se.[9]

4 The Barten Equivalence Scale Model

If all members of the household are assumed to have identical preferences and the household welfare model is symmetric across the members, then the above model simplifies to that of Barten (1964). These assumptions are not very appropriate for households where the members are quite varied, and so the Barten model is generally regarded as inappropriate for describing the costs of families with children (Muellbauer, 1977, Nelson, 1988). However, the model may serve as a reasonable approximation to the costs of living in households with different numbers of adults. This simplified model serves as the framework for the cost estimates in this report. (The implications of this simplification are discussed later).

As in the more general model, if a representative member j of the household were to live alone, they would seek to maximise a welfare function $u = U(q_{1j}, q_{2j}, \ldots, q_{Ij})$ subject to the budget constraint $\sum_i p_i q_{ij} \leq y$.

When the same person lives in a household of J individuals, the household budget constraint is $\sum_i p_i Q_i(q_{i1}, q_{i2}, \ldots, q_{iJ}) \leq y$. However, the identical preference and equal-sharing assumptions mean that the $q_{im} = q_{in} \forall m, n$. That is, the purchase function collapses to a point along the diagonal (bottom-left to top-right) line in Figure 1. It can thus be represented by a single parameter summarising the distance from the origin (irrespective of the functional form of the purchase function). For example, the quasi-linear purchase function for commodity i simplifies to $q_i = r_i q_{ij}$ where q_{ij} is the consumption by any one member of the household of that commodity, q_i is the household purchase requirement, and $r_i = J\big/(1 + (J-1)(1-t_i))$. For households of two people, this is simply $r_i = 2/(2 - t_i)$.

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[9] The consumer equivalence scale would be unidentified if household composition were to enter the cost function in an unrestricted manner. Contrast the restricted form of the cost functions here with those considered by Pollak and Wales (1979).

Recall that t represents the proportion of consumption that is allocated to private consumption in the household. If the good is fully private, $t = 1$ and hence $r = 2$; the household needs to purchase twice the amount that each individual consumes. If the good is fully public, $t = 0$ and $r = 1$; no additional purchases are required. Intermediate values apply to goods that are partly public within the household. For example, consider the running costs of a car on a given day. If the car travels 1 km taking (only) person 1 to a destination, 1 km for person 2 and 1 km to a destination for both people, then $t = 2/3$ and $r = 1.5$. That is, each person travels 2 km, but the car must travel 3km. The running costs for the household of 2 people is thus 1.5 times the running costs associated with the consumption of a single person.

Under these assumptions, the impact of household size is precisely the same as a change in the price of household goods. In the multi-person household, resources are allocated to maximise the same person-level welfare function $U(q_{1j}, q_{2j}, \ldots, q_{Ij})$. However, the budget constraint is now $\sum_i p_i Q_i \leq y$ or $\sum_i p_i (r_i / 2) q_{ij} \leq y/2$. That is, half of household income is allocated to the consumption of person j, who effectively faces prices that are cheaper by a factor of $r_i / 2$. (Using the notation of the previous section, $r_i / 2 = s_{ij} \forall j$).

This equivalence between household size and price effects was first derived by Barten (1964) who sought to use this equivalence to derive price elasticities from data where all subjects faced the same prices. Subsequent research using this model has generally sought to use information on behavioural responses to price changes, together with information on consumption patterns in households of different sizes, to estimate the values of r_i.

If the vector of r_i values is known, then the consumer equivalence scale can be derived using conventional price index theory without needing to specify a full demand system. Denoting the budget share of commodity group i by $w_i = q_i p_i / y$, a representative person living alone and with income y^0 consumes $q_i^0 = w_i^0 y^0 / p_i$ of each commodity and reaches welfare level u^0. In the couple household, the Barten assumptions imply that the husband and wife consume the same amount of each commodity and income is equally shared between them. When the couple household purchases a quantity Q_i, of each commodity, each person consumes $q_i^1 = Q_i / r_i$ and reaches a welfare level of u^1. Personal consumption of each commodity can then be expressed in terms of household budget shares and income as $q_i^1 = w_i^1 y^1 / r_i p_i$.

A Laspeyres equivalence scale (corresponding to a Laspeyres price index) for the cost of a couple relative to a single person can then be defined as $m_L = \sum_i q_i^0 p_i r_i \big/ \sum_i q_i^0 p_i$. The denominator is the expenditure required by a single person to consume the vector q^0. The numerator is the expenditure required by the couple household in order for each individual to consume the same vector of commodities. Using the relationships shown in the paragraph above, this simplifies to $m_L = \sum_i w_i^0 r_i$, i.e. the average relative

purchase requirement for each commodity, weighted by the single-person budget shares.

Now q^0 is the bundle of goods chosen by the single-person household. It will not necessarily be the welfare-maximising quantity for the people in the couple households. It is possible that couples could achieve the same welfare level at a lower total expenditure by adjusting their expenditure patterns. In particular they might substitute towards goods which are shared and thus provide more total consumption per unit purchased (i.e. goods that are effectively cheaper). This means that the true equivalence scale at welfare level u^0, must be less than m_L (or equal if there is no substitution).

Similarly, a Paasche equivalence scale can be calculated using couple-consumption patterns as weights. This represents the cost of consuming the consumption bundle of the individuals when living as couples, and is defined as $m_P = \sum_i q_i^1 r_i p_i / \sum_i q_i^1 p_i = 1 / \sum_i w_i^1 \frac{1}{r_i}$, i.e. the harmonic mean of the relative purchase requirements, weighted by couple-income shares. Following similar reasoning to above, this scale will be a lower bound for the true equivalence scale calculated at welfare level u^1. If budget shares are constant with real income, or if $u^1 = u^0$ these two bounds can be combined as $m_P \leq m \leq m_L$. Whilst neither of these conditions holds precisely, it is likely that average welfare levels will be reasonably close in single-person and couple-retired households. This is because the age pension forms the main component of aged incomes, and Australian pension relativities are explicitly set so as to lead to similar welfare levels.

Hence it reasonable to use the average Paasche and Laspeyres equivalence scales as bounds on the true equivalence scale, at least for the population considered here. In fact, in the results shown below there are only relatively small differences between these scales,[10] and so most of the discussion focuses on the 'Fisher Ideal' scale (the geometric mean of these two scales).

These estimates assume that the r_i values are known. These are discussed in the next section. Before considering these results, however, it is necessary to consider the implications of using the Barten model simplifications. Aged couples do not consist of identical twins, and we cannot assume that resources are shared equally between them. Are these simplifying assumptions likely to have much impact on the likely equivalence scales?

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[10] This is consistent with a low degree of price substitution in consumer behaviour, though it could also conceivably be a result of income effects. It can be shown that if the individual welfare functions are homothetic with zero substitution, then $m_L = m = m_P$ where m is the true equivalence scale. It is also interesting to note that an alternative, apparently plausible, method for calculating an equivalence scale might be to calculate the arithmetic average of the commodity-specific scales with the couple budget shares as weights. Such a 'naive' scale leads to a higher estimate of the equivalence scale than either the Paasche or Laspeyres scales.

Three aspects of this question are considered below: the implications of unequal income sharing, the implications of different consumption patterns, and the implications of home production. It is argued here that these factors are likely to have little impact. Evidence suggests that income sharing within aged couples is relatively even, differences in consumption patterns will tend to offset one another and home production costs, while important, are usually not considered an appropriate focus for retirement income policy.

4.1   Implications of unequal income sharing

First, if resources are unequally distributed within the household, then the relative needs of each member (compared to being single) will be different. The member receiving the greater share of the household resources will only need a small increase in household income in order for them to enjoy the same standard of living as they had when single, whereas the other member will require a greater increase.[11] The results shown here reflect the average of these two income relativities, and so can be considered as useful on this basis.

Now the concept of an equivalence scale does not require that personal welfare be measured in a cardinal way – but a process of averaging like this does. To do this, it is necessary to assume a within-household 'social welfare function' which embodies assumptions about the magnitude of welfare gains and losses. Conventional social welfare functions, as used in poverty and inequality analysis, typically assume that an additional dollar of consumption has more social value if provided to a poorer person. (Technically, the welfare function is concave, or inequality averse). This also implies that a given amount of resources leads to a higher social welfare level if evenly rather than unevenly divided between two people. In the present context, this implies that even if incomes are adjusted according to the equivalence scale so that the average consumption level is the same in the couple household as in the single-person household, within-household inequality of consumption will lead to the average welfare level of the people in the larger household being lower.

Bradbury (1997) investigated the degree of sharing within aged-couple households using the model described here, and found that, on average, resources appeared to be close to equally shared.[12] However, this will reflect a combination of households where the husband receives more, and other households where the wife receives more. In both cases, (if welfare is concave) the average welfare level would be less than if the income were equally shared. This implies that if we assume equal sharing, we might be underestimating the needs of couple households.

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[11] Note that a focus on individual welfare levels can lead to paradoxical policy implications. Considering this example from the other direction, it implies that the household member who receives least in the couple requires a *lower* income level when single to be as well off as when they were married. Unless there is a desire for social policy to reproduce the unequal relationships within the household when that household dissolves (unlikely) then reducing this person's pension would not be an appropriate policy response.

[12] This is estimated by observing whether the consumption patterns of aged couples are more like those of single men or those of single women (after adjusting for economies of scale).

The results in this report do not take any account of the effects of this within-household inequality on relative living standards. For better or worse, this reflects standard practice in poverty and inequality measurement. The results should thus be interpreted as describing the relative needs of singles and couples that could be achieved if resources were equally shared within the couple. Given that this appears to be the case on average, this is perhaps not too great an assumption, but it remains an assumption nonetheless.

4.2   Implications of unequal consumption of particular commodities

The Barten model also assumes that each member of the household has the same consumption preferences. However, in practice these are likely to diverge significantly, particularly as we disaggregate commodity groups. When consumption preferences differ, the simple Barten approach of scaling consumption by a constant value may often be inappropriate. Instead, more complicated functions, such as those shown in Figure 1 are required.

In this situation the effective (or 'shadow') price of the good in the two-person household can vary depending upon the consumption of the other member. In general, a higher level of consumption by the other household member implies a lower (or unchanged) shadow price (Bradbury 1997). The impact of this is greater the more public the good. In the limit, for pure public goods, the household needs to purchase the maximum of the consumption of each person. A person consuming less than the maximum can thus increase their consumption without the household needing to purchase more of the good – implying a shadow price of zero for this person but a market price for the maximum consumer.

At the other extreme, the shadow price is always equal to the market price for goods that are fully private. This is convenient, because these are goods where unequal consumption is often the norm, e.g. men's and women's clothing.

If we are prepared to assume that the purchase requirement function approximates the quasi-linear form for partly private goods, then the shadow price will be equal to the market price as long as the consumption patterns of each member are reasonably similar (i.e. lying on the segment (A,B) in Figure 1).

In general, however, prices will vary according to the consumption of each member. On average these will tend to offset each other. If a person is the primary consumer of commodity A, they will be less likely to be the primary consumer of commodity B. These offsetting effects mean that the impact on the average equivalence scale will be small (though non-linearities mean that there may be some differences). Bradbury (1997) estimates this model using the iso-elastic form and derives average equivalence scales that are much the same as those derived when using the Barten assumptions.

4.3   Implications of home production

Bradbury (1997) also tests whether the actual consumption patterns of households are consistent with this consumption framework. The main divergence is found in prepared food consumption; couples spend more on food than the consumption patterns of singles and the sharing assumptions would suggest.

These changes probably arise from the incentives associated with home production. The sharing assumptions for prepared food used here include an allowance for reductions in wastage in couple households, but do not take account of the time inputs associated with home meal preparation. Because the time required to cook for two is not much more than the time required to cook for one, there are strong incentives for couples to engage in more home food preparation. Interestingly, they don't spend any less on non-prepared and eat-out food (Bradbury, 1997), suggesting that this change is mainly one of quality of food consumption rather than quantity.

The calculations here do not take account of the economies of scale of home production that are available to couples. If they were taken into account, that would imply that couples were better off than the calculated equivalence scale would imply.

It is not clear, however, that pension policy should take these time costs into account. These patterns of consumption imply that pensioners do value their time – they spend less time on activities that yield less output. Nonetheless, they still have much of what, by average community standards, might be considered 'free' time. Current discourse on public pension policy does not include discussion of compensation to single pensioners for their lost home production time. These results in this report follow this convention of not considering these time costs.[13]

5 Estimates of the relative needs of older single person and couple households

The Barten model framework discussed above is used here to calculate estimates of the relative income needs of older single people and couples. The two key inputs required for this calculation are the expenditure shares of singles and couples on different commodity groups, and the magnitudes of the relative purchase requirement parameters, r_i.

The budget shares are estimated from the ABS Household Expenditure Surveys of 1988-89, 1993-94, 1998-99 and 2003-04.[14] Attention is confined to households with one adult or with two adults of opposite sex, all of whom are age-pension age or older (65 for men, 62 for women in 2003-04, 60 for women in other years). To control for wealth effects we restrict attention to home-owning households (with or without a mortgage). This includes four-fifths of retired households. Costs for renters are examined in Section 6.

The relative purchase requirement parameters could be estimated in several ways. The most common approach in the literature has been to draw upon the observed link between prices and consumption behaviour and between household size and consumption to estimate these relationships. This approach has a number of drawbacks. It is demanding of data, requiring substantial price variation across time or

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[13] See Bittman (1991) for a discussion of the gender differences in home production in older households.

[14] Following ABS conventions, investment outlays such as mortgage principal repayments and capital housing expenditures are excluded.

space over which preferences must be assumed stable, and it does not explicitly take account of home production effects which might also influence behaviour.

However, we can also think of the relative purchase requirements as technological features of household consumption, albeit influenced by social consumption norms. For some commodities, the 'purchase technology' is clear. There are negligible economies of scale in the purchase of clothing in two-person households, particularly when of the opposite sex.[15] Most other commodities involve some degree of joint consumption. For these, it is usually possible to make plausible assumptions, or at least upper and lower bounds, on relative purchase requirements. This is the approach used here.

To undertake this calculation, it is convenient to group commodities according to their relative purchase requirements. The grouping used here is shown in Table 1. In principle, these assumptions could be made at a much more detailed level (e.g. for the 400 to 600 commodities separately identified in the Australian household expenditure surveys). However, grouping according to the expected degree of sharing loses little detail while the communication of assumptions is improved. This also makes it possible to permit interactive calculations where readers of this report can specify their own preferred values (see accompanying spreadsheet).

Table 1 shows two representations of the relative purchase requirements of couple households. The first set of data columns shows the author's assumptions of the amount needed to be purchased by the larger household in order to for each individual to have one unit of personal consumption (the r_i parameters). Low, preferred and high values for these parameters are given. Values of 1 indicate pure public goods, 2, pure private. The relative shadow price facing the individuals in the couple household is half the r value.

The second set expresses these same relationships from the perspective of the quasi-linear model of purchase requirements, i.e. if the good can be assumed to comprise two parts, one pure private and one pure public. The t_i parameters show the fraction of the good that is private.

A few goods (clothing, tobacco, health insurance, transport fares) are assumed to be purely private. Most other goods are assumed to be either close to private or close to public (the bimodal distribution is clearest in Figure 2 below).

Goods that are assumed close to private include alcohol and personal food such as biscuits, fruit, processed meat, breakfast cereals, cakes, non-alcoholic drinks, dairy products (other than milk), spreads, tea, coffee, confectionary, tinned fish, etc. Even though each unit of food is only consumed by one person, these are assumed not to be fully private because wastage means that singles need to purchase more than half the amount of couples in order to have the same consumption. For these goods, the low, preferred and high relative requirements assumptions are set at 1.8, 1.9 and 2.0 respectively. Equivalently, we can think of these goods as having between zero and 10

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[15]   A very minor exception (ignored here) is clothing purchased as gifts for people in other households, as the social norm is usually for a couple to purchase a single gift.

per cent of a public component – which in this case might be the fraction that is per-household wastage.

In this report, such assumptions have been assigned in a relatively arbitrary way. However, in principle, it would be possible to gather this data in other ways, e.g. in-depth studies of food wastage, or consultations with people in older households, similar to the consultations undertaken in budget standards studies. Or to take another example, household expenditure on fuel predominantly comprises water heating, home heating/cooling and cooking. The first of these is primarily used for bathing and has little joint consumption, while joint consumption is substantial for the others. Data collected by the utility industries on the relative importance of these different components in typical households could be used to provide more precise scale economy bounds than given here.

In principle, it may not be always possible to distinguish the consumption technology from preferences. For example, a household containing members who prefer their dwelling to be kept very warm will enjoy more joint consumption of the commodity 'household fuel' than a household where people use the same amount of fuel having long showers. However, for the purpose of policies such as pensions, it is the average patterns that are most important.

Table 1 Commodity categories and relative purchase requirement assumptions

Expenditure Categories

		Relative purchase required (r: 1 = pure public, 2 = pure private)			Assumed degree of sharing Fraction of good that is private (t = 2(1-1/r))		
Title	Description	Low	Pref.	High	Low	Pref.	High
Housing	Repairs and maintenance, rent, land and water supply taxes	1.00	**1.15**	1.30	0.00	**0.26**	0.46
Fuel	Electricity, gas etc (not transport fuels)	1.20	**1.30**	1.40	0.33	**0.46**	0.57
Prepared food	Foods that require preparation and/or are perishable such as flour, rice, pasta, vegetables, bread, unprocessed meat and milk	1.60	**1.75**	1.90	0.75	**0.86**	0.95
Eat out	Restaurants, take-away food	1.90	**1.95**	2.00	0.95	**0.97**	1.00
Personal food	Biscuits, fruit, processed meat, breakfast cereals, cakes, non-alcoholic drinks, dairy products (other than milk), spreads, tea, coffee, confectionary, tinned fish, etc.	1.80	**1.90**	2.00	0.89	**0.95**	1.00
Alcohol	Alcohol	1.80	**1.90**	2.00	0.89	**0.95**	1.00
Tobacco	Tobacco	2.00	**2.00**	2.00	1.00	**1.00**	1.00
Clothing	Clothing	2.00	**2.00**	2.00	1.00	**1.00**	1.00
Shared furnishings & equipment	Lounge room, kitchen and garden furniture, art, major appliances and household tools	1.10	**1.20**	1.40	0.18	**0.33**	0.57
Other furnishings	Floor coverings, curtains, other furniture	1.20	**1.30**	1.40	0.33	**0.46**	0.57
Household shared operation	Gardening services, nails, screws etc.	1.00	**1.05**	1.10	0.00	**0.10**	0.18
Communication	Telephone and post	1.20	**1.30**	1.50	0.33	**0.46**	0.67
Cleaning	Soaps and detergents (not personal), wraps, gardening products etc	1.20	**1.30**	1.50	0.33	**0.46**	0.67
Hygiene	Household paper (not stationery), toilet paper and tissues	1.80	**1.90**	2.00	0.89	**0.95**	1.00
Health insurance	Health insurance	2.00	**2.00**	2.00	1.00	**1.00**	1.00
Medical	Dental and medical fees and medications	1.90	**1.95**	2.00	0.95	**0.97**	1.00
Transport fares	Air, bus, rail fares etc (excluding holiday fares).	2.00	**2.00**	2.00	1.00	**1.00**	1.00
Vehicle fixed costs	Vehicle registration and insurance, purchase, accessories etc	1.00	**1.05**	1.10	0.00	**0.10**	0.18
Vehicle running	Vehicle operating costs such as petrol, vehicle servicing etc	1.20	**1.30**	1.40	0.33	**0.46**	0.57
Shared recreation	Shared goods such as newspapers, televisions, stereos and associated supplies; pets, general holiday expenditures	1.00	**1.20**	1.40	0.00	**0.33**	0.57
Personal recreation	Books, magazines, gambling, sports, admission charges, and holiday travel.	1.60	**1.75**	1.90	0.75	**0.86**	0.95
Personal care	Haircuts, toiletries and cosmetics etc	1.80	**1.90**	2.00	0.89	**0.95**	1.00
Gifts and shared misc	Gifts, misc property payments, personal advertising, etc	1.00	**1.10**	1.20	0.00	**0.18**	0.33
Misc not shared	Child support/alimony payments, jewellery, and accessories, education fees, professional association subscriptions, etc	1.80	**1.90**	2.00	0.89	**0.95**	1.00
Misc part shared	Miscellaneous commodities and services nec, stationary, fees and fines, non-housing interest payments, etc	1.20	**1.50**	1.80	0.33	**0.67**	0.89

Returning to Table 1, other close-to-private goods include eating out (a negligible amount of meal sharing is assumed), prepared food (a larger wastage fraction than personal food), personal hygiene goods (mainly toilet paper and tissues, assumed not shared), medical fees (less per-person wastage of non-prescribed medications in couple households), personal care (some sharing of toiletries), and miscellaneous goods that are likely to be personally consumed.

On the other hand, housing is assumed to be close to fully public. That is, the social norm of housing consumption for a single aged person is very close to that of a couple. It is assumed that housing is not perfectly public because it might be considered normal for members of a couple to have slightly more space to accommodate activities only undertaken by one member (e.g. a sewing room). The preferred estimate assumes that about one-quarter of the value of house is privately consumed and the remainder public.

Other goods which are closely linked to housing are assumed to have a similar degree of sharing (fuel, furniture, household operation, cleaning, shared recreation goods). Telephone and postal costs are assumed to be substantially shared because of overlaps between the social contacts of the couple (though 46 per cent is assumed to be private). Vehicle costs are split into fixed costs (it is assumed that a couple will not need an extra vehicle) and running costs, where it is also assumed that 46 per cent of journeys are private.

For all categories of goods, Table 1 also shows low and high plausible bounds for the relative purchase requirements of couples.

The observed budget shares in 2003-04 for singles and married couples over Age Pension age are shown in Table 2. Goods that have budget shares over 5 per cent are shown in bold to aid identification of the most important goods in the equivalence scale calculation. For the grouping shown here, the most important commodity groups are housing (maintenance and taxes), food, medical expenses, vehicle costs, and recreation. Couples tend to spend a lower proportion of their total expenditure on goods such as housing which have a high degree of joint consumption.

Note that some of the differences between singles and couples might reflect the fact that singles are generally older (which might be part of the explanation for the higher housing and medical expenditure). We explore variations with age below, but at this point note that differences in the average ages of singles and couples are not likely to have much impact on the equivalence scale, as the two alternative estimates based on the single and couple budget shares respectively, lead to very similar estimates for the relative costs of couples.

At the preferred values of the relative purchase requirements for couples, the Laspeyres scale (based on the singles budget share) yields a value of 1.48 and the Paasche scale based on the expenditure patterns of couples a scale of 1.44. A much greater variation arises from the use of the low and high assumptions for the commodity-specific scales. The Fisher scale (the average of Laspeyres and Paasche)

ranges from 1.35 to 1.58, with a preferred value of 1.46.[16] The sampling variance associated with these estimates is quite small. Using the jackknife method recommended by the ABS, we calculate standard errors of 0.011, 0.011 and 0.010 for the lower, preferred and upper Fisher estimates respectively.

The relative needs of singles can be expressed as the inverse of these numbers, shown in the bottom panel of the table. These range from 62.4 to 75.7 per cent of the needs of couples.

As noted in the introduction, the current relativity in the Australian Age Pension falls outside the range shown in Table 2, at 1.64 (including allowances). If this range of values for the commodity-specific scales were to be accepted, this implies that home-owning couples reliant solely on the Age Pension have a higher living standard than corresponding single people.

The final column of Table 2 shows a set of r values chosen to ensure that the Fisher ideal scale will be equal to the current pension relativity. These have been chosen by starting from the preferred values of r_i shown in the table, transforming these to the t_i scaling (which represents the proportion allocated to private consumption), then increasing all t_i by the same amount (on a logit scale) so as to ensure that the Fisher scale is equal to the current pension relativity.[17] Though other scalings are possible, this shows that high relative purchase requirements for couples might be needed in order to justify the current pension relativity. For example, couples might be required to spend 1.38 times that of singles to attain the same per-person standard of housing consumption. A spreadsheet accompanies this document that will permit users to specify their own relative need assumptions and calculate the resulting equivalence scales based on the 2003-04 budget shares.

Table 3 shows the results for the same calculations for the years 1988-89, 1993-94, 1998-99 and 2003-04. For convenience, just the results for the preferred scales are shown (the high and low estimates are shown in the Appendix). A striking feature of this table is that the relative needs of couples have been steadily declining over this 15-year period (the Fisher scale falls from 1.49 to 1.46).

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[16] Note that the estimates here are for the population of Age Pension age. If we restrict the analysis to the population of Age Pension age who are actually receiving some income support payment (typically Age or Veteran's Pension), then the estimates are (very) slightly larger, with the relativities ranging from 1.36 to 1.59, with a preferred value of 1.47. Corresponding inverse estimates are 0.737, 0.627 and 0.679.

[17] As noted above, $r_i = 2/(2-t_i)$ and so $t_i = 2(1 - \frac{1}{r_i})$, which is bounded between 0 and 1. Let $L_i = \ln(t_i/(1-t_i))$, $L_i^* = a + L_i$, $t_i^* = 1/(1+\exp(-L_i^*))$, $r_i^* = 2/(2-t_i^*)$ and calculate the Fisher equivalence scale based upon r_i^*. Then adjust a until the Fisher scale equals the current pension relativity of 1.64. This can be done using simple tools such as the 'goal seek' functionality of Microsoft Excel.

Table 2   2003-04 budget shares and equivalence scales based on alternative relative need assumptions

| Expenditure category	Budget share (>5% in bold)		Relative needs for couples (r)			
	Singles	Couples	Low	Preferred	High	Implied Current
Housing	**0.182**	**0.089**	1.00	1.15	1.30	1.38
Fuel	0.042	0.034	1.20	1.30	1.40	1.60
Prepared food	**0.065**	**0.077**	1.60	1.75	1.90	1.91
Eat out	0.039	0.040	1.90	1.95	2.00	1.99
Personal food	**0.078**	**0.091**	1.80	1.90	2.00	1.97
Alcohol	0.018	0.025	1.80	1.90	2.00	1.97
Tobacco	0.004	0.006	2.00	2.00	2.00	2.00
Clothing	0.027	0.031	2.00	2.00	2.00	2.00
Shared furnishings & equipment	0.041	0.035	1.10	1.20	1.40	1.46
Other furnishings	0.014	0.025	1.20	1.30	1.40	1.60
Household shared operation	0.028	0.018	1.00	1.05	1.10	1.15
Communication	0.037	0.029	1.20	1.30	1.50	1.60
Cleaning	0.012	0.013	1.20	1.30	1.50	1.60
Hygiene	0.003	0.004	1.80	1.90	2.00	1.97
Health insurance	0.026	0.034	2.00	2.00	2.00	2.00
Medical	**0.069**	0.048	1.90	1.95	2.00	1.99
Transport fares	0.006	0.002	2.00	2.00	2.00	2.00
Vehicle fixed costs	**0.060**	**0.089**	1.00	1.05	1.10	1.15
Vehicle running expenses	**0.050**	**0.060**	1.20	1.30	1.40	1.60
Shared recreation	**0.050**	**0.066**	1.00	1.20	1.40	1.46
Personal recreation	**0.059**	**0.094**	1.60	1.75	1.90	1.91
Personal care	0.021	0.022	1.80	1.90	2.00	1.97
Gifts and shared misc	0.038	0.032	1.00	1.10	1.20	1.28
Misc not shared	0.005	0.006	1.80	1.90	2.00	1.97
Misc part shared	0.025	0.030	1.20	1.50	1.80	1.78
Sample size	472	533				
Upper bound equivalence scale (Laspeyres)			1.38	1.48	1.60	1.65
Lower bound equivalence scale (Paasche)			1.32	1.44	1.57	1.63
Geometric mean (Fisher ideal)			**1.35**	**1.46**	**1.58**	**1.64**
(Jackknife standard error)			(0.011)	(0.010)	(0.010)	
Inverse (singles/couples)						
Upper bound equivalence scale (Laspeyres)			0.727	0.674	0.624	0.605
Lower bound equivalence scale (Paasche)			0.757	0.694	0.639	0.614
Geometric mean (Fisher ideal)			**0.742**	**0.683**	**0.631**	**0.610**

Source: ABS Household Expenditure Survey 2003-04, Confidentialised unit record file. Author's relative needs assumptions.

Table 3   Budget shares and implied equivalence scales based on preferred relative requirements, 1988-89 to 2003-04

Expenditure category	Pref. r	Single budget shares				Couple budget shares				Budget share trend	
		1988-89	1993-94	1998-99	2003-04	1988-89	1993-94	1998-99	2003-04	Single (% pt pa)	Cpl
Housing	1.15	**0.15**	**0.12**	**0.12**	**0.18**	**0.09**	**0.09**	**0.09**	**0.09**	0.2	0.0
Fuel	1.30	0.04	0.05	0.04	0.04	0.04	0.04	0.03	0.03	0.0	0.0
Prepared food	1.75	**0.08**	**0.07**	**0.07**	**0.07**	**0.10**	**0.08**	**0.08**	**0.08**	-0.1	-0.1
Eat out	1.95	0.02	0.02	0.03	0.04	0.02	0.03	0.04	0.04	0.1	0.1
Personal food	1.90	**0.10**	**0.10**	**0.09**	**0.08**	**0.11**	**0.10**	**0.09**	**0.09**	-0.2	-0.2
Alcohol	1.90	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.0	-0.1
Tobacco	2.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.0	0.0
Clothing	2.00	**0.06**	**0.05**	0.04	0.03	**0.05**	0.05	0.04	0.03	-0.2	-0.2
Shared furnishings & equipment	1.20	**0.05**	0.04	0.04	0.04	0.05	0.04	**0.06**	0.03	-0.1	0.0
Other furnishings	1.30	0.05	0.02	0.02	0.01	0.03	0.03	0.03	0.02	-0.2	-0.1
Household shared operation	1.05	0.02	0.02	0.03	0.03	0.01	0.02	0.02	0.02	0.1	0.0
Communication	1.30	0.04	0.04	0.04	0.04	0.03	0.03	0.02	0.03	0.0	0.0
Cleaning	1.30	0.02	0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.0	0.0
Hygiene	1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0
Health insurance	2.00	0.02	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.0	0.0
Medical	1.95	0.04	0.04	0.05	**0.07**	0.04	0.04	0.04	0.05	0.2	0.1
Transport fares	2.00	0.01	0.01	0.02	0.01	0.01	0.00	0.01	0.00	0.0	0.0
Vehicle fixed costs	1.05	0.03	**0.07**	**0.06**	**0.06**	**0.09**	**0.08**	**0.11**	**0.09**	0.2	0.1
Vehicle running expenses	1.30	0.04	**0.05**	**0.06**	**0.05**	**0.06**	**0.06**	**0.05**	**0.06**	0.0	0.0
Shared recreation	1.20	**0.05**	**0.05**	**0.05**	**0.05**	**0.06**	**0.07**	**0.06**	**0.07**	0.0	0.0
Personal recreation	1.75	**0.06**	**0.06**	**0.09**	**0.06**	**0.07**	**0.07**	**0.08**	**0.09**	0.0	0.2
Personal care	1.90	0.03	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.0	0.0
Gifts and shared misc	1.10	0.03	0.03	0.03	0.04	0.02	0.03	0.03	0.03	0.0	0.1
Misc not shared	1.90	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.0	0.0
Misc part shared	1.50	0.02	0.03	0.02	0.02	0.02	0.03	0.02	0.03	0.0	0.1
Sample size		481	576	450	472	458	554	491	533		
Upper bound scale		1.53	1.52	1.52	1.48						
Lower bound equivalence scale						1.46	1.45	1.43	1.44		
Geometric mean (Fisher ideal)						**1.49**	**1.48**	**1.47**	**1.46**		
Inverse (singles/couples)						**0.671**	**0.675**	**0.678**	**0.683**		

Source: ABS Household Expenditure Surveys, various years. Author's relative needs assumptions. Results based on the low and high relative need assumptions shown in the Appendix. Budget share trends calculated as OLS linear trends across the years 1988-89 to 2003-04.

Figure 2   Trend change in budget share 1988-89 to 2003-04 by assumed relative needs of couples
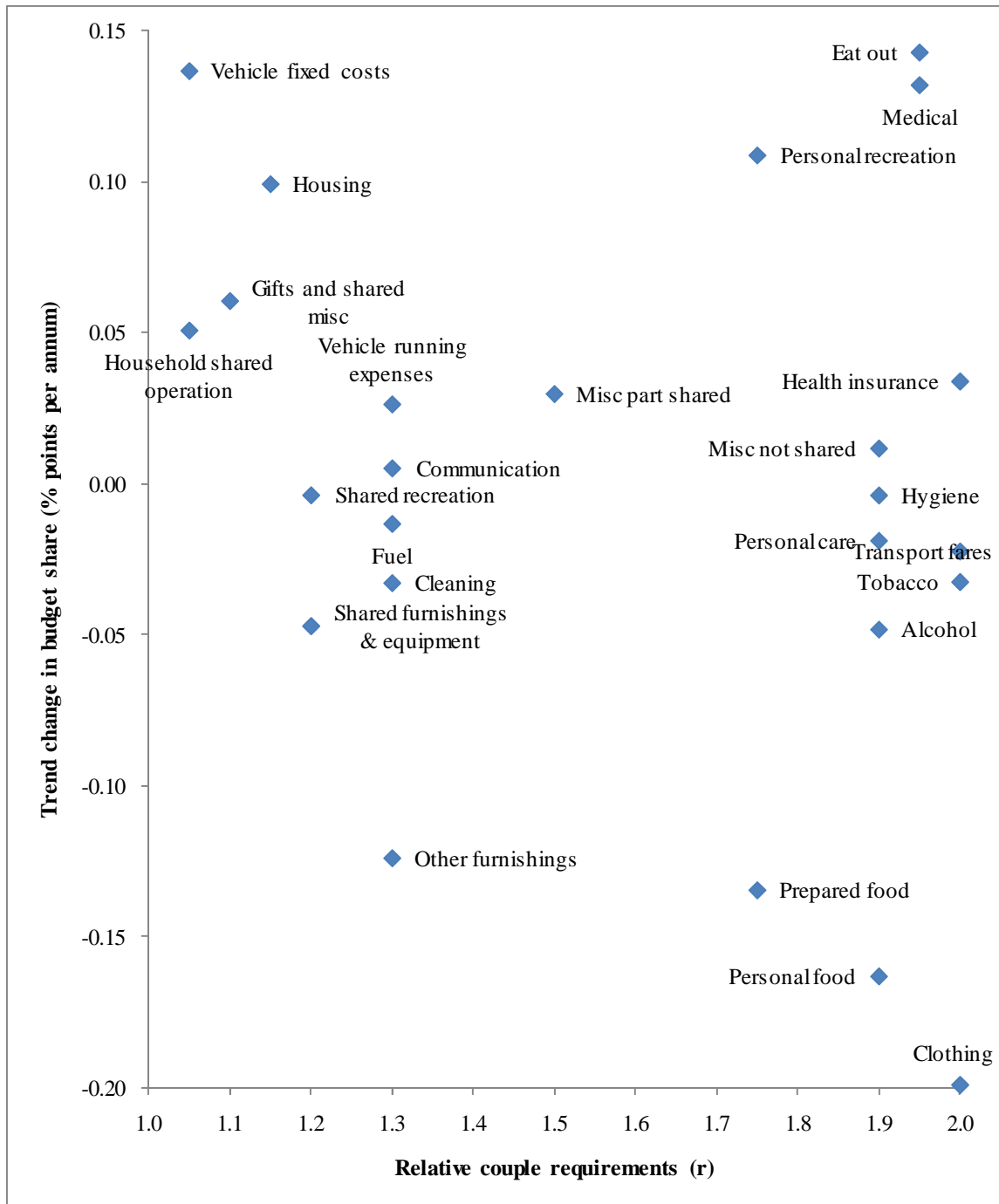
Notes: Trend change in budget share calculated is the average of the single and couple trend shown in Table 3.

This has been driven by falls in the budget shares of home-eaten food and clothing together with increases in the budget shares of vehicle fixed costs and housing. These trends have been partly offset by increases in eating out, medical, and personal

recreation. These trends in budget shares are summarised in the last two columns of Table 3 – a simple linear trend through the shares is shown. Figure 2 plots these changes in budget shares against the degree of sharing for each commodity. There are fewer goods in the bottom-left of the figure, implying a general increase in the budget share among goods that have greater economies of sharing.

The reasons for these changes in expenditure patterns might include income effects (e.g. the elderly are now richer and more likely to purchase vehicles), price effects (e.g. clothing is cheaper), and possibly taste changes. But whatever the reasons, the trend is clearly towards increases in the relative needs of singles. Alternative assumptions about the degree of commodity sharing are not likely to change this conclusion, unless they are large so large as to move more goods into the bottom-left of Figure 2.[18]

6   Extensions

6.1   Cost variations with age

The Age Pension population considered in this report covers a wide range of ages. Moreover, the single elderly are typically older than those living in couples. Does this affect the calculations of the relative needs of singles and couples?

The methods used in this report cannot address the most fundamental issue underlying this question: do the income needs of individuals change as they get older? It is plausible that this might be the case, irrespective of whether the person is living alone or in a couple. In particular, health and mobility generally decline as people get older and these might involve either additional or reduced expenditures. The latter might occur if older people are less likely to use private transport. Most fundamentally, to address these questions one must make difficult decisions about the role of expectations in defining need. For example, do people who cannot drive their own cars have a need to spend enough on taxis so that they still have the same degree of mobility? If the additional needs of growing older were conceptualised in this way, then they would be very expensive indeed. On the other hand, if people don't see this type of expenditure as a social norm, then needs might decline with age. These issues are discussed further in Bradbury (2008).

This report, however, only addresses changes in needs that arise from the ability to share consumption with other members of the same household. It addresses the question of how much income would the members of a couple need if they were living separately (but still keeping the same characteristics – including their age). Even here, however, changes in consumption patterns with age might influence relative needs. If, for example, older people were more likely to consume personal goods such as health care, then the relative needs of couples would be greater.

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[18] See Blundell and Lewbel (1991) and Banks and Johnson (1994) for more discussion of the implications of price changes for changes in consumer equivalence scales.

The changes in consumption patterns with age are shown in Table 4. Here we show the budget shares for young and old retired households as well as the overall results for the Age Pension-age population from Table 2. Young households are defined here as single or couple households where the male (if present) is aged 65-69 and the female (if present) is aged 62-69. In old households the members are aged 75 or higher.

There are some noticeable differences in the consumption patterns of the younger and older households. Older single-person households tend to spend a larger fraction of their total expenditure on housing and medical care, and smaller fraction on vehicle fixed costs (e.g. purchases), personal recreation (e.g. travel) and eating out. The patterns for couples are broadly similar, though here there is generally less difference between the younger and older age groups than in the case of singles (except for personal recreation, where much less is spent by older couples than by younger couples).

However, there is no clear tendency for older households to shift their consumption towards goods that are either relatively public or private. For example, the increase in housing expenditure tends to be offset by the decrease in vehicle fixed costs, and the increase in medical care expenditure is offset by the decrease in personal recreation expenditure.

The implication of this is that there are negligible age differences in the calculated equivalence scales. The results in Table 5 show that, for the most part, the equivalence scales are identical to the second significant digit. Any differences that do exist are very small compared to the standard errors of the estimates.

Table 4   Budget shares by age and household composition, 2003-04

	Singles				Couples			
				Old-				Old-
Expenditure category	All	Young*	Old**	young	All	Young*	Old**	young
Housing	0.182	0.142	0.197	0.06	0.089	0.067	0.111	0.04
Fuel	0.042	0.038	0.044	0.01	0.034	0.029	0.039	0.01
Prepared food	0.065	0.068	0.062	-0.01	0.077	0.072	0.080	0.01
Eat out	0.039	0.054	0.036	-0.02	0.040	0.041	0.037	0.00
Personal food	0.078	0.075	0.084	0.01	0.091	0.082	0.103	0.02
Alcohol	0.018	0.026	0.013	-0.01	0.025	0.023	0.025	0.00
Tobacco	0.004	0.007	0.003	0.00	0.006	0.006	0.004	0.00
Clothing	0.027	0.027	0.023	0.00	0.031	0.030	0.027	0.00
Shared furn. & equip.	0.041	0.052	0.040	-0.01	0.035	0.043	0.025	-0.02
Other furnishings	0.014	0.015	0.013	0.00	0.025	0.033	0.024	-0.01
Household shared op.	0.028	0.016	0.040	0.02	0.018	0.020	0.020	0.00
Communication	0.037	0.039	0.036	0.00	0.029	0.028	0.029	0.00
Cleaning	0.012	0.014	0.010	0.00	0.013	0.014	0.014	0.00
Hygiene	0.003	0.003	0.003	0.00	0.004	0.004	0.004	0.00
Health insurance	0.026	0.027	0.027	0.00	0.034	0.030	0.039	0.01
Medical	0.069	0.044	0.102	0.06	0.048	0.051	0.059	0.01
Transport fares	0.006	0.004	0.007	0.00	0.002	0.002	0.002	0.00
Vehicle fixed costs	0.060	0.071	0.041	-0.03	0.089	0.099	0.073	-0.03
Vehicle running exp.	0.050	0.055	0.041	-0.01	0.060	0.058	0.060	0.00
Shared recreation	0.050	0.062	0.049	-0.01	0.066	0.064	0.072	0.01
Personal recreation	0.059	0.083	0.041	-0.04	0.094	0.132	0.065	-0.07
Personal care	0.021	0.017	0.022	0.00	0.022	0.018	0.020	0.00
Gifts and shared misc	0.038	0.036	0.033	0.00	0.032	0.021	0.022	0.00
Misc not shared	0.005	0.005	0.005	0.00	0.006	0.003	0.012	0.01
Misc part shared	0.025	0.021	0.027	0.01	0.030	0.031	0.033	0.00
Sample size	472	141	230		533	137	139	

* Men between 65 and 69 and Women between 62 and 69

**Men and women older than 75

Source: ABS Household Expenditure Survey 2003-04, Confidentialised unit record file.

Table 5   Equivalence scales by age

	All	Young*	Old**
Preferred relative need assumptions			
Upper bound equivalence scale (Laspeyres)	1.48	1.49	1.49
	(0.018)	(0.013)	(0.035)
Lower bound equivalence scale (Paasche)	1.44	1.45	1.45
	(0.009)	(0.016)	(0.017)
Geometric mean (Fisher ideal)	1.46	1.47	1.47
	(0.011)	(0.010)	(0.021)
Low relative need assumptions			
Upper bound equivalence scale (Laspeyres)	1.38	1.38	1.39
	(0.020)	(0.013)	(0.039)
Lower bound equivalence scale (Paasche)	1.32	1.33	1.32
	(0.008)	(0.014)	(0.016)
Geometric mean (Fisher ideal)	1.35	1.35	1.35
	(0.011)	(0.009)	(0.022)
High relative need assumptions			
Upper bound equivalence scale (Laspeyres)	1.60	1.61	1.61
	(0.016)	(0.014)	(0.030)
Lower bound equivalence scale (Paasche)	1.57	1.57	1.57
	(0.010)	(0.018)	(0.017)
Geometric mean (Fisher ideal)	1.58	1.59	1.59
	(0.010)	(0.011)	(0.019)

Jackknife standard errors in brackets

* Men between 65 and 69 and Women between 62 and 69

**Men and women older than 75

6.2   Equivalence scales for private renters

The above calculations are based on the consumption patterns of home owners (including people with mortgages). Though this is by far the most common housing situation of the elderly in Australia, there are still substantial numbers of elderly who do not own their own homes. The 2003-04 HES, for example, reports that, of those people of age-pension age living in private households, 86 per cent owned their own home, 5 per cent were paying rent to a government landlord, 7 per cent to other landlords, and 2 per cent were living in other tenure arrangements (including rent-free).[19]

The Age Pension recognises the additional costs of renters by providing Rent Assistance to pension recipients renting in the private market.[20] The higher amount for singles reflects the strong economies of sharing associated with accommodation costs. For single and couple renters receiving the maximum rate of payment, the payment ratio for all payments combined is thus 1.53 (compared to 1.64 for non-renters).

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[19]   Source: CURF file. These estimates are for all people of Age Pension age (not just those in one and two-person households).

[20]   See footnote **Error! Bookmark not defined.** for payment rates.

Table 6   Estimates for private renters

| Expenditure category | Budget share (>5% in bold) | | Relative needs for couples (r) | | | |
	Singles	Couples	Low	Preferred	High	Implied Current
Housing	**0.383**	**0.268**	1.00	1.15	1.30	1.29
Fuel	0.034	0.030	1.20	1.30	1.40	1.50
Prepared food	**0.057**	**0.087**	1.60	1.75	1.90	1.88
Eat out	0.023	0.028	1.90	1.95	2.00	1.98
Personal food	**0.077**	**0.085**	1.80	1.90	2.00	1.96
Alcohol	0.016	0.018	1.80	1.90	2.00	1.96
Tobacco	0.012	0.005	2.00	2.00	2.00	2.00
Clothing	0.031	0.027	2.00	2.00	2.00	2.00
Shared furnishings & equipment	0.034	0.026	1.10	1.20	1.40	1.37
Other furnishings	0.014	0.021	1.20	1.30	1.40	1.50
Household shared operation	0.021	0.017	1.00	1.05	1.10	1.11
Communication	0.035	0.047	1.20	1.30	1.50	1.50
Cleaning	0.010	0.018	1.20	1.30	1.50	1.50
Hygiene	0.004	0.006	1.80	1.90	2.00	1.96
Health insurance	0.012	0.026	2.00	2.00	2.00	2.00
Medical	0.033	0.032	1.90	1.95	2.00	1.98
Transport fares	0.006	0.007	2.00	2.00	2.00	2.00
Vehicle fixed costs	0.046	0.043	1.00	1.05	1.10	1.11
Vehicle running expenses	0.020	0.038	1.20	1.30	1.40	1.50
Shared recreation	0.045	**0.059**	1.00	1.20	1.40	1.37
Personal recreation	0.034	**0.057**	1.60	1.75	1.90	1.88
Personal care	0.016	0.027	1.80	1.90	2.00	1.96
Gifts and shared misc	0.011	0.013	1.00	1.10	1.20	1.21
Misc not shared	0.002	0.001	1.80	1.90	2.00	1.96
Misc part shared	0.028	0.012	1.20	1.50	1.80	1.70
Sample size	63	19				
Upper bound equivalence scale (Laspeyres)			1.29	1.41	1.54	1.53
Lower bound equivalence scale (Paasche)			1.26	1.39	1.53	1.53
Geometric mean (Fisher ideal)			**1.27**	**1.40**	**1.53**	**1.53**
(Jackknife standard error)			(0.011)	(0.011)	(0.010)	
Inverse (singles/couples)						
Upper bound equivalence scale (Laspeyres)			0.776	0.709	0.650	0.653
Lower bound equivalence scale (Paasche)			0.794	0.718	0.654	0.654

Source: ABS Household Expenditure Survey 2003-04, Confidentialised unit record file.

Table 6 shows the same results as for Table 2, except here the budget shares are estimated for the population who were renting from a non-government landlord. Compared to Table 2, the main difference in consumption patterns is the much higher share of the budget devoted to housing costs. For home owners, housing costs make up 9 and 18 per cent of the budget for couples and singles respectively, whereas for renters, housing costs amount to 27 and 38 per cent on average.

Since housing is very much shared, we would expect this difference in expenditure patterns to be associated with a lower estimate of couple relative needs, and this is

indeed the case. For renters, the preferred Fisher scale is 1.40 compared to 1.46 for owners.[21] The former number is lower than the actual payment relativity for singles and couples receiving maximum rent assistance, but note that the estimate based upon high relative needs is 1.53, which is the same as the actual relativity (for maximum rent assistance recipients). In other words, the current relativity between single and couple renters could be justified if we were to adopt the high relative-need assumptions.

6.3 Other household structures

The estimates above are based on one- and two-person households. What impact does living in a larger household have on relative needs? Table 7 provides some information on the living arrangements of people of age-pension age in 2003-04. Note that, as with all the data in this report, this describes the situation of people living in private households. People living in non-private dwellings, such as nursing homes, are not included.

Table 7   Household size of people over age-pension age

Household size	Single %	Partnered %
1	78.1	-
2	13.3	84.6
3	6.0	12.3
4+	2.7	3.1
Total (%)	100.0	100.0
Total ('000)	977.3	1,697.4

Source: ABS Household Expenditure Survey 2003-04 Confidentialised Unit Record File.

Among non-partnered people over age-pension age, about 22 per cent live with other people – 13 per cent with just one other person and 9 per cent with two or more. These households include older singles living with one of their adult children (and possibly their family), older singles living with one of their own parents, as well as people sharing with their siblings and unrelated individuals.

Among partnered people over age-pension age, 12 per cent live with one other person in addition to their partner, and another 3 per cent with two or more other people. These other household members could include children[22] still living with their parents, or a parent of the couple.

The larger households shown in Table 7 encompass a wide range of living arrangements. Nonetheless, we can summarise the economic implications of these larger households with two main questions: 'what are the implications of a larger household for the total consumption needs of the household?', and 'what are the

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[21]   The jackknife standard errors are the same as those for the home-owner sample (to 3 decimal places), but these cannot be considered reliable given the small sample size.

[22]   This could include non-adult children if the older person has a younger partner.

implications for the within-household income distribution?' The former is particularly relevant to the question of base pension levels, and the latter for pension income-testing.

The focus of this report is on the first of these, but the latter is also important. Consider the situation of a single older person with few economic resources who is living with their employed married adult child. It is unlikely that the higher income of the children would not be used to contribute to the living standard of the older person in this situation. At the very least, they all share in the consumption of the common areas of the dwelling. A targeting policy based solely upon consumption levels might thus seek to reduce benefits to older people who are able to live with their children. However, this would effectively impose a financial burden on those children who live with their parents, which would discourage care relationships and is unlikely to be considered equitable given current Australian social norms.

Nonetheless, even if people sharing with others cannot draw upon the income resources of other household members, they do share in the economies of scale of joint consumption of goods. What are the implications of this for relative needs?

Here, we use the approach outlined above to describe the most straightforward situation of this type, two non-partnered people of age-pension age sharing a household. What does the model described above tell us about their relative consumption needs?

Because there are so few of these households in the expenditure survey, estimating their expenditure patterns cannot be done in a robust fashion. Nonetheless, we can still work from the expenditure patterns of single-person households to obtain some indicative estimates of the costs in these types of households. Some estimates are shown in Table 8. The first two data columns in this table are from Table 2, showing the budget shares for singles and the preferred relative needs for couples. The next three columns show some assumed relative needs for pairs of singles (compared to single people). Where these are in bold, they are different to the assumed relative needs for couples. To aid in interpreting these, the right-hand panel repeats this information, but here showing the value of t_i, the share of the good that is private.

Table 8   Indicative estimates of relative needs of two singles, 2003-04

Expenditure category	Budget share: Singles	Base (pref in Table 2)	Relative needs for pairs of singles (r) Low	Preferred	High	Corresponding share of good which is private (t = 2(1-1/r)) Base	Low	Preferred	High
			(Note: bold denotes different from base case for couples)						
Housing	0.182	1.15	**1.15**	**1.33**	**1.66**	0.26	**0.26**	**0.50**	**0.80**
Fuel	0.042	1.30	**1.25**	**1.35**	**1.45**	0.46	**0.40**	**0.52**	**0.62**
Prepared food	0.065	1.75	1.60	1.75	1.90	0.86	0.75	0.86	0.95
Eat out	0.039	1.95	1.90	1.95	2.00	0.97	0.95	0.97	1.00
Personal food	0.078	1.90	1.80	1.90	2.00	0.95	0.89	0.95	1.00
Alcohol	0.018	1.90	1.80	1.90	2.00	0.95	0.89	0.95	1.00
Tobacco	0.004	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00
Clothing	0.027	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00
Shared furnishings & equipment	0.041	1.20	1.20	1.30	1.50	0.33	0.33	0.46	0.67
Other furnishings	0.014	1.30	**1.30**	**1.40**	**1.50**	0.46	**0.46**	**0.57**	**0.67**
Household shared operation	0.028	1.05	1.00	1.05	1.10	0.10	0.00	0.10	0.18
Communication	0.037	1.30	**1.80**	**1.90**	**2.00**	0.46	**0.89**	**0.95**	**1.00**
Cleaning	0.012	1.30	1.20	1.30	1.50	0.46	0.33	0.46	0.67
Hygiene	0.003	1.90	1.80	1.90	2.00	0.95	0.89	0.95	1.00
Health insurance	0.026	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00
Medical	0.069	1.95	1.90	1.95	2.00	0.97	0.95	0.97	1.00
Transport fares	0.006	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00
Vehicle fixed costs	0.060	1.05	**1.50**	**1.70**	**2.00**	0.10	**0.67**	**0.82**	**1.00**
Vehicle running expenses	0.050	1.30	**1.50**	**1.70**	**2.00**	0.46	**0.67**	**0.82**	**1.00**
Shared recreation	0.050	1.20	**1.20**	**1.40**	**1.70**	0.33	**0.33**	**0.57**	**0.82**
Personal recreation	0.059	1.75	1.60	1.75	1.90	0.86	0.75	0.86	0.95
Personal care	0.021	1.90	1.80	1.90	2.00	0.95	0.89	0.95	1.00
Gifts and shared misc	0.038	1.10	1.00	1.10	1.20	0.18	0.00	0.18	0.33
Misc not shared	0.005	1.90	1.80	1.90	2.00	0.95	0.89	0.95	1.00
Misc part shared	0.025	1.50	1.20	1.50	1.80	0.67	0.33	0.67	0.89
Sample size	472								
Laspeyres equivalence scale			1.49	1.62	1.79				
Laspeyres equivalence scale for couples (Table 2)			1.38	1.48	1.60				
Ratio			1.08	1.09	1.12				

Our knowledge about the sharing patterns of pairs of singles is rudimentary, and so these estimates can only be considered as broadly indicative. Nonetheless, it is clear that pairs of single people will have fewer opportunities for sharing than couples, e.g. they will be unlikely to share a bedroom. They may also undertake fewer activities together, although this will depend upon the nature of their relationship – members of the same family may well shop and travel together.

Using the *t* parameterisation, the share of housing consumption which is assumed private is increased from 26 per cent in the base case for couples, to a preferred value of 50 per cent. A smaller increase is made for fuel (to account for the additional bedroom, but no change in water heating, etc.) and in other furnishings. Communication is assumed to be close to private (i.e. assuming different friendship

networks), as are vehicle costs. Shared recreation is assumed to be less shared, reflecting greater diversity of tastes.

Without information on the consumption patterns of the pair households, we cannot estimate the Paasche equivalence scale, but we are able to estimate the Laspeyres scale using the budget shares of single-person households. Changing the sharing assumptions as described in this table increases relative costs by about 10 per cent. That is, using the preferred assumptions, we estimate that couples need 1.48 times the income of singles, whereas pairs would need about 1.62 times the single income.

Note that two single people receiving the Age Pension would receive twice as much as a single person – and so by this reckoning would have a higher standard of living than if they were living alone. However, this is clearly not the only consideration that should be taken into account when considering pension policy. People sharing sacrifice privacy and autonomy, and this might be much more important than economic considerations. Indeed, the fact that most aged singles do not share suggests that this is usually the case.

In principle, questions of preferences for household composition are also relevant to the question of singles vs couples. But here household composition is usually not a matter of choice. The most common reason for people to become single is when one member of a couple dies. Moreover, living as a single person or as a member of a couple are both situations that are widely accepted as normal – and so there is greater support for the idea that economic and social considerations of household arrangements can be separated.

6.4   Other populations

The approach used here can be extended to other populations of singles and couples on the basis of either of data or of assumptions relevant to those populations. The equivalence scales calculated here are weighted averages of the assumed relative couple requirements for each commodity, where the weights are the budget shares for singles and couples. If there is evidence of how either the relative purchase requirements or the budget shares differ from those used above, then this can be used to calculate alternative relativities. Even in the absence of such information, it might be possible to make approximate estimates of the impact based upon plausible assumptions.

For example, policy changes such as the introduction of a carbon-credit trading scheme will change prices and hence household expenditure patterns. If predictions of these changes can be made, then the impact on the relative needs of different households can be calculated. If household energy prices increase, it is likely that the share of the household budget allocated to these goods will also increase (the absolute price elasticity, at least in the short run, will be less than one). Some such energy costs, particularly heating and cooling, are close to per-household in their consumption patterns. This implies that single people will be relatively worse off.

The calculation of the impact of energy policies on household budget shares is beyond the scope of this paper. However, an illustrative calculation can be made to show the likely magnitude of these impacts. The December 2008 White Paper on a carbon

pollution reduction scheme forecasts an increase in household electricity prices of 18 per cent and gas prices of 12 per cent.[23]

If we start from the results shown in Table 2 and assume that the budget share of household energy consumption increases by 18 per cent[24] (with other budget shares decreasing proportionately), then the relative needs of couples (preferred *r*, Fisher scale) decreases from 1.463 to 1.462, a negligible change. The impact is so small because energy is such a small share of the budget (only 3 to 4 per cent). Of course, this also does not take account of other expenditure changes that might be associated with a carbon-trading scheme.

Another extension might be to other population groups where patterns of household consumption are likely to be very different from those of the average elderly person. For example, people living in remote areas might spend much less on housing and more on transport. The budget shares could be adjusted in the same way to take account of this. However, in doing so, one should also consider the values of the sharing parameters. Above, for example, it was assumed that much private transport was shared (both members of the couple travel to the same destination). This might not be the case for people living remotely, where much travel might be for business purposes (even for those over retirement age).

More difficult would be adaption to the situation where household members have very different consumption patterns. For example, if one member is disabled and largely house-bound. One could estimate the effect of this on relative needs by reducing the sharing economies (increasing *r*) for goods that are normally shared but might not be shared in this household (eg private transport). Whether this would be sufficient to capture all the effects of different consumption patterns remains a matter of conjecture.

7   Conclusion

This report has assigned plausible values for relative purchase requirements to a detailed list of commodity groups. The assumptions on which these values are based imply that, in order for aged singles and couples to attain the same living standard, the couple pension should be between 1.32 and 1.60 times the single pension, with a preferred value of 1.46. All these values are lower than the current age-pension relativity of 1.64.

This relativity has also been falling over time, driven by increases in expenditure on shared goods such as vehicles, and decreases in non-shared goods such as clothing.

These conclusions apply to age-pension age people who own their own homes (including those with mortgages). Among private renters, the required relativities are

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[23] *Carbon Pollution Reduction Scheme: Australia's Low Pollution Future*, White Paper, December 2008, Australian Government.

[24] This is a short-run assumption, as it assumes that energy consumption is not reduced in response to the price change.

lower because housing comprises a larger share of the household budget. For this group the couple relativity ranges from 1.26 to 1.54 times the single rate, with a preferred value of 1.40. The current relativity of 1.53 for maximum rent assistance recipients falls at the edge of this range.

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9 Appendix: Additional tables

Table 9   1988-89 budget shares and equivalence scales based on alternative relative need assumptions

Expenditure category	Budget share (>5% in bold)		Relative needs for couples (r)		
	Singles	Couples	Low	Preferred	High
Housing	**0.148**	**0.087**	1.00	1.15	1.30
Fuel	0.041	0.037	1.20	1.30	1.40
Prepared food	**0.084**	**0.100**	1.60	1.75	1.90
Eat out	0.017	0.021	1.90	1.95	2.00
Personal food	**0.102**	**0.113**	1.80	1.90	2.00
Alcohol	0.021	0.034	1.80	1.90	2.00
Tobacco	0.008	0.010	2.00	2.00	2.00
Clothing	**0.062**	**0.054**	2.00	2.00	2.00
Shared furnishings & equipment	**0.050**	0.046	1.10	1.20	1.40
Other furnishings	0.046	0.034	1.20	1.30	1.40
Household shared operation	0.020	0.011	1.00	1.05	1.10
Communication	0.036	0.027	1.20	1.30	1.50
Cleaning	0.018	0.017	1.20	1.30	1.50
Hygiene	0.004	0.004	1.80	1.90	2.00
Health insurance	0.022	0.027	2.00	2.00	2.00
Medical	0.043	0.036	1.90	1.95	2.00
Transport fares	0.010	0.007	2.00	2.00	2.00
Vehicle fixed costs	0.026	**0.086**	1.00	1.05	1.10
Vehicle running expenses	0.045	**0.056**	1.20	1.30	1.40
Shared recreation	**0.051**	**0.061**	1.00	1.20	1.40
Personal recreation	**0.065**	**0.066**	1.60	1.75	1.90
Personal care	0.027	0.022	1.80	1.90	2.00
Gifts and shared misc	0.028	0.020	1.00	1.10	1.20
Misc not shared	0.004	0.004	1.80	1.90	2.00
Misc part shared	0.023	0.018	1.20	1.50	1.80
Sample size	481	458			
Upper bound equivalence scale (Laspeyres)			1.42	1.53	1.65
Lower bound equivalence scale (Paasche)			1.34	1.46	1.58
Geometric mean (Fisher ideal)			**1.38**	**1.49**	**1.61**
Inverse (singles/couples)			**0.73**	**0.67**	**0.62**

Source: ABS Household Expenditure Survey 1988-89, Confidentialised unit record file. Author's relative needs assumptions.

Table 10   1993-94 budget shares and equivalence scales based on alternative relative need assumptions

Expenditure category	Budget share (>5% in bold)		Relative needs for couples (r)		
	Singles	Couples	Low	Preferred	High
Housing	**0.122**	**0.095**	1.00	1.15	1.30
Fuel	0.046	0.035	1.20	1.30	1.40
Prepared food	**0.074**	**0.080**	1.60	1.75	1.90
Eat out	0.024	0.025	1.90	1.95	2.00
Personal food	**0.102**	**0.103**	1.80	1.90	2.00
Alcohol	0.021	0.034	1.80	1.90	2.00
Tobacco	0.012	0.011	2.00	2.00	2.00
Clothing	**0.053**	0.050	2.00	2.00	2.00
Shared furnishings & equipment	0.039	0.041	1.10	1.20	1.40
Other furnishings	0.022	0.030	1.20	1.30	1.40
Household shared operation	0.021	0.017	1.00	1.05	1.10
Communication	0.039	0.026	1.20	1.30	1.50
Cleaning	0.016	0.018	1.20	1.30	1.50
Hygiene	0.004	0.004	1.80	1.90	2.00
Health insurance	0.028	0.035	2.00	2.00	2.00
Medical	0.037	0.037	1.90	1.95	2.00
Transport fares	0.012	0.004	2.00	2.00	2.00
Vehicle fixed costs	**0.070**	**0.075**	1.00	1.05	1.10
Vehicle running expenses	**0.055**	**0.060**	1.20	1.30	1.40
Shared recreation	**0.053**	**0.071**	1.00	1.20	1.40
Personal recreation	**0.064**	**0.067**	1.60	1.75	1.90
Personal care	0.024	0.022	1.80	1.90	2.00
Gifts and shared misc	0.034	0.026	1.00	1.10	1.20
Misc not shared	0.003	0.004	1.80	1.90	2.00
Misc part shared	0.025	0.029	1.20	1.50	1.80
Sample size	576	554			
Upper bound equivalence scale (Laspeyres)			1.41	1.52	1.63
Lower bound equivalence scale (Paasche)			1.33	1.45	1.57
Geometric mean (Fisher ideal)			**1.37**	**1.48**	**1.60**
Inverse (singles/couples)			**0.73**	**0.68**	**0.62**

Source: ABS Household Expenditure Survey 1993-94, Confidentialised unit record file. Author's relative needs assumptions.

Table 11   1998-99 budget shares and equivalence scales based on alternative relative need assumptions

Expenditure category	Budget share (>5% in bold)		Relative needs for couples (r)		
	Singles	Couples	Low	Preferred	High
Housing	**0.118**	**0.091**	1.00	1.15	1.30
Fuel	0.043	0.031	1.20	1.30	1.40
Prepared food	**0.071**	**0.076**	1.60	1.75	1.90
Eat out	0.030	0.037	1.90	1.95	2.00
Personal food	**0.089**	**0.089**	1.80	1.90	2.00
Alcohol	0.016	0.027	1.80	1.90	2.00
Tobacco	0.006	0.008	2.00	2.00	2.00
Clothing	0.038	0.039	2.00	2.00	2.00
Shared furnishings & equipment	0.036	**0.057**	1.10	1.20	1.40
Other furnishings	0.022	0.028	1.20	1.30	1.40
Household shared operation	0.030	0.016	1.00	1.05	1.10
Communication	0.038	0.025	1.20	1.30	1.50
Cleaning	0.015	0.014	1.20	1.30	1.50
Hygiene	0.004	0.004	1.80	1.90	2.00
Health insurance	0.031	0.033	2.00	2.00	2.00
Medical	0.048	0.042	1.90	1.95	2.00
Transport fares	0.016	0.006	2.00	2.00	2.00
Vehicle fixed costs	**0.062**	**0.111**	1.00	1.05	1.10
Vehicle running expenses	**0.061**	**0.053**	1.20	1.30	1.40
Shared recreation	**0.054**	**0.056**	1.00	1.20	1.40
Personal recreation	**0.090**	**0.085**	1.60	1.75	1.90
Personal care	0.025	0.021	1.80	1.90	2.00
Gifts and shared misc	0.027	0.027	1.00	1.10	1.20
Misc not shared	0.005	0.003	1.80	1.90	2.00
Misc part shared	0.024	0.021	1.20	1.50	1.80
Sample size	450	491			
Upper bound equivalence scale (Laspeyres)			1.41	1.52	1.64
Lower bound equivalence scale (Paasche)			1.31	1.43	1.55
Geometric mean (Fisher ideal)			**1.36**	**1.47**	**1.59**
Inverse (singles/couples)			**0.73**	**0.68**	**0.63**

Source: ABS Household Expenditure Survey 1998-99, Confidentialised unit record file. Author's relative needs assumptions.