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# Estimating Child Costs

A critical review  
of the underlying concepts and  
methods of estimation

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# Table of Contents

1	<u>Introduction</u>	1
	Objectives	
	Major themes	
	The structure of this report	
2	<u>Setting the Scene: a preliminary discussion and survey of issues</u>	4
	The distribution of welfare relevant resources within the family	
	Costs (and benefits) to whom?	
	The cost of children and low fertility rates	
	The importance of credible estimates and of an explicit conceptual framework	
	Why is it so difficult to produce estimates of child costs?	
	Methods of presentation of direct child costs	
	Wide range of estimates produced	
3	<u>Synopsis</u>	18
	Introduction	
	A first attempt at producing estimates - a direct approach	
	Finding an acceptable indirect method	
	Identifying equivalent welfare	
	Selected complications in more detail	
4	<u>Concepts of 'the costs of children'</u>	35
	Multi-dimensional aspect	
	Key assumptions	
	Comments on selected assumptions	
	Concepts of direct child costs	
	Criteria for assessing the various methods	
5	<u>The Needs Question</u>	48
	Analysis of selected studies	
	Summary of results	
	Evaluation and commentary	
6	<u>The Expenditure Question</u>	66
	Introduction	
	Analysis and evaluation of selected studies	

7	<u>Equivalence Scales and the Cost of Children - an Introduction</u>	74
	Introduction	
	An anatomy of equivalence scales	
	Moving from equivalence scales to weekly dollar values	
	Formal analytic framework	
	A best method?	
	Between a rock and a hard place	
8	<u>The Iso-welfare Question I</u>	97
	Engel method - selected studies and evaluation	
	Extended Engel (or 'Canadian') method - selected studies and evaluation	
	Rothbarth (adult goods) method- selected studies and evaluation	
9	<u>The Iso-welfare Question II</u>	113
	Introduction to full utility function Iso-welfare methods	
	Formal analytic framework	
	Critique	
	From household budget data sets to cost function - the identification problem	
	Concept of welfare	
	Other issues	
	Summing up	
	Some results	
10	<u>The Iso-welfare Question III</u>	145
	Introduction	
	Subjective method	
	Relative deprivation method	
	Budget method	
	Modular or arbitrary scales	
	Life-cycle methods	
	Political scales	
	Do scales vary with the income of the reference household?	
11	<u>Indirect Costs</u> (including special treatment of sole parent families)	174
	Introduction	
	Analysis and evaluation of selected studies	
	Summary	
	The special costs of sole parenthood?	
	Recent estimates of the costs of children in sole parent households	

12	<u>New Zealand Studies</u>	188
	Jensen (1978, 1988, 1989)	
	Smith (1989)	
	Easton (1973,1980, 1995)	
	Royal Commission on Social Policy (1988)	
	Fergusson <i>et al</i> (1990)	
	Rutherford <i>et al</i> (1990)	
	Robertson (1994)	
	The New Zealand works and this study's conceptual framework for direct child costs	
13	<u>Summary and conclusions</u>	202
	Concepts underlying the notion of 'the costs of children'	
	Critical account of the estimation strategies	
	An indication of direct costs	
	An indication of indirect costs	
	<u>Appendices</u>	220
	A Converting to 1992 New Zealand Dollars	
	B All scales used in main text	
	C Atkinson <i>et al</i> (1995) - summary of scales and their elasticities	
	<u>Bibliography</u>	233

# 1 Introduction

The objectives of this research were:

- to identify and examine the concepts underlying the notion of 'the costs of children' in both the New Zealand and the international literatures on the subject; and
- to provide a critical account of how these costs have been estimated and an indication of the sorts of values that have been produced as a result.

This study represents the 'document research' component of a larger research project which aims to produce some credible New Zealand based estimates of child costs and to provide a critical account of the rationales for State financial support for children in New Zealand in recent years. While it gives some estimates of New Zealand child costs (mainly on the basis of studies done in other countries) and is cognizant of policy implications, it is primarily a preparatory conceptual paper that supports the rest of the project. A comprehensive bibliography forms part of the report.

In a recent brief review of the literature, the Office of the Commissioner for Children noted that '[t]he New Zealand research on the cost of children is sparse' (Robertson, 1994: 20). This report is a first step towards meeting the need and is designed to give the inquisitive non-expert mediated access to the vast, complex and often rather abstract literature (including the more technical papers) and to be a practical and updatable guide on the subject. It stops short of major technical discussion and exposition, but for those with more advanced mathematical and statistical skills and for those who may be working in a team with such colleagues, the study provides a solid conceptual framework and a full critical discussion of the issues raised in seeking to produce credible estimates of the cost of children.

## Major themes

Four major themes are developed in the paper. *First*, there is explicit recognition that the question of child costs has to be set in the context of families and the society in which they are themselves embedded. It is families, or more precisely parents, who in the main have access to the financial and other resources which are then allocated among family members. In modern industrial democracies children are relatively powerless to change their lot of extended economic dependence on their parents as the processes of state-regulated advanced capitalism exclude adolescents from regular full-time paid employment. The other side of the issue is that parents are expected to provide for their dependent children who in turn cannot contribute significantly to the family's material well-being. This provision by parents is analysed in terms of both the direct costs (food, clothing, shelter, and so on) and the indirect costs (arising primarily from child care provided by a parent or purchased to facilitate parental employment).

The evidence from the literature is that both components, and especially the latter, require a considerable outlay.

The standard economic models are applied to the relationship of children to their parents and to society as a whole. They are viewed as social investment goods, as public goods with both positive and negative externalities and as consumer durables providing a welfare (or utility) flow to their parents. There is also the recognition that 'children tumble out of every category economists try to put them in ... [as they] ... are also people, with certain rights to life, liberty, and the pursuit of happiness' (Folbre, 1994b: 86). The importance of conceptualising child costs from the point of view of the well-being of the children themselves is acknowledged.

*Second*, it is shown how the apparently simple task of estimating the direct costs of children is complicated by several often interdependent factors such as the sharing of some goods within the family, living within a budget constraint, the possible spreading of the costs over the life-cycle and changing adult preferences due to the presence of the children. If there are significant wider family contributions directed to the children or changing government policies regarding direct private contributions to the cost of, say, education and health care, then the challenges multiply.

*Third*, this study questions two aspects of the received wisdom that is transmitted in some of the literature: (1) the claim or assumption that those methods that are based primarily on expenditure survey data are *ipso facto* superior to those that rely primarily on expert opinion or the views of ordinary citizens, and (2) the claim that the more mathematically sophisticated utility function methods based on the consumer demand theory of microeconomics are superior to other approaches, whether based on expenditure survey data or not. A key contributing factor to the positive assessment of the economics based methodology is the oft repeated claim that the scope for arbitrary decision and value judgements seems quite limited in contrast to the situation for the other methods. This paper does not share that optimism and seeks to show how there are significant judgements involved in the assumptions of the theoretical framework of these so-called more 'objective' approaches, assumptions which often end up hidden deep within the mathematics. On top of this there is the fact that the household expenditure survey data that the method uses reports on market transactions only. This is in itself an arbitrary decision with significant implications for estimates of the cost of children.

*Fourth*, because the literature on the costs of children has a large overlap with that on the generation of sets of equivalence scales, considerable space is devoted to a critique of the issues surrounding their development. In particular it is emphasised that, given that no method of estimating such scales is free of value judgements and given the wide range of cost estimates produced, the practical reality is that there is no escaping the need to exercise informed judgement so as to come up with some 'plausible' or 'credible' scales. This paper raises the question of the need to revisit the basis of the judgements which lie behind the current New Zealand de facto official scales, whether they are taken to be the revised Jensen scales (Jensen, 1988) or Whiteford's geometric mean scales (Whiteford, 1985).

## **The structure of this report**

The next chapter outlines a model for the distribution of welfare-relevant resources within the family, identifies the various costs and benefits associated with the raising of children, presents a comprehensive rationale for the need to have credible estimates of child costs and briefly explains why the task is so difficult. A Synopsis follows which seeks in the one broad sweep to give an integrated account of these complicating factors and the estimation strategies which have been developed to overcome them. Chapter four outlines the various components of the conceptual framework for 'the costs of children', makes explicit several key assumptions that the literature makes about the children and their family and social context, before identifying and discussing the different concepts of direct child costs. Chapters five to ten provide a critical account of the main estimation strategies, with chapter seven giving a comprehensive introduction to equivalence scales. Chapter eleven reviews some estimates of indirect costs and addresses the question of the cost of children in sole parent families. Chapter twelve examines the relevant New Zealand research and the study concludes in chapter thirteen with some general conclusions and a summary of the empirical evidence.

## 2 Setting the Scene:

a preliminary discussion and survey of issues

This study is concerned with the direct and indirect economic costs that parents<sup>1</sup> incur in raising their children in a modern western industrial democracy. The *direct costs* include both the explicitly child-induced outgoings on items such as food, clothing, school related expenses and toys, as well as the child(ren)'s portion of the shared costs of housing, heating, transport and the like. The *indirect costs* are the opportunity costs of having children and refer primarily to the loss of income that a household experiences when one or both parents spend time out of paid employment to look after the children<sup>2</sup>. Further indirect costs would include loss of leisure time, though this is rarely considered in the literature. While the main treatment of indirect costs is delayed until chapter eleven, this should not be taken to mean that these sorts of costs are deemed to be less important or relatively insignificant - as will be shown, they are not. Rather, the greater space allocated to the estimation of direct costs is simply a reflection of the relative volumes of literature on the two aspects.

Although the concepts of direct and indirect costs are distinct and reasonably well-defined, they are interrelated. For instance, in the situation where a couple has a first child and one parent leaves paid employment, the interrelationship shows itself in two ways: first, the loss of income as a result of child care responsibilities tightens the budget constraint and limits the amount that is available for direct spending; and, second, the presence of the principal caregiver in the home reduces the need to spend on some items because they are 'home-produced'.

### The distribution of welfare-relevant resources within the family

Any analysis of the concepts of the costs associated with the raising of children has to be set in the context of the family, as children are 'the recipients (in the material, psychological and social sense) of their parents' relative access to wealth, income and resources' (Cass *et al*, 1983:13).

Although the development of a full-scale empirical model of the relationship between the presence of children and family well-being is not feasible, some consideration of the bigger

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<sup>1</sup> In the first ten chapters it will be assumed that the families under discussion are nuclear ones, headed by an adult couple. The special treatment of sole parent households is delayed until chapter eleven, although some passing comment will be made before then.

<sup>2</sup> Some parents choose to purchase a significant amount of child care to avoid loss of time and opportunity in paid employment. In such cases the indirect costs are better conceived of as 'replacement costs' rather than 'opportunity costs'. In this study, child-minding or babysitting are taken to refer to services for briefer times away from childcare responsibilities - say, for shopping, the movies or other leisure pursuits - and are included in direct costs when they are considered at all.

picture is both useful and necessary. Figure 2.1 below gives a stylised analysis of the distribution of welfare-relevant resources within families<sup>3</sup>. To simplify presentation, no account is taken of the receipt of other resources (including time) from friends, relatives and others and it is assumed that parents are a homogeneous unit. The resources to be distributed include the time available to the parents plus the resource flows arising from three sources - their human and physical capital, their fertility potential and their citizenship rights. The unshaded boxes represent the allocations that might be made in the absence of children.

The model described in Figure 2.1 explicitly incorporates the time costs<sup>4</sup> of children. In the standard theory of the household in mainstream economics, the utility maximising individual allocates total time between leisure consumption and market labour supply. It has been recognised for some time (at least since Becker (1965))<sup>5</sup> that such a simple dichotomy is inadequate as a significant proportion of non-market time is spent in 'household production' - child care, property maintenance, cooking, cleaning and so on. In other words, the household produces as well as consumes. The model in Figure 2.1 is consistent with this view and allocates the parents' time between leisure, labour market activity and household production<sup>6</sup>.

If a couple choose to have children, a standard revealed preference argument would conclude that 'in a perfect contraceptive society' the benefits of such a decision must outweigh (or at least be equal to) the costs (Pollak and Wales, 1979). The welfare gains are seen to derive solely from 'the joys of parenthood' as children are presumed to have no income, and the losses come from the additional money and time costs of the children. The monetary costs can be conceived in terms of a 'distribution rule' (Gronau, 1988, 1991) which allocates income between adult and child market consumption. This distribution rule represents the direct costs of children. Analysis of the indirect costs of the children to the parents focuses on the trade-off between the time needed for aspects of household production (especially child care) on the one hand, and labour market and leisure<sup>7</sup> opportunities on the other.

The cost of children literature in the main sets aside the matter of the psychological and social benefits (and costs) of children to parents, despite the revealed preference argument above and

<sup>3</sup> Figure 2.1 is based on Figure 1 in Bradbury (1989a).

<sup>4</sup> The direct/indirect costs distinction is sometimes referred to as the money costs/time costs distinction. The two sets of distinctions are in general reasonable equivalents when the social norm of one parent as breadwinner, one as child-carer is widespread. However if both parents are in paid employment and pay for childcare, the money costs increase and include some of the 'indirect costs'.

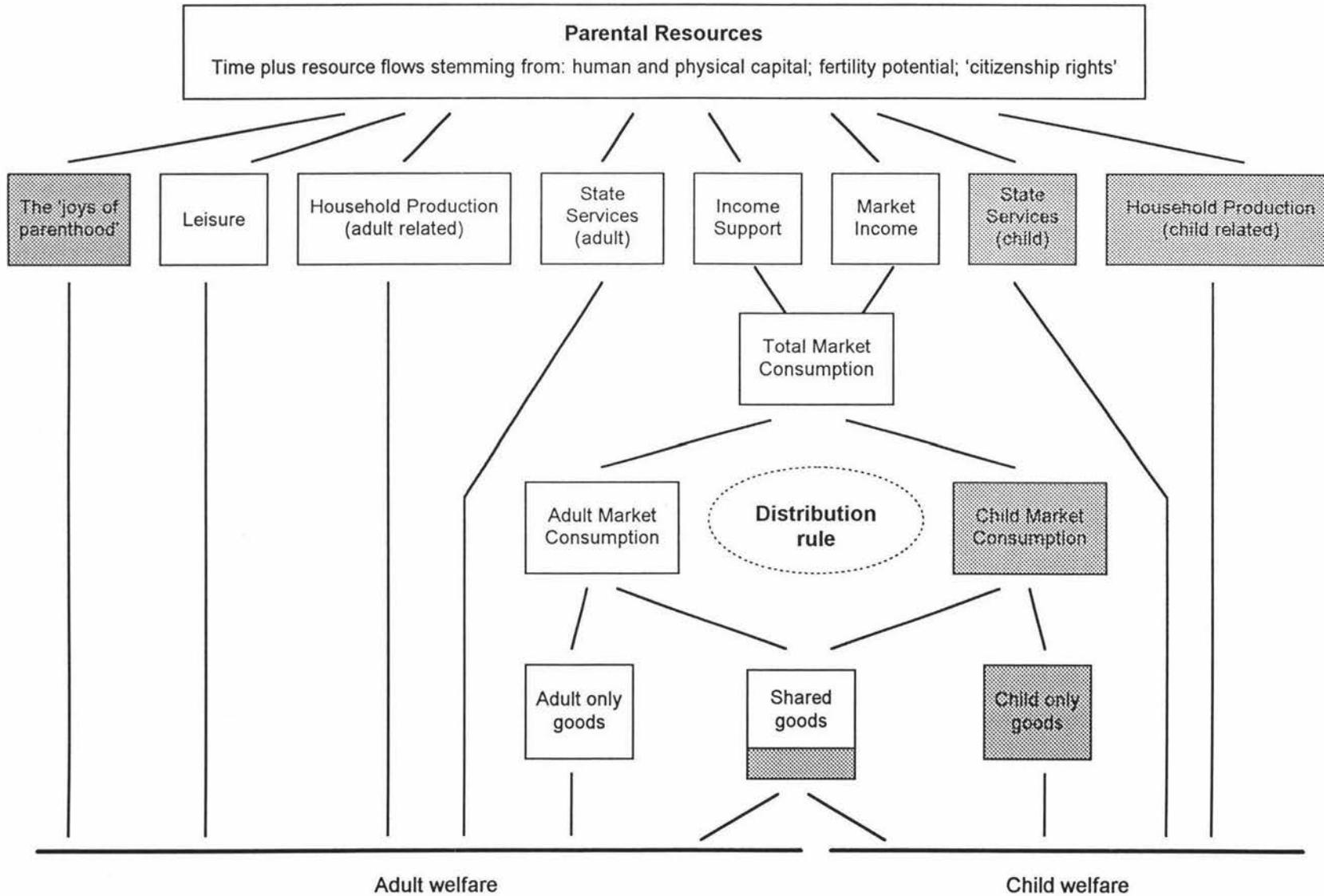
<sup>5</sup> '[T]he allocation and efficiency of non-working time may now be more important to economic welfare than that of working time; yet the attention paid by economists to the latter dwarfs any paid to the former' (Becker, 1965: 493). It could be argued that Becker's judgement that non-working time may be 'more important' is a little overdone, but what is not in doubt is that it is highly significant and has been ignored for too long (cf Gronau (1980) who found that the value of home production associated with the work at home of US wives in 1973 was approximately 70% of the family's after-tax income.)

<sup>6</sup> The concept of parental resources in Figure 2.1 is similar to, but a little wider than that of 'full income' in Becker (1965). Gronau (1980), Browning (1992) and Apps & Rees (1996) also develop models that recognise the tripartite allocation of time.

<sup>7</sup> In practice, leisure is very rarely considered in the child costs literature.

**Figure 2.1**

The distribution of welfare-relevant resources within the family



the logic of Pollak and Wales (1979). The justifications and implications of adopting the narrower or wider view of parental welfare are discussed in chapter nine.

The analysis in the previous two paragraphs is made from the perspective of the parents. Children are treated almost as consumption goods for the parents without reference to the level of well-being of the children themselves. The situation for children is quite different from that for the parents. In contrast, they have no say about their existence or their family structure, and have only a limited say in the allocation of the market consumption that reaches them. The children's well-being depends on this market consumption allocated to them plus the child-care services of the parents (and other household production benefits). However, the 'joys of parenthood' benefits received by the parents cannot be transferred to the children<sup>8</sup>.

## Costs (and benefits) to whom?

### The costs

The bulk of the costs of raising children are undoubtedly borne by their parents with most of the remainder coming from the rest of society making a modest economic contribution mainly (in New Zealand) through the public health and education systems<sup>9</sup>. Although the total contribution from the wider family (eg time, money, meals) and the wider community (eg sports clubs, organisations for children and youth) is negligible as a proportion of the total resources 'invested' in children, they can be crucial at the margins. So also can changes in the philosophy and practice of provision of services by the state. Assuming a given total cost for a child for a given time period, the cost to the parents is determined by the portion of the total cost borne by each party. For example, if the state's contribution to education costs decreases, then, other things being equal, the cost to the parents must increase. Conversely, if the wider family increases its contribution to the child's costs, the cost to the immediate family decreases. Any comprehensive comparison across countries or across different cultural groupings within countries of the costs of children to parents must take this wider picture into account.

In the New Zealand setting, such considerations are relevant on at least three counts:

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<sup>8</sup> Except, of course, where the children have obligations to their parents, for instance, for care in their old age. In western industrial democracies, these obligations have to a large degree been socialised through collective provision of income support for older citizens.

<sup>9</sup> In New Zealand, the public expenditure in 1994 for primary schooling was around \$3200 per student pa, for intermediate \$3800 pa and for secondary \$5000 pa. Public expenditure on health care is estimated at around \$600 per child (under 15) per year. (Sources: Ministry of Education (1996), Table 11; private correspondence with Sector Analysis Unit, Ministry of Health, Wellington). The total public spending per child for health and education is of the same order of magnitude as the direct costs to parents. When indirect costs are added the total costs borne by parents far exceeds that borne by the rest of society through the state.

- First, there is the increased user-pays philosophy of the last decade with application in the health and education sectors in particular.
- Second, there is the reality of participation in some form of extended family<sup>10</sup> for some Maori and Pacific Island children. In relation to the cost of providing for children in this setting, the concept of the nuclear family or household as the spending/consumption unit breaks down. The breakdown occurs both on the income side in that available resources are not accurately represented by declared family income and more significantly on the expenditure side where, for example, 'given the demands of whanau, both for ongoing personal support to whanau members outside the household, and for whanau events such as hui, [it] can mean that significant sums of money may go out of joint couple income before it can be allocated for household uses' (Taiapa, 1994: 53). Thus the nuclear family model generally assumed in the cost of children literature is not compatible with the traditional Maori model which is based on the inter-related social organisation of whanau, hapu and iwi. To the extent that urban Maori retain patterns of behaviour, organisation and values that are distinctly Maori, the model will not be appropriate for their circumstances either. Although it cannot be assumed that all Maori will participate actively in their whanau nor that all whanau function for the material benefit of their members, it remains the case that 'consideration of whanau ... remains basic to an understanding of Maori household economics' (*ibid*, p6).
- Finally, there are a significant number of sole parent families who live in households with others. According to the 1991 New Zealand census, about one third of sole parent families lived in households with other relatives, unrelated individuals or another family (or two) (Rochford, 1993: 51). These living arrangements are likely to have considerable effect on the shape of the budgets of these sole parent families.

### The benefits?

In pre-industrial western economies (and currently in some so-called 'less developed' societies), children were, in economic terms, a crucial private investment for parents. They provided labour for home production and were a crucial resource for the elderly, the sick, the disabled and the unemployed in kin-based welfare systems. By contrast, children in advanced industrial democracies do not generally bring any significant economic benefits to their parents<sup>11</sup>. The benefits that do accrue to parents come under the general banner of 'the joys of parenthood' (Figure 2.1) and consist of less tangible contributions such as providing companionship and being a source of pride through their achievements. On the other hand, child-rearing brings considerable social and economic benefits to society as a whole, particularly but not only

<sup>10</sup> 'Extended' as seen from the perspective of the 'nuclear' family as the norm.

<sup>11</sup> In particular, the combination of compulsory education and laws restricting child labour has improved children's future productivity but has imposed higher net costs on parents. The major economic benefit would now probably be some 'childminding' by older children in larger families. ( But see van Praag *et al* (1988: 203) for a note on the effect of the 'extended' family in contemporary rural Europe on their scale estimates using the subjective approach.)

through the production of the next generation of the labour force. The argument that Folbre (1994a) puts forward in relation to her own country has application across the developed world:

All citizens of the United States enjoy significant claims upon the earnings of future working-age adults through Social Security and public debt. But not all citizens contribute equally to the care of these future adults. Individuals who devote relatively little time or energy to child-rearing are free-riding on parental labor ... economists need to analyse the contributions of nonmarket labor to the development of human capital: as children become increasingly public goods, parenting becomes an increasingly public service (Folbre, 1994: 86).

Table 2.1 below summarises the relative sizes of the allocation of the costs and benefits of raising children in a modern industrial economy.

**Table 2.1**

Allocation of costs and benefits in the raising of children

type of benefit or cost	size of benefit	size of cost
social/economic (for society 'as a whole')	considerable	low to modest
economic (for parents)	zero or negligible	considerable
social/psychological (for parents)	The overwhelming majority of 'cost of children' studies ignore or deliberately set aside the issue of 'the joys and trials of parenthood'. See chapter nine for a discussion of the matter.	

### Do the costs fall disproportionately on mothers?

In the previous major section on the distribution of welfare-relevant resources within the family, it was noted that the simplifying assumption of parents being a homogeneous unit was being used. There is a considerable body of literature that questions the general application of this assumption, arguing that the cost of raising children falls disproportionately on mothers (eg Cass *et al*, 1983; Joshi, 1987; Moss, 1988; Bergmann, 1990; Folbre, 1994a, 1994b; Donath, 1995). The basis of the view is the simple observation that if one of the two parents leaves the paid work-force to provide child care at home, it is almost always the mother who does so, and consequently it is she who loses the income and the years of experience in the paid work-force. Increases in the relative wage for female labour and increased female labour force participation rates have both raised the indirect costs of children. 'Increases in the cost of children have also been associated with trends that shift a greater share of the cost to mothers, such as new child-custody laws, growth in the proportion of families maintained by women alone, and poor

enforcement of fathers' child-support responsibilities' (Folbre, 1994a: 87). Full discussion of the question falls beyond the ambit of this research<sup>12</sup>, but the issues lie just beneath the surface whenever indirect costs and household production (especially child care) are discussed.

## The cost of children and low fertility rates

One of the significant changes in the family environment in recent decades has been the reduction in average family size<sup>13</sup>. This change has gone hand in hand with increasing female labour force participation rates and both these social changes can in turn be seen as driven by two inter-related social forces: first, the desire of women for greater (economic) equality and independence and second, a strategy adopted by many family households to maintain or improve levels of affluence in the face of a declining real wage ... and by others to merely survive (see the lower half of Figure 2.2 below).

The simple model implicit in Figure 2.2 also suggests that 'the cost of children' is a factor to be considered in understanding the trend to smaller families. First, the rising relative value of women's market time has raised the indirect costs of children which are incurred in being out of the paid workforce, and second, as far as the total costs are concerned, it appears that there is an increasingly clear understanding that children are an economic liability, not an asset in any substantial material way<sup>14</sup>. These factors clearly interact with the others described in the outer boxes, and together go some way<sup>15</sup> to explaining the trend to small family sizes and the lowest fertility rates in recorded history.

<sup>12</sup> Pollak and Wales (1979: 216) well-known line has application here also in that it could be argued that the answer to the question depends in part on 'how the mother feels about her primary role being that of child-carer', and whether or not it is net or gross costs that are being considered.

<sup>13</sup> In New Zealand, the number of children per family decreased from around 2.5 in the late 1960s to just under 2.0 in 1991. In 1992, the total fertility rate (2.18 births per woman) was around half what it was three decades earlier when it was 4.19 births per woman (Statistics New Zealand, 1994a).

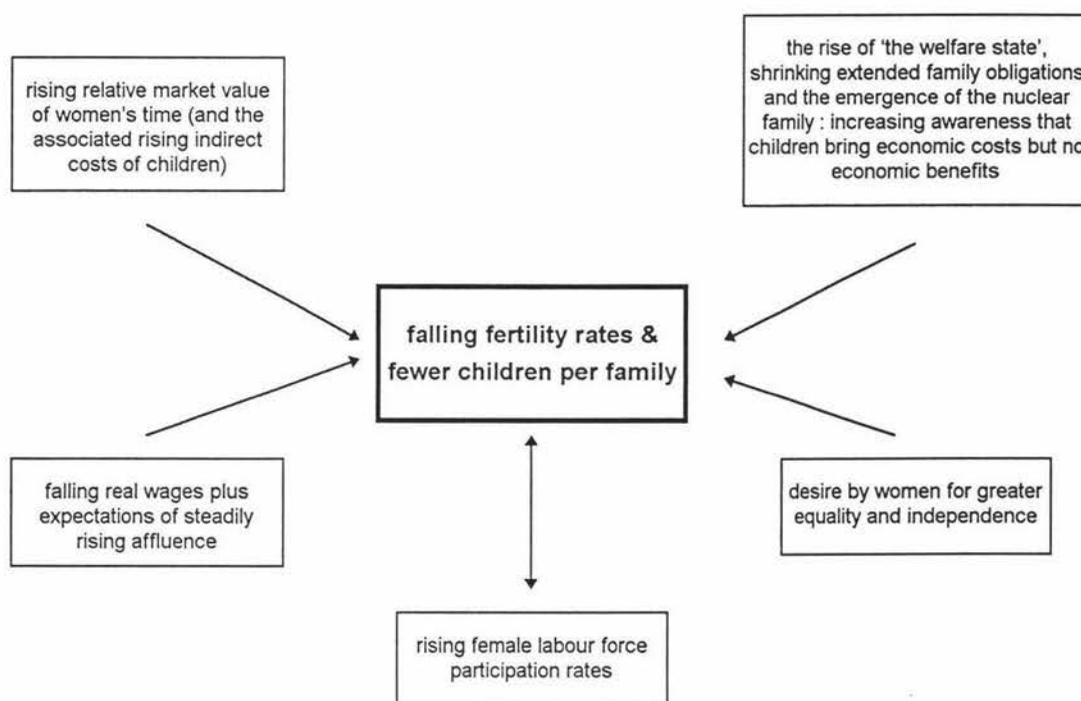
<sup>14</sup> In an investigation of the attitudes towards children of a random sample of 600 couples in the early years of marriage, Neal *et al* (1989) found that 'by only a small margin ... [they] ... rated children as more valuable than having extra money, than having a neat and orderly household, and than finding interests in hobbies ... [and that] ... nearly half of the couples also rated such values as freedom of movement, the use of leisure time, and employment opportunities for the wife as equally valuable or more valuable than children' (p325).

<sup>15</sup> The simple model in Figure 2.2 is intended to be suggestive rather than rigorous and comprehensive. Apart from the easy availability of effective and unobtrusive contraception, other factors that may influence the trend to smaller family size include the increased divorce rate which can suppress the desire for children by increasing the risks for women of being left to raise the children alone, and the increased psychological and social costs of having children in the face of contradictory views from friends, fellow-workers and relatives.

**Figure 2.2**

Some key factors behind the trend to smaller families

(Note: a comprehensive model would require linkages between each outer box and most if not all the other four. To avoid clutter and confusion these linkages are not drawn in.)



There are signs that the trade-off between material affluence, job status and children has not yet run its full course. If the DINKS (double-income-no-kids) phenomenon grows or if increasing numbers of unpartnered women and men decide not to have children at all<sup>16</sup>, then the fertility rate is likely to drop even further. Among other things, this has major implications for the funding of retirement benefits in an ageing society in the next century, unless immigration policy changes sufficiently to allow a significant net gain from that source. In particular it seems likely that governments will be forced to better target dwindling resources to those in retirement who have little of their own to live on. This sort of knowledge increases the incentive not to have children as, in order to ensure future security while maintaining present affluence, high savings and high household income are needed. As the economic cost of having children makes these goals too difficult to achieve, the total fertility rate declines or remains at an historically very low level (cf Smeeding, 1989; Rankin, 1996).

The issue is well summed up by Thomson (1991) who argues that:

Having children is now to give tens of thousands of private dollars into the collective pool, since children become an economic asset for the whole community but not for their parents. Those who spend effort and personal

<sup>16</sup> In 1980, around 10% of women in the United States aged 40 to 44 had not had children - in 1990 the proportion had risen to 16% (DaVanzo and Rahman, 1993: 359).

income in raising children have no better claim to their future production than the neighbour who made no such investment. The attraction must grow of avoiding this unnecessary personal contribution, to 'freeload' off the children of others and so maximise one's own lifetime income (Thomson, 1991: 204).

## The importance of credible estimates and of an explicit conceptual framework

How much does it cost parents to raise their children?

The efforts of researchers to answer the apparently simple and innocuous 'cost of children' question are reported in a literature that is vast and often complex. At times it becomes very abstract (academic in the pejorative sense), far removed from such practical realities as carefully budgeting the household income so that a growing 12 year old can have a much needed new pair of shoes for winter. Yet the economic cost of children and the associated conceptual framework are matters of great practical significance in developing public policy and, as shown above, in understanding certain social trends that are closely linked to the decision of couples to limit family size and of others to not have children at all.

The most obvious practical value of child cost estimates is for a range of policy areas relating to the incomes of families. Examples include decisions about the level of income support to be provided for different family types, setting the level of child support payments in the event of separation or divorce and for establishing remuneration to be given to those providing foster care. In a wider context estimating the costs of children is an essential component in the construction of equivalence scales which seek to allow direct comparisons between households of different types. These scales in turn can be used in assessing the impact of government policies on the living standards of households and in the measurement of poverty and inequality.

Beyond the immediate confines of the social security and child support realms, other uses of reliable figures are in demand. Estimates of child costs are required by the courts in some jurisdictions for matters other than child support matters - for example, in ascertaining a measure of damages for the wrongful death of a child (Bruce, 1987). For general public education on matters relating to family budgeting and home economics, the costs of children are also highly relevant.

The last fifteen to twenty years have seen considerable changes in the financial circumstances of households with children. They have become over-represented among 'the poor', in contrast to the situation in the 1970s when the elderly were more likely to have been in that group. In

the United Kingdom, for example, 'couples with children are twice as likely to have incomes below half the national average than are those without.' (Banks and Johnson, 1993: 70). This new phenomenon gives its own impetus to the quest for good estimates of the costs of children.

Certain changes in the political climate in the developed economies have also added urgency to the question. An integral part of public policy in such regimes has been that 'the cost of childrearing should not be allowed to lie entirely where it falls' (Mitchell and Cooke, 1988: 27), so that there is a sharing of costs between parents and the state. However, a trend has emerged in the last two decades, given impetus but not entirely caused by the difficult economic times that began in the mid 1970s (OECD, 1977; Alber, 1988), to strongly question what once seemed axiomatic about the role of the state in many facets of modern society (Pierson, 1991). In particular, the economic burden of welfare has moved to the centre of political debate with 'a growing consensus amongst policy makers and some economists that the welfare state is bad for growth' (Dixon, 1996: 1725; cf Bolger *et al*, 1990)<sup>17</sup>. The state's responsibility for support for children is involved in that perceived burden. The new mood is well illustrated by the following input from review team members as they heard evidence in the Review of Benefits for Children and Young People in the United Kingdom in 1984. The content and tone are consistent with a view which sees children primarily as 'consumption goods' for the parents and which minimises their 'public good' / 'social investment good' aspects.

As compared with Beveridge's time, 40 to 50 years ago, there is very much more choice today about having children and about how many to have. Why should someone who consciously decided not to have children be expected to pay for others who decide to have children?

and

I have always thought that, if one [sic] reaches a decision to bring a child into the world, one takes responsibility, including financial responsibility for the situation. I do not think I would particularly want someone else to relieve me of it or share it with me (Lister, 1984: iv).

These views run counter to the received wisdom of the post-war consensus which accepts the 'shared costs' principle in which all citizens are perceived as having a vested interest in ensuring the viability of families. In an environment of competing ideologies in regards to the economic burden of welfare and the questioning of the 'shared costs' principle, it is more than ever important to have a reasonable estimate of just what these costs are.

There is also value in a comprehensive focus on the costs of children as a means of addressing what can be argued to be a deficiency in a key assumption of mainstream economics, namely that labour is not produced in the economy. It is standard practice in most economics textbooks to identify land, labour and capital as the three major factors of production (inputs). Land and labour are described as primary for in contrast to capital they are not produced within the economy but are taken as givens. Labour supply is seen as being effectively increased through education and training or, in the jargon, through investing in human capital.

<sup>17</sup> This analysis has been dubbed the 'sclerosis diagnosis' (eg Korpi, 1996).

All this assumes the existence of people ready to work or ready to be trained to work, ignoring the degree to which non-market household production 'contributes to the formation and upkeep of human capital' (Chadeau, 1992: 86). Thus mainstream economics ignores the 'production' of those individuals who are the very subjects of economic theory. It is incomplete because it has no adequate account of how economic actors are produced and therefore the work of those who care for children in the household is invisible within the economy (Donath, 1995). It has long been recognised that this deficiency significantly affects the estimates of Gross Domestic Product (GDP) as traditionally measured<sup>18</sup>.

A wider perspective such as that affirmed above finds eloquent and passionate advocates (eg Waring, 1988) but little mainstream acknowledgement although there is evidence of a sea-change occurring (eg Chadeau, 1992; OECD, 1995; Apps and Rees, 1996). Comprehensive studies on the costs of children can at least inform the debate and may even have a part to play in addressing the identified deficiency.

So, far from being a matter of mere academic interest, the economic cost of children is a significant factor in several major areas of life in a modern society:

- the development of public policy especially for income support for families;
- the debate on 'rolling back the state';
- the measurement by economists of national output; and
- as a key element in a plausible model for understanding increasing female labour force participation, decreasing family size and low total fertility rates in western democracies.

The reality of the costs of children is well accepted. The need for reasonable estimates of these costs has been demonstrated. However, the situation is not as tidy when the question is asked as to how these costs should be measured or even conceptualised.

## Why is it so difficult to produce estimates of child costs?

On the face of it the exercise of estimating the current cost of providing for a child seems to be a reasonably straightforward one, but the experience of social scientists is quite different from this. Piachaud (1979) goes so far as to speak of the issue 'tying researchers in knots'. Many would agree with the view of McDonald (1990) that 'estimating the cost of a child is a complex and highly imprecise exercise'. Certainly this is an area of 'considerable controversy' (Browning, 1991).

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<sup>18</sup> In a recent work, Statistics Canada has estimated that household work represents somewhere between a third and a half of their GDP as currently measured (OECD, 1995), while Gronau (1980) finds it to be 'over one third'. Cass (1994) reports on recent studies in Australia and Europe that put the figure at around 60% of GDP. Easton (1990) estimates that for New Zealand the total of direct costs, indirect costs and the cost of state services for children amounts to about a quarter of GDP and concludes that 'in economic terms child rearing is certainly the largest industry in the country' (p3).

Why is this? There are several sets of issues that conspire together to make the task difficult:

- the cost is dependent on several factors;
- there are different concepts of child costs and associated with each, a variety of methods of estimation;
- there are complications that affect all estimation strategies; and
- each method has its particular advantages and limitations.

In the first place, the reported cost of a child depends on a variety of variables - the age of the child, the child's rank order in the family, the standard of living to which the costing applies, the geographical location of the home, the way housing costs are allocated and so on. This could be seen as a challenge for succinct and manageable presentation as much as anything.

Secondly there are different concepts of the cost of children and there is the possibility that these different concepts may give rise to different costings. Furthermore, even when the same broad concept of the cost of a child is assumed, within that framework there are a variety of available methods for making the estimates and each of these has its own limitations and disadvantages. This adds a further level of complication.

Thirdly, there are some issues at a general level that all methods have to face one way or another.

- \* the question of how to allocate the costs of shared goods and services. Decisions here affect the degree of economies of scale as household size increases.
- \* the reality of the family's budget constraint. It is difficult to establish an adequate concept of the costs of a child in the situation where the number of children in the family increases while the family income remains the same. Unless dissavings or borrowing are possible total expenditure remains static while some child-related costs increase. Presumably some components of the family budget decrease - but which ones?
- \* the matter of possible adult preference modification as children are added or even in anticipation of children being added. This is a problem for any method which compares the consumption behaviour of different household types in order to estimate the cost of the children. The adults in the two households may in effect be 'different' in that their tastes have changed. This introduces an unwanted ambiguity into the estimation process.
- \* intertemporal transfer of expenditure - the costs of children may be spread over the life-cycle by various means. This can be seen as a relaxing of the assumption that income = spending over the usual one year period, and thereby introduces the role of savings, dissavings and borrowing.
- \* the charge of subjectivity and arbitrariness - these charges are levelled most easily at certain methods (eg budget methods and those that use surveys of citizens' opinions about levels of adequacy).

- \* the data - does it tell the whole story? - in particular, what about the non-market transactions that are not captured?
- \* special costs of sole parenthood? - over and above the usual direct child costs, are there costs that sole parents have that single non-parent adults do not have?

## Methods of presentation of direct child costs.

Estimates of the costs of children can be presented in different ways. The most readily generally understood one gives details of the money amounts that various types of families either 'need' to spend or do spend each week (or year) on children. A second but less common approach which also produces money amounts does so for the total expenditure that families will make in providing for a child from birth to independence (say, 18 years).

The third method expresses the costs of children in terms of equivalence ratios or scales<sup>19</sup> for which an arbitrarily chosen household type (often a childless couple<sup>20</sup>) is taken as the reference (value = 1.00). For example, if the figure for a family comprising a couple and a child is 1.25 the implication is that this larger family needs 25 percent more income to attain the same standard of living as the smaller one and that the child accounts for 20 percent ( $0.25 / 1.25$ ) of the family budget. This latter is the 'distribution rule' of Figure 2.1.

A fourth method expresses the cost of the first child or the average cost of the first two or three as a proportion of that of each parent. For instance, Deaton and Muellbauer (1986) conclude that 'child costs are 30 - 40 percent of expenditure per adult' (p741)<sup>21</sup>.

Conversion from equivalence scale format to weekly dollar costs is possible provided that the total spending<sup>22</sup> is known. For example if the childless couple is spending \$24,000 each year, then an equivalence ratio of 1.25 for the one child situation implies that the weekly child costs are \$115 (ie  $0.25 \times 24000 / 52$ ). Alternatively a one child two parent household that spends a total of \$28,000 a year has weekly child costs of \$108 (ie  $(0.25/1.25) \times 28000 / 52$ ).

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<sup>19</sup> The literature in the main uses these terms in one of two ways: firstly, scale = the complete set of numbers for different household types; secondly, scale = 'scaling factor' for a particular household type - ie just one element in the set. 'Ratio' is sometimes used for the latter and 'ratios' for the former. This report will use the terms interchangeably.

<sup>20</sup> The main alternative is the single adult household, a reference point that has much going for it. For child cost analysis, the childless couple is usually used (see discussion in chapter seven).

<sup>21</sup> That is, per adult in a couple, not per adult living alone.

<sup>22</sup> Or, total after-tax income, if the simplifying assumption of income = expenditure over the year is a reasonable approximation.

## Wide range of estimates produced

Any survey of the literature will quickly reveal the wide range of equivalence ratios produced. By way of illustration, in the preparation of this report ratios ranging from 1.15 to 1.50 were found for the one child two parent family<sup>23</sup>. Whiteford's (1985) survey reported a range of 1.01 to 1.47 for the same household.

Even the same data can yield different results depending on the methodology used, as is illustrated from a recent Australian study in Table 2.2 below.

**Table 2.2**

Comparison of equivalence scales based on same data but using different methodologies.

Methodology	A	2A	2A+1	2A+2	2A+3
Extended Engel	0.70	1.00	1.26	1.59	2.01
Consumption Theory	0.52	1.00	1.20	1.27	1.44

Note: A = one adult household, 2A+1 = two adult plus one child household, etc

Source: Tran Nam and Whiteford (1991), Tables 3 and 5.

This uncertainty is a difficulty not only for the purpose of providing acceptable estimates, but also for the presentation of the results. Tidy tables with equivalence ratios given to two decimal places can seduce the unwary reader or user into assuming that they are taking in or using the results of a precise science, especially when the methodology uses any sophisticated mathematical or statistical techniques that give an aura of credibility.

<sup>23</sup> Appendix B lists 40 or so sets of scales, grouped according to method of estimation. See also Table 7.10.

### 3 Synopsis:

the complications in producing child cost estimates and the general strategies developed to overcome them

This Synopsis seeks to give a brief but integrated account of the major factors which complicate attempts to produce well-grounded estimates of child costs and the strategies which have been developed to overcome them. Some of the difficulties are of a fundamental nature arising from the nature of 'family life' (eg families share many goods and services), while others result from the attempts made to overcome these more fundamental issues. Some are of a general nature and must be faced by all estimation strategies, while others are associated only with a particular method or group of methods.

The development of a conceptual framework and the evaluation of estimation strategies is a multi-layered exercise that has to cope with many interrelated issues. This Synopsis is a response to the challenge posed to effective communication by this complexity. As well as having value in itself, it serves as an introduction to the next chapter in which the leading simplifying assumptions usually employed in the literature are identified, and the core conceptual framework for 'the cost of children' is developed. These two chapters together set the scene for the detailed accounts and further conceptual analysis in chapters five to ten.

In the Synopsis (as in most of the literature) it is assumed that the children are dependents (aged under 18) in a nuclear family headed by an adult couple and living in the suburbs of a city or town in an OECD type country. The household manages its affairs so that there is an equitable intra-household sharing of resources, so that each household member experiences a similar level of material well-being. As discussed in the previous chapter, the economic benefit of children to the household is taken to be negligible, while the psychological and social benefits (and costs) to parents are ignored. All households are assumed to face the same prices in the market.

The next main section begins by identifying two of the fundamental difficulties (D1, D2) that face any attempt to estimate child costs - the issues of shared goods and co-mingled private goods. The review then goes on to identify yet other complications which arise as solutions to these two problems are sought. To avoid interrupting the flow of the story there will very limited use of citations and footnotes. By the end of the summary, most of the major issues, themes and strategies for producing estimates that are described and critically examined in the rest of the report will have been introduced.

## A first attempt at producing estimates - a direct approach

It is quite natural as a first thought to see the task of estimating child costs as that of identifying the various child components of the family budget - food, clothing, housing, heating, toys and personal effects, healthcare and so on - then adding them up. Child costs in this approach are taken to be 'what is spent on them'.

A promising start can be made with clothing and footwear (see Table 3.1) as many national data sets and other smaller surveys give such information based on the diaries kept by survey participants. Unfortunately there are very few other budget categories that allow such an easy analysis, as some 90% of a family budget is made up of shared goods and co-mingled private goods.

**Table 3.1**

Simulated attempt at identifying annual expenditures on a child from survey data.

Budget category	Total spending	Child portion	Private or shared?	Identifiable?
Clothing/footwear	\$1,300	\$350	private	yes
Other personal effects (eg toys)	350	60	private	yes
Education related	70	70	private	yes
Medical/healthcare - exl insurance	180	80	private	yes
Food	4,000	?	private	no (co-mingled)
Housing	5,800	?	shared	no
Household operation	3,300	?	mostly shared	in the main, no
Transport	4,000	?	mostly shared	in the main, no
Other	6,000	?	-	-
<b>TOTAL</b>	<b>25,000</b>	<b>?</b>	<b>-</b>	<b>-</b>

- *D1 Shared goods and services*
- *D2 Co-mingled private goods and services.*

Shared goods raise the question of how to allocate costs between the various household members. For example, what portion of the (capital and running) costs of a shared good like a television set or a refrigerator should be allocated to the children? What portion of the electricity bill should be considered expenditure on the children? Even for most privately consumed goods (eg food, toothpaste), the allocation of costs to individual consumers is not possible without the use of rules of thumb or extreme data collection measures involving a

generally unacceptable invasion of privacy. Even if the latter were done, there still remains the challenge of shared goods.

More sophisticated versions of a direct approach use multivariate regression analysis to estimate expenditure equations from the data sets, with dummy variables judiciously chosen to control for and take account of major differences between the households (eg income, employment status of the parents, geographical location, number and ages of the children and so on). From this analysis it is possible to draw up budgets for households that are similar in all important aspects except that some have children and some do not. The budget can be broken down into as many commodity groupings as the data will allow so that spending by a household with, say, one child can be compared in detail with that of a similar childless one. In the hypothetical illustration below (Table 3.2) only five categories are used so as to keep the analysis straightforward.

**Table 3.2**

Hypothetical comparison of spending patterns of households with and without a child (but otherwise similar).

Budget category	No children	With one child
Identifiable adult-only goods	\$2000	\$1500
Identifiable child-only goods	0	1000
Other privately consumed goods	9000	9000
Shared goods	12000	13000
Savings	2000	500
<b>TOTAL</b>	<b>\$25000</b>	<b>\$25000</b>

- *D3 The budget constraint*
- *D4 Inter-temporal transfers*

The only clear-cut conclusion that can be drawn from the comparison is that spending on the child was at least \$1000 (line 2). It is reasonable to conclude that the increase in the amount spent on shared goods is attributable to the presence of the child, but the data set itself does not indicate how the total spent on shared goods should be allocated between adults and children. There is undoubtedly other spending on the child that is hidden in other lines but nothing certain can be deduced. For example, line 3 will include the spending on the child's food consumption, but just how much is not clear. Whether overall adult consumption spending has decreased, increased or remained steady depends in part on where the reduced savings have been spent.

If a household's income remains steady, then when a child is added either adult spending must decrease or savings must decrease (or dissaving or borrowing must occur) or a mixture of these must occur. Other things being equal, the budget constraint requires that when the amount spent on some goods increases, the amount spent on others must decrease. Inter-temporal transfers (saving and dissaving) open up the possibility that some of the consumption spending on a child may effectively occur in periods when that child is not present. The implication of this is that single period data sources will lead to an underestimation of child costs (Pashardes, 1991).

### Per capita approach

Given the difficulties posed by shared goods and co-mingled private goods, an easy way to estimate child costs is to divide the total consumption spending by the number in the family. A family of five spending \$25,000 pa would be deemed to be spending \$15,000 pa on the children. Although this procedure avoids these two problems (D1 and D2), it has little merit as it ignores the economies of scale that exist with shared goods and assumes that a child spends the same amount as an adult on co-mingled private goods. Neither of these are plausible assumptions. This strategy is likely to overestimate child costs.

This inability to directly observe what is spent on children means that an indirect approach is needed.

## Finding an acceptable indirect method

Consider a childless couple with a particular level of income and standard of living<sup>1</sup>. If a child is added to the household the family will spend some of its budget on the child. Assuming that the income available for consumption expenditure is not supplemented by reduced savings, new dissaving or borrowing, the adults must spend less on themselves and their level of material well-being decreases. The cost of a child to the adults (or the household<sup>2</sup>) can then be defined as the extra resources needed to bring the parents (household) back to the same level of economic well-being they (it) had while childless. This is referred to as *the iso-welfare concept of child costs*.

<sup>1</sup> In this Synopsis, the terms standard of living, economic well-being, material well-being and welfare are used interchangeably. More detailed analysis will later reveal that the choice of welfare as material well-being is not unproblematic.

<sup>2</sup> Given the assumption of equitable intra-household allocation of goods and services, all household members are assumed to be experiencing the same level of material well-being. This means that it is of no consequence whether it is adult or household welfare that is discussed. If, however, the concept of 'welfare' is broadened beyond that of material or economic welfare, then the situation is more complicated. This issue is discussed in chapter nine.

All the methods that provide estimates based on this concept of child costs can produce a set of equivalence scales (ES) for various household types (h) in relation to a reference household (r), usually taken to be that of a couple without children. The ratio is estimated for a given level of material well-being or 'welfare' (W).

$$ES_h = \text{Spending by h to reach W} / \text{Spending by r to reach W} \quad (1)$$

The cost of the children (C) is given by

$$C_h = \text{Spending by h to reach W} - \text{Spending by r to reach W} \quad (2)$$

As noted at the end of the previous chapter, child costs can be expressed either in dollar terms (eg annual, weekly, birth to 18 years) or in equivalence scale format. For example, if a childless couple with after tax annual spending of \$25,000 is found to need \$5,000 more to restore them to their previous standard of living when a child is added, the annual child costs are considered to be \$5,000 and the larger family's equivalence ratio or scale is 1.25 (\$30,000/\$25,000).

The basic approach can be extended to produce estimates of the cost of second and subsequent children, and to indicate how the cost varies with circumstances like the age of the child, the geographical location of the family, the employment status of the parents and so on.

- *D5 Comparison of welfare levels across households*

This iso-welfare concept of child costs is intuitively attractive and has a long history in cost of children studies. Unfortunately, a household's level of well-being cannot be observed directly, so assumptions have to be made about the determinants of well-being. By devising a means of getting around the difficulties caused by shared goods, co-mingled private goods and the budget constraint, a new challenge is created - namely, how to compare welfare levels across households. This is by no means a simple exercise and several fundamental questions are raised in the process of seeking to carry it out: what concept of welfare should (can) be used? what measure of or proxy for welfare is most appropriate? whose welfare is being compared - that of the household, the adults or the child(ren)? is it reasonable to even attempt to compare welfare across households, especially when their composition varies? Full discussion on these issues is found in chapter nine. For the purposes of the Synopsis the main methods that have been developed to provide a means of allowing comparison of welfare levels across households are briefly and simply described with minimal evaluative comment. The detail is left until later.

## Identifying equivalent welfare

Despite the impression left by some of the literature that the economic or consumption theory approach<sup>3</sup> is the only one worth considering, there are in practice a good number of other options for producing estimates of equivalence scales. In terms of the general framework summarised by (1) and (2) above, the various methods are distinguished by the way in which they identify the circumstances that lead to two households being judged as equally well off or having equivalent welfare (W). The identifying criteria are summarised in Table 3.3 and briefly described in the text that follows.

**Table 3.3**

The means used to identify when households are at the same or similar standards of living

Iso-welfare Method	Means of identifying 'equivalent welfare'
Engel	equal food-share
Extended Engel	equal 'necessities'-share
Sophisticated Engel (PH)	[weighted average of all commodity scales]
Rothbarth	same absolute amount on 'adult goods'
Consumption Theory	same 'utility'
Subjective	perception of sampled citizens
Savings Ratio	same savings ratio <sup>1</sup>
Budget (DV)	informed judgement of experts
Relative deprivation	index of relative deprivation
Modular/arbitrary	informed judgement/intelligent guess

Notes 1 The savings ratio = savings / total after-tax spending

### Same food-share (Engel)

One assumption that has been widely used is that two households are at the same level of material well-being when they spend the same proportion of their total spending on food. It is also assumed that poorer households spend a higher proportion of their budget on food. This approach can be extended to a more general 'iso-prop' (same proportion) approach by including a wider range of 'essential' goods (eg heating, clothing, housing and so on) in the numerator.

<sup>3</sup> The following terms are used interchangeably in the literature and in this report: the economic approach, full utility function approach, consumption theory approach.

### Same spending on adult-only goods (Rothbarth)

A second assumption that is used is that two households are at the same level of material well-being when the adults spend the same amounts on goods consumed exclusively by adults.

A numerical example is given in Table 3.4. By the Engel assumption, families A and C are equally well off as they each spend 30% of their total on food. The cost of the first child is therefore estimated to be \$10,000 for the year (\$30,000 - \$20,000). On the Rothbarth assumption, families A and B are equally well off as they each spend \$2,000 on adult-only goods. This assumption leads to a \$4,000 estimate of child costs for the year (\$24,000 - \$20,000).

**Table 3.4**

Hypothetical comparison of the welfare of three family households using different concepts of equivalent well-being

Budget category	Family A (no children)	Family B (one child)	Family C (one child)
Food	\$6,000	\$8,000	\$9,000
Adult-only goods	2,000	2,000	3,000
All other goods	12,000	14,000	18,000
TOTAL	\$20,000	\$24,000	\$30,000
Welfare proxy	Relative welfare levels		
Engel (food-share)	same as C	lower than A & C	same as A
Rothbarth (adult-only goods)	same as B	same as A	higher than A & B

### Prais-Houthakker (PH) method

Both the food-share and the adult-only goods methods use only a small proportion of the range of expenditure information available in household survey data sets. Others have sought to make use of the full range of data available. One approach that follows this course is that of Prais and Houthakker (1955) who developed a technique that seeks to allow children to have different effects on the consumption of different goods - in contrast to Engel's food-share method which assumes that children influence spending on all goods in the same way as they affect spending for food. For each commodity group econometric techniques are used to

estimate an Engel equation<sup>4</sup> for each household type. From the specific costs of children estimated for each commodity group (in dollar or equivalence scale format), the overall cost of children can be estimated. The PH approach is primarily a 'mechanical' statistical approach which does not depend on a particular definition of well-being.

• *D6 The identification problem*

The method suffers from a significant problem which in another form also proves to be a considerable hurdle for the utility function approach mentioned below. If the budget is divided into, say, nine commodity groups, then there are only eight independent Engel equations that can be derived from the expenditure data, as the final one can be deduced from the knowledge of the total spending and the eight other equations. In statistical terms there is an 'identification' problem - there is not enough information from the data itself to reliably estimate all nine equations and therefore the cost of the children. More information or a further assumption has to be imported from outside the data to solve this problem. This is an action which introduces an undesirable element of arbitrariness into the estimation process. In the case of the Engel and Rothbarth estimators, the assumptions are clear and explicit. The PH system has been identified by using nutritional needs (Muellbauer, 1980) and 'rough estimates' followed by an iterative convergence process (McClements, 1977). In the utility function approach, the outside information is more subtly incorporated through the particular mathematical form chosen for the utility function and/or the cost function.

**Same 'utility'**

Although each of the above iso-welfare approaches fits comfortably within the simple analytic framework being used for the iso-welfare concept of child costs, none of them can be said to have a rigorous theoretical foundation. They are simply a means of analysing the data. The economic approach seeks to meet this challenge through the application of the well-established consumer demand theory to household welfare comparisons. Despite the fact that there is considerable debate as to whether the two are compatible, this method has proved increasingly popular for many reasons, not least of which is the claim that it avoids many of the subjective and *ad hoc* elements of the other approaches.

Consumer demand theory is a well-established field within the discipline of economics. At the heart of the theory is what economists refer to as a 'utility function', which is simply a mathematical formula which attaches a number to an individual's consumption of a given set of chosen goods and services. In modern economics, the number is not intended as a measure of 'utility' in the sense of 'consumer P derives 125 units of well-being from certain consumption'. Rather the numbers generated by the formula simply indicate the relative preferences of the

<sup>4</sup> An Engel equation specifies the relationship between commodity group spending and household income (and, in this case, household composition), holding prices constant.

consumer for different bundles of goods and services. A higher number represents a stronger preference.

In the cost of children literature, the theoretical and analytical tools of individual-focussed consumer demand theory of micro-economics are applied to family households to allow a comparison of welfare levels across households. In contrast to the simpler and narrower 'food-share' and 'adult-only goods' approaches, the full utility function methods use data on the consumption of the full range of goods and services. Utility functions come in different mathematical formulations, each one representing a particular understanding of how changing household composition affects spending patterns. Advanced theoretical work has shown that the Engel, Rothbarth and PH estimators can all be incorporated into a utility function framework as special cases of the more general theory (Muellbauer, 1974, 1977, 1980). In comparison with the more *ad hoc* nature of their original basis, it is argued that this gives them at least some semblance of theoretical underpinning. Because they can be seen as special cases of the more general formulation, the isoprop and Rothbarth methods are sometimes referred to as the 'reduced form' methods.

There are several significant conceptual and technical matters that need addressing in any critical assessment of the utility function approach, not the least of which is the identification problem mentioned above. These issues are addressed in detail elsewhere in the report (chapter nine, especially). However, two of them are relatively simple in conceptual terms (though of considerable moment in their implications for this and other estimation strategies) and can be briefly mentioned here.

- *D7 Changing adult preferences*

There is no way of telling from the expenditure data alone whether the origins of the changes in household spending patterns as household composition changes lie in the diversion of resources from parents to children or in the fact that parents' preferences change once they have children. This is a major problem for iso-welfare approaches in general and the utility function approach in particular. As is shown later (chapter nine) the form in which the identification problem shows up in the full utility function methods is closely related to this issue.

- *D8 Household expenditure data sets tell only a part of the story*

The claim of the economic approach to superiority on the grounds that it is more 'objective' and 'scientific' is challengeable on several grounds. At the most fundamental level the question arises as to whether the HES type of data set tells a sufficient part of the story to be adequate for a study of child costs. There is much that could be said, but it is sufficient at this stage to reiterate the point made in the previous chapter, namely that as these data sets capture only market transactions they do not reflect the contributions to material well-being of non-market

time. In particular, there is no recognition in them of the goods and services arising from household production (especially childcare).

### **Same welfare level as understood by ordinary citizens (the 'subjective' approach)**

Another source of data that can provide a basis for estimating child costs in an iso-welfare context is the responses of people to questions which ask what levels of after tax household income they consider correspond to different standards of living which are usually described on a multi-point scale such as 'poor, ...., getting by, ...., prosperous'. From the responses, estimates of the cost of children can be produced at a given welfare level. There are several variations on the theme, some using the respondent's own family situation as the reference point, others using a hypothetical family.

### **Same welfare level as understood by 'experts' (a budget standards approach)**

The budget standards approach relies on the judgements of experts and researchers to produce a carefully defined and costed basket of goods and services that is deemed adequate to enable a child to live at a certain standard of living in the context of certain cultural and social norms. Budget standards can be developed in either of two ways. In the first (the itemised variant, IV), the budget is drawn up directly for the child who is assumed to be living in a certain family context. This approach immediately runs into difficulties arising from shared goods (D1) and is forced to adopt some allocation rule.<sup>5</sup> The second version (the deductive variant, DV) belongs to the iso-welfare group of estimators. In this case full budgets are drawn up for households with and without children, using the judgement of the experts to determine what goods and services are required to ensure that the two households are at the same level of material well-being.

The use of focus groups to estimate budget requirements at a given standard of living (eg modest-but-adequate) is a form of data gathering that has elements of both the subjective and budget standards approaches.

- ***D9 The issues of subjectivity and arbitrariness***

The budget standards option is open to the charge of subjectivity in two senses: first, there are many judgements to be made in the process of developing and costing the budget and second,

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<sup>5</sup> The proportional approach is a method that has some links to both the budget standards and the Engel food-share approaches. It applies a multiplier ( $n$ ) to a child's basic food budget prepared by nutritional experts.  $n$  is often an integer (3, 4 and 5 have been used). This sidesteps the problems raised by shared and co-mingled private goods but raises other problems (eg arbitrariness) that are difficult too.

by way of contrast, it lacks the 'objectivity' of the behavioural data drawn from surveys of 'how consumers actually live'.

Economists have not in general embraced the 'subjective' approach with any of the enthusiasm they have shown for the Engel, Rothbarth and utility function approaches, reflecting in part their antipathy to data which is based on what people say rather than what they do. The latter is considered to be much more likely to reveal a consumer's true preferences. What people say is not considered to produce behavioural data of the same quality as it is based on introspection which is not open to observation. (cf Sen, 1982).

### **Same welfare level as understood by 'experts' (an *ad hoc* or modular approach)**

A good number of institutions and a few individuals use sets of equivalence scales that are built from a simple base such as 'the second adult counts for 70% of the first and each child is 50%'. They are often chosen so as to reflect aspects of several different approaches and represent the institution's or the individual's estimate of what the relative cost of children is, given that the various households are at the same standard of living.

## Selected complications in more detail

Nine key issues have been identified as complications that make it difficult to produce good estimates of direct child costs.

- shared goods;
- co-mingled private goods;
- the budget constraint;
- inter-temporal transfers;
- the comparison of welfare levels across households;
- the identification problem;
- changing adult preferences;
- household data sets telling only a part of the story; and
- the issues of subjectivity and arbitrariness

There is considerable overlap between many of the issues. For example, the issue of inter-temporal transfers can be seen as a factor that 'contaminates' HES type data sets, further undermining the claim that they are 'objective' in the sense that they show how consumers 'actually behave'. Also, the way adult tastes appear to change as children are added is related in part to the realities of the budget constraint that most households experience. These latter two issues are treated under the one heading.

In this section, three of these nine complications are discussed in more detail. Nothing more need be said about co-mingled private goods and discussion is delayed until chapter nine on the issues surrounding the making of welfare comparisons across households, the identification problem and problems with HES type data sets not giving the complete picture. Inter-temporal substitution is covered in chapter ten. Further discussion on the issues of subjectivity, arbitrariness and ad hoc assumptions are made in the evaluations of the individual estimation strategies. The more detailed discussion that follows immediately below therefore covers shared goods, the budget constraint and changing adult tastes.

### Shared goods and services (allocation problems, economies of scale)

Household expenditure can be categorised in either of the two ways as shown in Figure 3.1 below. Adult goods (A) are made up of adult only (private) goods (AO) such as adult clothes, alcohol and so on, plus the adult share of the shared goods.

**Figure 3.1**

Two ways of categorising household expenditure

adult-only goods (AO)	adult goods (A)
shared goods (S)	
child-only goods (CO)	child goods (C)

The implications of there being significant shared goods in a family household enter the discussion on the cost of children by three main pathways.

#### Allocating the appropriate portion of the cost of shared goods to children.

There are three options for meeting the challenge of the presence of shared goods: deliberately ignore them (eg Piachaud, 1979, 1981; Lovering, 1984; Gronau, 1988); find a constructive way around the problem (as the iso-welfare approaches seek to do); or, devise an allocation rule for apportioning the shared goods among household members.

If the latter course of action is chosen, there is no escape from making an informed judgement as the data itself does not demand a particular rule. The decision effectively comes down to justifying a particular percentage where the question marks are in the third column in Table 3.4

(cf Table 3.1). The simplest allocation rule is the per capita one which will invariably tend to overestimate the child portion (33% in this case). Some form of marginal approach is therefore commonly used.

**Table 3.4**

Simulated attempt at identifying annual expenditures on a child from survey data.

Budget category	Total spending	Child portion	(Estimated) child portion?	Identifiable from survey?
Clothing/footwear	\$1,300	\$350	27%	yes
Other personal effects (eg toys)	350	60	17%	yes
Education related	70	70	100%	yes
Medical/healthcare - excl insurance	180	80	44%	yes
Food	4,000	?	?	no (co-mingled)
Housing	5,800	?	?	no
Household operation	3,300	?	?	in the main, no
Transport	4,000	?	?	in the main, no
Other	6,000	?	?	in the main, no
<b>TOTAL</b>	25,000	?	?	-

#### Economies of scale as household size increases

For the majority of two parent families with one dependent child, there is likely to be some excess capacity in the accommodation arrangements and in the stock of many consumer durables. It could therefore be expected that expenditure data would indicate economies of scale as the family size increases thus making a second child appear to cost less than the first and so on, up to the point where excess capacity is used up.

Similarly the first child may appear 'cheaper' than otherwise if a reasonable proportion of childless couples purchase durables and other items in anticipation of children being added later. The issue for estimating the costs of children is this: how does the researcher take into account the fact that many parents have consumption patterns that are influenced by their anticipation of having (more) children? If 'excessive' purchases are made before they are needed then many methods are likely to underestimate the cost of children and a portion of the observed economies of scale may simply be a reflection of advance purchases occurring<sup>6</sup>.

A factor which further complicates the analysis of the effect of shared goods is that on closer examination not all shared goods are the same. Some are near enough to pure public goods -

<sup>6</sup> cf D4: intertemporal substitution

electric light in a room, security provided by door locks, heat from a fire, the beauty of a picture on the wall, are good examples. Consumption by one family member does not rule out consumption of the same good by another. On the other hand, other shared goods are not even close to being pure public goods, but would better be classed as congestible goods. Examples of these would be a telephone, a shower, refrigerator space and even a dwelling itself. For a three bedroom home, there are definite economies of scale in housing as the household increases from childless couple to a one-child and then a two-child family. The arrival of a third child may require the purchase of a larger home or an extension of the current dwelling if existing bedrooms are small. Different socioeconomic and ethnic groupings would no doubt have different expectations on this one. The presence of a fourth child would almost certainly require a fourth bedroom if at least three are of the same gender and the prevailing social custom of separate bedrooms for girls and boys is accepted. Thus, there is not necessarily a smooth continuity in economies of scale as family size increases - there may even be diseconomies. This is a significant issue in the evaluation of any method for estimating child costs for larger families. Households with four or more children made up only 7 or 8 percent of two parent families with dependent children in New Zealand in 1991, but if it turned out that such a sub-group had more than its fair share of financial hardship or deprivation, then continuing with an economies of scale assumption when in fact there may even be diseconomies could lead to poor policy advice being offered.

*The implications for the 'separability assumption' of the potential interaction between shared and private goods and services .*

The separability assumption is discussed below.

**The budget constraint, changing adult preferences and the separability assumption**

It is difficult to adequately conceptualise child costs in the situation where the number of children in the family increases while the family income remains the same. Unless dissavings or borrowing are possible, total expenditure remains static while some child-related costs increase and other components of the family budget decrease. This is potentially a problem (directly or indirectly) for all methods but it shows up most obviously for the direct method which faces the following dilemma: if all expenditure categories are included then the cost of children turns out to be zero which is an unacceptable result. The usual response is to exclude some categories, but this is similarly unacceptable as it is not at all clear as to what grounds can be given for excluding certain categories from consideration.

Browning (1991a) has examined the question in detail using the 1986 Canadian Family Expenditure Survey (FAMEX). Using multivariate regression techniques he quantified the relationship of expenditure on selected commodities to a wide variety of variables including income, age of children and some socioeconomic factors. For food consumed at home, he

found, as expected, that costs rise with family income and the age of the child. Next he analysed the situation for all food. The same sorts of results emerged as for food at home. As long as these results were considered in isolation from each other there was no problem. However, when the actual numbers were compared it turned out that children's costs for all food were less than for food at home. This is clearly a nonsense.

A stylised version of the situation is shown below in Figure 3.2. From a comparison of spending patterns between the two representative households, cost for children of food at home would be estimated at \$50 per week, while total food costs for children would appear to be only \$30 per week.

The explanation for this strange result is to be found in the changed behaviour of the adults who reduce the amount spent on food away from home once children are added to the household. This change in revealed preferences for the adults means that we are not dealing with 'the same adults' (in an economic sense) in both households, a fact which has quite serious implications when trying to establish equivalent standards of living between household types. As far as the costs of children goes, the implication is that the costs will be underestimated if total food costs are compared. The 'true' child costs for food would be somewhere between thirty and fifty dollars per week.

**Figure 3.2**

Changing food expenditure patterns

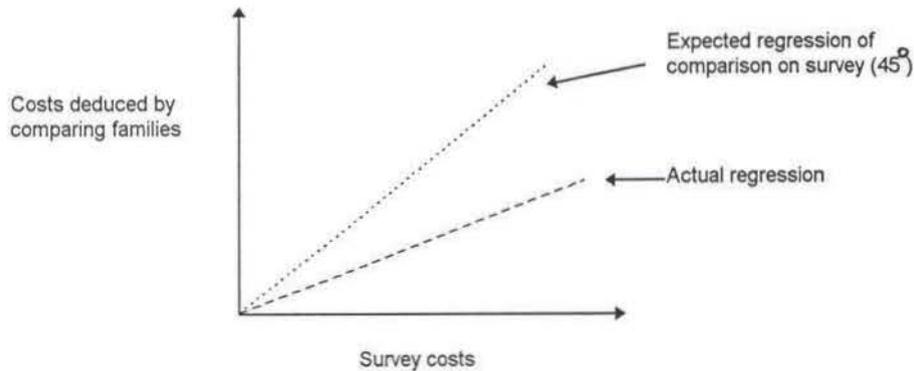


Because of the importance of this matter of the non-constancy of adult tastes as children are added to the household, it is worth looking at another part of Browning's analysis. The FAMEX data breaks down the spending on clothing into adult and child components. This enables a comparison of child costs derived from two sources: the first is based on the difference in the total clothing spending by the two household types and the second is the actual survey results for the one child family. His findings can be summarised graphically as shown below in Figure 3.3. As can be seen, the estimated spending (based on a comparison of the spending of the two families) is systematically lower than the actual spending revealed in the

survey itself. The conclusion is as before: children's costs are underestimated by the direct method because adults' preferences change as children are added.

**Figure 3.3**

Comparison of two methods of obtaining clothing costs for children



There is no doubt that this sort of empirical and theoretical evidence casts serious doubt on the direct approach to estimating child-costs. This is not of great moment in itself as other methods of estimation are available. The problem is that in the process of looking at the issue of 'the budget constraint', evidence has been found which shows that adult preferences and tastes change in the presence of children. This means that there is a major problem for all iso-welfare methods as the adults in the households being compared cannot be counted on as being 'the same'. When changes in consumption patterns occur in association with the addition of children to the household, there is no way of knowing whether these are due to adjustments within the constraint of the budget or to changes of preferences or to a mixture of both. This point lies at the heart of the Pollak and Wales' (1979) criticism of the full utility function equivalence scale methodology and its application to welfare comparisons. This difficulty also forms part of the motivation for estimating child costs in a life-cycle context, recognising that 'children change not only what parents consume but when they consume it' (Banks and Johnson, 1993: 21). The effect of the budget constraint on results using iso-welfare methods is likely to be a downward bias in the estimate of child costs.

The matter has been formalised in the literature under the heading of 'the separability assumption'. The separability of parents' and children's consumption means that the preferences of parents for their own consumption are not affected by the addition of children to the household. It is a crucial assumption for several estimation strategies and is equivalent to claiming that the addition of a child has only an income effect on parent's consumption (ie when a child is added, it is as if the parents had remained childless but their income suddenly dropped, while their preferences remained unchanged). The choice is between maintaining the assumption of unchanging preferences by assuming separability (against which anecdotal and more formal evidence exists), and accepting that the presence of children has more than an

income effect, which introduces an awkward ambiguity into the iso-welfare concept of child costs.

## 4 Concepts of 'The Costs of Children'

At the heart of a conceptual framework for the notion of the costs of children are the various concepts of direct child costs. These seek to give a precise meaning to claims such as 'a child costs \$5000 each year'. This fundamental clarification is examined in detail in the second half of the chapter.

There are however other components which are needed to round out the picture: for example - the direct/indirect costs distinction; the issues raised by the 'who pays?' question; the complications involved in producing child cost estimates; the assumptions about the children, their family and the wider social and economic context in which they and their family are embedded; the identification and critical evaluation of the underlying concepts of any estimation procedure (especially the sophisticated mathematical modelling of household behaviour in the consumer demand theory of microeconomics); issues involving the source and nature of the data drawn upon for making estimates.

Aspects of the conceptual framework that informs the notion of child costs are set out below in summary form in Table 4.1, which also notes where the major discussion of each is located.

**Table 4.1**

Components of the conceptual framework underlying the notion of the cost of children

Component of the conceptual framework	Location of Discussion
<ul style="list-style-type: none"> <li>• the direct/indirect costs distinction</li> </ul>	chapters 2 and 11
<ul style="list-style-type: none"> <li>• issues arising from the 'who pays?' question</li> </ul>	chapter 2
<ul style="list-style-type: none"> <li>• the identification of the complications involved in producing estimates;</li> </ul>	chapter 3
<ul style="list-style-type: none"> <li>• key assumptions about the children, their family and the wider social and economic context in which they are raised</li> </ul>	below
<ul style="list-style-type: none"> <li>• key assumptions about the nature and distribution of household welfare</li> </ul>	chapters 2 and 9
<ul style="list-style-type: none"> <li>• <b>the different concepts of (direct) child costs</b></li> </ul>	<b>later in this chapter</b>
<ul style="list-style-type: none"> <li>• the identification and critical evaluation of key elements in any underlying theories used in estimation strategies (especially the consumer demand theory of microeconomics);</li> </ul>	chapter 9
<ul style="list-style-type: none"> <li>• the source and nature of the data drawn upon.</li> </ul>	chapters 3 and 9

## Key assumptions

- about the children, their family and the social context
- about the nature and distribution of household welfare

For chapters five to ten, seven sets of simplifying assumptions are adopted to keep the analysis manageable and focussed. From time to time, the implications of relaxing or modifying some of them are examined.

- A1 The children are dependents (aged under 18) in a nuclear family headed by an adult couple. This household lives in the suburbs of a city or town in an OECD type country and owns a vehicle.
- A2 No family member has a special healthcare need or disability.
- A3 The costs are the direct financial costs only - for food, clothing, housing, heating, transport, household goods and services, leisure goods and services, and so on. The indirect costs due to loss of opportunity for employment or leisure are excluded at this stage - except in the case of some budget-based estimates.
- A4 All households face the same market prices for goods and services.
- A5 There is an equitable intra-household sharing of resources, so that each household member experiences a similar level of material well-being.
- A6 The well-being of households can be compared.
- A7 In contrast to earlier western societies and some contemporary non-western ones in which the children's labour has considerable value, the children's economic benefit to the household described in Assumption 1 is negligible. Psychological and social benefits (and costs) are ignored, except for the discussion in chapter nine. Table 2.1 is reproduced here for convenience as Table 4.2.

**Table 4.2**

Allocation of costs and benefits in the raising of children

type of benefit or cost	size of benefit	size of cost
social/economic (for society 'as a whole')	considerable	low to modest
economic (for parents)	usually zero	considerable
social/psychological (for parents)	The overwhelming majority of 'cost of children' studies ignore or deliberately set aside the issue of 'the joys and trials of parenthood'. See the chapter ten for a discussion of the matter.	

## Comments on selected assumptions

Assumptions 1, 2 and 5 are discussed below. Discussion of assumptions 6 and 7 belongs more appropriately in chapter nine.

### Assumption 1

*The children are dependents (aged under 18) in a nuclear family headed by an adult couple. This household lives in the suburbs of a city or town in an OECD type country and owns a vehicle.*

This study is about the cost of children, and for the most part the focus is on the 'cost' part of the phrase. It is important, however, to clarify what is meant by a 'child' in this context. A relatively arbitrary line has to be drawn between childhood and adulthood for the purposes of the exercise of estimating child costs as there is no widely recognised 'natural' way to distinguish between those humans who are children and those who are adults. Nor, in the modern world, is there a single recognised rite of passage from childhood to adulthood. Second, children are raised in families (of varying types) and these families are embedded in a particular society. The literature almost without exception assumes that the social setting is that of a developed modern industrial democracy.

This first assumption excludes the following households from consideration: sole parent households, 'households' from a different culture where children 'belong' to a wider group, and households with other family members or boarders living with them. It has already been noted (p8) how the assumption of a nuclear family context is not compatible with the traditional Maori model which is based on the inter-related social organisation of whanau, hapu and iwi. It is acknowledged that this first assumption reflects a particular set of cultural norms which, though predominant in the West, is far from universal.

### Children as those dependents aged under 18

Most of the literature takes the upper age limit of children to be sixteen or seventeen and finds that child costs increase with the age of the child (if child-care costs are excluded). This upper limit is in reasonable harmony with the legal context of the costs of children as provided by the Child Support Act 1991 which sets the limit at 18 years old<sup>1</sup>. There are, however, several reasons for considering that such an approach, while keeping the analysis relatively simple and tidy, has considerable limitations for some policy making and evaluation purposes.

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<sup>1</sup> Under section 72 of the Family Proceedings Act 1980, the upper limit for child maintenance payments was 15 although the courts could deem it in the child's interests to set it as high as 19. This section was repealed in the Family Proceedings Amendment Act 1991, but saved up to 1 July 1998 by section 259 of the Child Support Act 1991 in respect of outstanding liabilities payable before 1 July 1992. This writer has not been able to find any 'positive duty' requirements in law in New Zealand for parents in intact families, except that contained in the 'Objects' of the Child Support Act 1991.

- \* First, in New Zealand just over half of all young adults aged 15 to 24 live with their parents. The proportion drops from virtually 100 per cent for 15 year olds to 50 per cent for 20 year olds and 25 per cent for 24 year olds (Statistics New Zealand, 1994a). A good number of those over eighteen would be to a significant degree (or even fully) economically dependent on their parent(s).
- \* Second, children are staying at home as dependents longer these days. This is a phenomenon that New Zealand shares with many developed countries. Whatever the causes for this change it certainly is relevant to any comprehensive consideration of the costs of children.
- \* Third, recent changes in the levels and structures of fees and subsidies in the tertiary education sector have been brought in with the clear expectation that relatively well-off parents are expected to subsidise their children to some degree. This component of the costs of children may even affect consumption patterns in earlier years if the parents decide to save in anticipation of their children needing assistance later.

#### Blended families

The substantial increase in the number and proportion of sole-parent families and the associated decreasing percentage of two parent families is not the only significant change in the nature of family life in the last two or three decades. The dominant immediate factor behind the proliferation of sole-parent families is the relatively high divorce rate (three times what it was thirty years ago). This same social phenomenon also means that there are many blended or reconstituted families involving children for whom some economic support comes from outside their new family environment. Again the main body of literature is virtually silent on the degree to which the cost of children in such households is different from those for children in intact families.

#### **Assumption 2**

*No family member has a special healthcare need or disability.*

Clearly there are extra economic (and other) costs incurred in caring for a disabled child. The literature reviewed in this report does not estimate these costs - it is a specialist field beyond the scope of this study and in which it is unhelpful or even meaningless to come up with an average figure. A useful starting point for reading in this area is Graham (1987).

#### **Assumption 5**

*There is an equitable intra-household sharing of resources, so that each household member experiences a similar level of material well-being.*

In general, the literature makes the assumption that each family member gets a fair share of the resources available to the household. The 'head' (parents) is effectively assumed to be a benevolent dictator whose allocation decisions maximise the welfare of each member and that of the whole family. How close this model is to reality is open to debate (Chiappori, 1992; Fleming and Easting, 1994; Apps and Rees, 1996). Banks and Johnson (1993) note that:

... the work of Chiappori (1992) ... has shown how to develop a model that can identify sharing rules which allow the economist to focus on the welfare of individual members rather than of the unit as a whole. Sufficiently detailed sub-household-level data are very difficult to find, however, and the estimation of such a rule is extremely complex. (Banks and Johnson, 1993: 22).

Recently Ringen and Halpin (1995) explored the consequences for standard of living comparisons of relaxing the assumption of equity between children and adults. They did this by a theoretical simulation model on the grounds that 'the distribution of consumption well-being within the family may not be observable at all without radically simplifying assumptions which violate the complexities of family arrangements' (p8). Until progress is made on the empirical front, there seems to be little choice but to assume intra-household equity (cf Coulter *et al*, 1992a: 80f). In doing so, it needs to be made clear that '[this] assumption does not imply that each member of the family has equal levels of autonomy, self-esteem, power, etc - it refers solely to material standard of living' (Travers and Richardson 1993: 25). Middleton and colleagues discuss the issue, noting that:

... the financial and material resources of a child derive largely ... from expenditures made on them by other members of the family unit. From the viewpoint of the child, his/her income may be adequate or inadequate irrespective of the level of the family income; income flows from parents (and siblings) to a child are mediated by a complex web of aspirations, power relationships, persuasion and coercion ... our concern with the costs of children is also a concern with the adequacy of the resources reaching them. (Middleton *et al* 1994b: 20).

## Concepts of direct child costs

Given the considerable range of estimates of the direct costs of children it is tempting to hypothesise that matters could be reasonably tidied up by the development and use of a comprehensive and robust conceptual framework for the notion. Different studies may have been asking different questions and estimating different variables. If so, then these differences could perhaps explain a significant proportion of the variation in results.

There is certainly a need for a clear conceptual framework and there can be little doubt that conceptual differences have contributed to the variation in estimates of child costs (eg Tran Nam and Whiteford, 1990; Banks and Johnson, 1993, 1994). However, it would seem that some of the literature (eg van der Gaag, 1982; Deaton and Muellbauer, 1986; Fedyk, 1991a) tends to adopt a rather too optimistic view that expects conceptual refinement in itself to satisfactorily resolve much of the problem of the wide spread of results. As will be shown, none of the currently available methods have completely overcome the fundamental issues posed by the existence of shared goods, the budget constraint, preference modification, the charge of subjectivity and the limitations of the survey data already discussed. Thus, the indecisive results of the empirical work could be as much due to these endemic difficulties as to anything else.

Using a simple taxonomy Robertson (1994) identifies two concepts of child costs, each with its own distinctive associated methodology (see Table 4.3 below). He summarises the two ideas as firstly how much parents would spend on a child to ensure that it was maintained at a nominated standard of living and secondly as how much they 'actually spend'. The former uses a budgetary approach with the content of the basket determined by 'experts', while the latter draws its data from household expenditure surveys.

**Table 4.3**

Concepts of the direct costs of children (Robertson, 1994; cf McDonald, 1990)

	Budgetary	Expenditure
concept of child costs	how much parents would spend to provide a certain standard of living for the child(ren)	how much parents actually spend on their children
methodology	define and cost a basket of goods and services that maintains the children at a certain standard of living	compare the expenditures of families with children with those of childless couples at an equivalent standard of living
type of approach	prescriptive/normative	descriptive/behavioural

This analysis has the virtue of seeking to distinguish between a focus on the standard of living of the child and that of the household as a whole. This is possible in practice to the extent that the child's standard of living depends on his or her consumption of relatively 'private' goods like food and clothes. However, as there are many shared goods (like housing and other durables) that contribute very significantly to the welfare of both the child and the household, the distinction is difficult to maintain if a full estimate of the direct costs of a child is required (in contrast to a partial estimate based on 'child-only' goods). Nevertheless the point about where the focus is to be is well made and will be incorporated into this study's conceptual framework.

There are however some problems with the suggested analysis. It is somewhat misleading to claim that the expenditure methodology as described delivers estimates of what is 'actually' spent in contrast to the budget approach which delivers what 'ought' to be spent if a certain standard of living is to be provided for the child. This dichotomy of 'real' versus 'ideal' is also embraced by the Australian Institute of Family Studies (AIFS) in their regular update of child costs in *Family Matters* (eg McDonald, 1990). The survey-based concept as outlined by Robertson and the AIFS requires the identification of 'equivalent standard of living' when comparing family types. As the choice of method has a significant influence on the estimate of child costs that results, it oversimplifies the matter to say that expenditure based estimates as defined in the simple taxonomy above tell us what families 'actually' spend on children. They tell us only what is 'actually' spent *given a certain concept of equivalent standard of living*, and there is considerable room for differences of judgement to occur over that issue.

The concept of cost as 'what parents actually spend' is an attractive one and is worth retaining - it is its association with the 'equivalent welfare' methodologies that is the problem. Progress can be made by distinguishing two strands in the behavioural/descriptive stream. This distinction is adopted by Browning (1992) in a work in which he examines some of the methodological issues that arise in modelling the effects of children on household behaviour. He claims that 'much of the confusion in the literature on the costs of children arises because four distinct questions are being addressed but they are not always clearly delineated' (p1440). The first one is the very general positive one - how do children affect the expenditure patterns of a household? The remaining three represent three different concepts of the costs of children:

- \* how much income does a family with children need compared with a childless family?
- \* how much do parents spend on their children?
- \* how much income does a family with children require to be as well off as a family with no children?

These questions are incorporated into the summary in Table 4.4 below which also indicates the methodologies Browning associates with each. This is an advance over Robertson, but there is still further refinement required. It is not easy to see the distinction between his 'needs' and 'iso-welfare' questions, except that the former apparently has no reference to a particular standard of living. Without that anchor the concept is ill-defined. With it, it is indistinguishable from the 'iso-welfare' question! It seems better therefore to rework the

**Table 4.4**

Concepts of the direct costs of children - Browning (1992)

	<b>The Needs Question</b> (prescriptive)	<b>The Expenditure Question</b> (descriptive)	<b>The Iso-welfare Question</b> (descriptive)
concepts	How much income does a family with children need compared to a childless family?	How much do parents spend on their children?	How much income does a family with children require to be as well off as a family with no children?
methods	A bundle of goods and services is defined and costed - the basis is expert nutritional and physiological assessments	Direct 'who gets what?' survey approach - problems with shared goods.  Various indirect approaches	Full utility function analysis or reduced form approach using a welfare proxy such as food share (Engel)

conceptual framework as indicated in Table 4.5 below. The solid lines indicate that this report accepts Browning's 'expenditure' and 'iso-welfare' concepts of child costs. The broken line indicates that his 'needs' concept is simply a variant of the iso-welfare concept. The needs concept that this report adopts is defined in the box in the second column at the bottom of Table 4.5.

**Table 4.5**

Modifying Browning

	<b>The Needs Question</b> (prescriptive)	<b>The Expenditure Question</b> (descriptive)	<b>The Iso-welfare Question</b> (descriptive)
Browning	How much income does a family with children need compared to a childless family?	How much do parents spend on their children?	How much income does a family with children require to be as well off as a family with no children?
This report	What are the incremental costs incurred with the addition of a child to a household, with the child maintained at a nominated standard of living?	At a given income level, how much do parents spend on their children?	How much extra income is needed by a family with children to be as well off as a family with no children?

The final step in arriving at the conceptual framework that this study will use involves the modification of three other aspects of Browning's proposal.

In the first place, when he discusses the methodologies associated with the needs question he seems to conflate the idea of a budget approach with that of a proportional approach (p 1441). In the latter the judgement of nutritional experts is used to determine a food costing, then a multiplier (say 3, 4 or 5) is applied to estimate child costs for a nominated standard of living. This is quite different from formulating a budget plan and then costing it.

Secondly, as was indicated in chapter three, when using a budget approach there are two ways of deriving child costs. On the one hand, a basket of goods and services judged to be adequate for the needs of a child living at a certain standard of living in a particular family type can be defined and costed. This will require a decision on allocation rules for shared goods. On the other, a budget for a two parent household with children can be compared with one for a childless couple household at the same or similar standard of living. The difference is taken as a measure of the costs of the children. Oldfield (1992:177f) refers to these as the Itemised Variant (IV) and the Deductive Variant (DV) respectively and more will be said about these two versions later. At present the important issue is that the IV and the DV belong to different concepts of the cost of a child. The IV attempts to answer the needs question, whereas the DV seeks to answer the iso-welfare question.

This leads to the third improvement needed to Browning's schema - namely the breaking of the mentality that links the iso-welfare concept solely with the so-called economic or econometric approaches which use the consumer demand theory of microeconomics as the theoretical framework for deriving equivalence scales from household expenditure data. In Browning's case, this identification leads him to discuss only full utility function based methods and the 'reduced form' approaches (Engel and Rothbarth) under the iso-welfare heading. This is a limited perspective. There are other iso-welfare methods, the DV budget approach being one (see Table 3.3).

The final form of the conceptual framework is laid out in Table 4.6 below.

Table 4.6

Concepts of the direct costs of children

	The Needs Question	The Expenditure Question	The Iso-welfare Question
Formal	What are the incremental costs incurred with the addition of a child to a household, with the child maintained at a nominated standard of living? **	At a given income level, how much do parents spend on their children?	How much extra income is needed by a family with children to be as well off as a family with no children?
One-liner	What parents should spend	What parents do spend	Compensation required to maintain the same welfare
Associated methods	<p><i>Budget</i> - a basket of goods and services is defined and costed (IV option).</p> <p><i>Proportional</i> - a food budget is defined on the basis of expert nutritional opinion or by other means, then multiplied by a factor of <math>n</math> (<math>n</math> is often 3, 4 or 5)</p>	<p><i>Direct</i> - the spending on sets of goods by families with children is compared with that by childless couples. Regression analysis used to control for and tease out the effect of various factors.</p> <p><i>Allocative</i> - obtain a budget profile from HES data then allocate child costs out of each commodity group.</p> <p><i>Survey</i> - work closely with a sample of households using diaries, etc and thus get detailed child-only costs. Allocate cost of shared goods or exclude them.</p> <p><i>Adult Goods</i> - built on two assumptions: (1) adult-only and child-only goods exist. (2) the ratio of adult-only costs to total adult costs is constant across households</p>	<p>Compare the expenditures (or incomes) of different family types deemed to be 'equally well off' using various measures of well-being or standard of living, which are themselves based on data from surveys of household expenditure or from public opinion surveys relating household income and well-being ..... or</p> <p>... use the judgement of experts to define and cost a set of budgets or to build a modular scale:</p> <p><i>Engel (food-share)</i></p> <p><i>Ext Engel ('necessities')</i></p> <p><i>Rothbarth (adult goods)</i></p> <p><i>Sophisticated Engel (PH)</i></p> <p><i>'Utility' function</i></p> <p><i>Subjective (sample opinion)</i></p> <p><i>Savings ratio</i></p> <p><i>Budget (DV)</i></p> <p><i>Deprivation Indices</i></p> <p><i>Arbitrary/modular</i></p> <p><i>Political/Administrative</i></p>

\*\* Note that this question can be split into two subquestions, the one assuming that the existing accommodation and most other consumer durables are adequate for the larger family, the other assuming that a slightly larger dwelling and some more durables are needed as family size increases. The former assumption implies that a more limited and simpler budget estimate is adequate.

## Criteria for assessing the various methods

The next five chapters provide a critical account of the main estimation strategies and their applications by a wide variety of individual researchers and institutions. In order to offer a critique some sort of assessment regime is needed. This section discusses the possibilities and summarises the criteria that will be used.

### A 'horses for courses' model?

Does each concept and/or method fit with a particular policy purpose? If so, then it may be possible to avoid having to decide on the 'best' method and instead settle for the one that is most appropriate for a specified purpose. A 'horses for courses' taxonomy such as this would be elegant and useful, but there is little or no evidence to support the hope. Whiteford (1987) points out that estimates of direct and indirect costs may have different spheres of application. This is a sound and helpful observation, but it is at a high level of generality compared with, say, the seeking of different applications for a utility function strategy as against a subjective or Engel strategy. Browning (1992) claims that each of the concepts has its own domain - child support payments require use of the expenditure concept and the construction of inequality measures requires the iso-welfare concept, which for him means the full utility, Engel or Rothbarth methods, but not the subjective or budget approach. Again, there may be merit in his view but it is still at such a high level of generality that it is of little use for our purposes. This is the closest the literature appears to come to support for a 'horses for courses' model for assessing the worth of the various methods.

### Characteristics of 'good' equivalence scales?

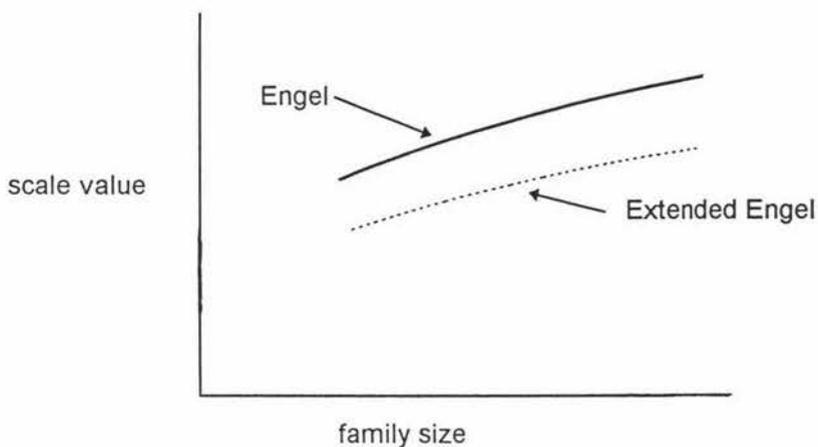
For the iso-welfare approaches a possible basis for judging between the various sets of equivalence scales would be to establish a set of characteristics that acceptable scales should have. Tran Nam and Whiteford (1990) identify four such criteria:

- equivalence scales should be an increasing function of family size at a given reference level of utility, as the well-being of households at a given level of income is a negative function of family size;
- the percentage increases in equivalence scales should diminish with family size because of the economies of scale available to larger households,;
- we should expect different equivalence scales estimated on different baskets of essentials (eg Engel different from extended Engel) because economies of scale are different for different commodities (eg small for food, large for housing); and
- differences in equivalence scales should diminish with increasing income as high income families have more discretion in consumption behaviour.

These are all very sound hypotheses and acceptable scales are likely to show these characteristics, but in terms of criteria for deciding between the scales produced by the various methods they, also, are set at too high a level of generality to be of great use. Graphically, the first three characteristics together require the trend in scales to be as in Figure 4.2 below, which is the shape that most estimation strategies deliver<sup>2</sup>. Unfortunately, the Tran Nam and Whiteford criteria cannot help us with three other features of the graphs: first, at what height the line should start; and second, how 'steep' or 'flat' the curve should be on average; and third, the degree of curvature that is acceptable. Yet these are three of the crucial features on which sets of scales differ.

**Figure 4.2**

The shape of acceptable scales (Tran Nam and Whiteford, 1991)



Researchers working on income distribution studies also face the question of choosing 'the best scale' for their analysis. One way that it is dealt with in that context is to use different sets of scales to conduct sensitivity tests for, say, measured inequality or poverty (Coulter *et al*, 1992a). There is, unfortunately, no equivalent sensitivity test available for child costs, as using a different set of scales is *ipso facto* making different assumptions about child costs.

<sup>2</sup> The purist will have already observed that it is not technically correct to draw a line to represent a set of scales. Rather there should simply be a series of points corresponding to the obvious reality that households have only integral numbers of members! However, in order to provide a more satisfying visual image, this report will use lines in all such graphs. [Note: as some children who are not living with both biological parents are supported by more than one household, some sole-parent and blended or reconstituted families may, in effect, not have an integral number of members. A child could, for example, be equivalent to 0.9 of a child for one household and 0.1 for the other.]

## **Beyond nihilism?**

The above discussion is not meant to imply that 'anything goes' when it comes to producing estimates of child costs. While this paper will argue in detail in chapters seven and nine that there can be no single definitive estimate, and that the best that can be done (beyond the sort of generalities noted above) is to produce 'plausible' or 'credible' estimates, there are some general questions that can be addressed to each method and for those that are built on a particular theoretical base, some probing of that underpinning.

### **For all methods**

- how does it deal with the general problems and any subsequent issues?
- how well does it fit with the concept of child costs it purports to estimate?
- is there consistency in the results that are produced?
- is there any known bias?
- can it cope (how flexible/effective is it) with relaxing the assumptions?

### **Where there is a theoretical base**

- is there internal coherence?
- do the assumptions appear sound?
- is there consistency in the results produced?
- is there any evidence of misplaced sophistication?

The above questions will guide the critique of the next five chapters.

## 5 The Needs Question

The first of the three concepts of the costs of children identified in this study is the one which underlies the 'needs' question - what expenditure is needed to maintain a child at a nominated standard of living? In other words, how much 'should' be spent on children? The main method used to answer this question is the budget standard or 'expert' method in which an appropriate basket of goods is defined then costed.<sup>1</sup> Bradshaw (1993) provides a comprehensive statement of what is entailed:

The task of those who are drawing up a budget is to decide what *items* are included in the budget, what *quantity* of items are included, what *quality* the item should have, what *price* should be given it, and where items are purchased intermittently or occasionally, what *lifetime* should be attributed to them (Bradshaw, 1993: 3, emphasis in the original).

Budget standards have a long history as a method of investigating living standards. They were pioneered at the turn of the century by Joseph Rowntree in his studies of poverty in York in England and used by William Beveridge in his influential report in 1942 in the United Kingdom. Following the Second World War the methodology 'went into the doldrums' and has remained 'deeply unfashionable' (Bradshaw, 1993:1f) in the UK, although others in both North America and Europe have pursued it. The budget standards option fell out of favour mainly because it was perceived to be too dependent on the experts' judgement and therefore lacking scientific rigour. In the last decade or so the strategy has been returned to some modicum of respectability with a considerable amount of the energy for that change coming from the work of Jonathan Bradshaw and colleagues at the Social Policy Research Unit (SPRU) established at the University of York.

A preliminary consideration in using the budget approach is to decide which, if any, shared goods are to be included in the estimates. If it is decided to include some then, broadly speaking, there are two ways of arriving at an estimate of child costs. In the first, some means has to be found to reasonably allocate to the child(ren) the appropriate percentage of the cost of each shared expenditure item. In the second, full budgets are required for a reference household (say, a couple) and for another (say, a couple and one child). The child costs are then calculated as the difference between the two. Oldfield (1992) refers to these as the itemised variant (IV) and the deductive variant (DV) respectively. In terms of the conceptual framework adopted by this study the latter sits more comfortably with the iso-welfare concept. Whichever is used, it is of great importance that the budget developers and the community have a clear idea about the standard of living that the budget is intended to reflect.

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<sup>1</sup> The proportional method can be seen as a mix of the Engel and budget standards methods. It estimates the total child budget by applying a multiplier (usually an integer - 3, 4 or 5) to a food budget. This approach is likely to overstate the costs of teenagers *vis-à-vis* younger children because of the considerably higher food intake of the former. It will not be considered in detail in this report.

The first two of the six studies reported on below almost entirely omit shared goods from their budget lists (Piachaud, Lovering). The sixth is a much more comprehensive work (Oldfield) which consciously adopts the IV method even though the DV alternative was available.

## Piachaud (1979, 1981)

The study was carried out by David Piachaud under the auspices of the Child Poverty Action Group (CPAG) and was concerned with two questions: evaluating the adequacy of the provision for children living in families dependent on social security and estimating how many children were living in poverty in Britain. Piachaud defined a basket of goods that he considered met 'modern minimum requirements' according to his perception of prevailing social attitudes and standards, noting that his minimum is not merely that 'necessary to maintain life'. He costed it in 1979 for children aged 2, 5, 8 and 11 who are all assumed to be living with their two parent families and in 1981 updated these costings (based on the same basket) and extended the age-range to include 14 and 15 year olds by using a survey of 91 teenagers from four comprehensive schools in south-east England. In the next section the basket is opened and, despite Piachaud's claim to be going beyond subsistence, it is quite clear why no reviews thought he was over-generous.

### Variables and methodology

The expenditure variables estimated for the younger children were food, clothing and footwear, some household costs, toys, presents and pocket money, school trips, entertainment and holidays. No allowance was made for child-care costs, transport or medical needs. The study bypassed the issue of shared goods by omitting most of them - there is no estimation of transport or housing costs nor any allocation for household durables. For the teenagers, food and household goods were estimated in the same way as for the younger children, but the other categories were estimated by the teenagers themselves or their parents. The survey of the teenage group allowed two estimates to be produced - what was actually spent by the teenagers themselves plus their parents' spending on them and a minimum needs figure from the teenagers alone. The following schedule gives an indication of the makeup of each expenditure category and the method used to estimate each.

#### *Food*

Food requirements are based on the quantities contained in a 'low-cost' diet in a US study of nutrition carried out by Bowes and Church (1970) which Piachaud converted into a three day cycle of menus and priced at the London supermarket of *Safeways*. The diet is based on a bare minimum standard of living and no snacks between meals and no 'treats' (icecreams) are allowed for. Within the limitations of this bare minimum, the study accepts that 'a compromise

reconciling nutritional needs, acceptability and economy is inevitable'. Teenage costs were taken to be 10 percent above those for an 11 year old.

#### *Clothing and footwear*

Estimates of minimum requirements for clothing and footwear for non-teenage boys and girls were arrived at by 'talking to mothers (and, in most cases, reducing their estimates)'. No further detail is given on just which mothers were talked to nor the precise process for reaching a consensus. The annual estimates he produces are for a 'flow' rather than a 'stock' of clothes. For example, the fact that he costs half a coat does not imply that a child wears a half-coat, but rather that one coat lasts two years. The study assumes that a child passes on as many hand-me-downs as it receives. Having established the items needed to be purchased over a year, he then costed them at *Marks and Spencers* and converted to a weekly sum.

#### *Household costs (including 'fuel')*

Very few items are included here - linen, the washing of clothes, toilet goods, heating and lighting. The last two are estimated on a marginal cost basis, assuming that most of the house would have been heated and lit anyway. Teenagers are assumed to have the same heating and lighting needs as younger children, an assumption which Piachaud considers will underestimate teenage costs. Despite the limited nature of the list, what is included accounts for 9 to 12 percent of his total estimates for the younger children.

#### *Toys, presents and pocket money*

Once again the bare minimum is prescribed - presents for the child's birthday and for Christmas, with the amount allowed for each occasion being around \$16 (1992 NZ dollars) for an 11 year old, and pocket money of \$2.20 per week for the same age group. The pocket money amount is about half that typically being received as indicated by a 1977 Gallup Poll.

#### *Costs of schooling*

Numerous expenses arise even for primary school students in a 'free' educational system. Piachaud identifies school trips as an important cost and allows for them and little else in his \$35 per year for an 11 year old.

#### *Entertainments and Holidays*

One low-cost holiday and four outings per year are allowed for. The estimate of about \$13 for each outing includes all costs - transport, entry fees and refreshments.

#### *Other costs*

No other costs are taken into account.

## Results

The study does not distinguish along gender lines for the younger children, but does for the teenagers. Teenage girls spent much more on clothes and toilet goods, but less on entertainment and hobbies than boys. The total expenditure recorded for the girls was on average around 25 percent more than for the boys. No economies of scale are assumed in the variables estimated for any age group. By contrast, it is assumed that there are considerable such economies in housing, the cost for which is not included. Table 5.1 summarises his findings for the five age groups and converts the figures to 1992 New Zealand dollars<sup>2</sup>.

**Table 5.1**

Piachaud (1981) results in 1992 NZ dollars

Age of child	2	5	8	11	14/15
1981 pounds	8.32	9.45	11.42	12.10	21.90
1992 NZ \$	38	43	52	56	101

## Lovering (1984)

The most detailed study using the budget method done to date in Australia was conducted by Kerry Lovering in association with the Australian Institute of Family Studies (AIFS). Her paper is essentially an attempt to replicate Piachaud's earlier work.

### Variables and methodology

Like Piachaud, Lovering overcame the problem of the allocation of costs for shared goods by omitting them. The rationale for this limited approach was informed in part by the Institute's judgement that a full scale study of the costs of children was "premature", and in part by perceived technical problems such as those caused by the wide variation in housing costs across states and families. So, her basket excludes the child-related costs of housing, transport, child care, medical costs, school fees and uniforms. It includes food, clothing, fuel, household provisions (excluding durables), costs of schooling other than school fees and uniforms, gifts, pocket money and entertainment. The Institute publishes updates each quarter on the basis of changes in the consumer price index and these estimates repeat Lovering's own reminder that the figures are not for the cost of a child, but only for part of the costs of a child.

<sup>2</sup> See Appendix A for a discussion of conversion methodology

A difference from the Piachaud work is the inclusion of estimates for two levels of family income - low and middle. Only the middle income family estimates allow for a holiday.

The following schedule gives an indication of the makeup of each expenditure category and the method used to estimate each.

### *Food*

Lovering considers a variety of food plans from other studies for inclusion in her estimates. All of them show that food costs increase with the age of the child. For her low income budget she uses Piachaud's diet costed in Australia except that she allows 20 percent extra for teenagers compared with Piachaud's 10 percent. This extra allowance was based in part on the results of a food plan prepared for the AIFS by a home economist at the Home Economics department of Victoria College. The estimates based on this food plan suggested that Piachaud's 'guesstimate' of an extra 10 percent for teenagers was unrealistically low. Furthermore, they were also on average 50 percent higher than his. For Lovering's medium income budget these higher figures were used.

### *Clothing and footwear*

For the younger children, Lovering uses Piachaud's list to estimate the low income costs. For the medium income budget, the figures produced in 1981 by the Australian Family Group Homes cottage mothers are used. These are 60 to 100 percent above those of Piachaud. Clothing costs for teenagers at the two income levels appear to be intelligent guesses only.

### *Household Provisions*

Piachaud is followed for the low income group, while the estimate for the medium income group is based on a case study of one family with three teenagers. Apart from the reference to Piachaud and another to 'toiletries and cleaning materials', the study does not make it clear what is included in this category. It cannot be very much as the allowance amounts to only 3 to 5 percent of the total for the younger children and 2 percent for the teenagers.

### *Heating and Lighting*

In contrast to Piachaud's marginal approach, Lovering used the average cost per person method, based on a paper produced by the Victorian Department of Minerals and Energy in 1983.

### *Pocket money*

The estimates are based on a survey done by the Institute in 1983 plus some 'guesstimating' for the teenagers.

### *Schooling*

A minimal allowance is made for 'schooling sundries' in line with the results of the ACOSS (Australian Council of Social Services) study of 90 low income families in Sydney by Smith in 1982. No allowance is made for uniforms. The teenage estimates are 4 to 6 times higher than

for the younger children. No tertiary education fees are included. This could be because the estimates are for younger teenagers (as in Piachaud) or it could be another deliberate omission. The report does not indicate which is the case.

#### *Entertainments*

The study notes the difficulty in assigning costs in this area, given the wide range of behaviour patterns in the community. The ACOSS study figures are used for the medium income group and half these for the low income group, even though that study was for low income families.

#### *Gifts*

An arbitrary amount is assigned for these items at a much lower level than Piachaud.

#### *Holidays*

Lovering considers that costing holidays for low income households is irrelevant as so many do not have holidays. She estimates that a two week holiday at the beach for a family of four with a medium income would cost at least \$450 (1992 NZ dollars), but there is no indication on key issues such as whether this is gross or net or whether transport is included.

#### *Other costs*

No other costs are taken into account

## **Results**

Table 5.2 summarises her findings for the five age groups and converts the figures to 1992 New Zealand dollars. The Australian figures are for the June quarter 1992.

**Table 5.2**

Lovering (1983) results in 1992 NZ dollars

Age of child	2	5	8	11	teenage
1992 Aus \$ <i>low income</i>	28.46	36.51	44.76	47.50	70.73
1992 Aus \$ <i>avg income</i>	42.81	48.05	61.99	78.26	117.67
1992 NZ \$ <i>Lovering low</i>	33	43	52	55	82
1992 NZ \$ <i>Lovering avg</i>	50	56	72	91	137

Source: Australian Institute of Family Studies (1993)

## Middleton et al (1994b)

A team headed by Sue Middleton from the Centre for Research on Social Policy (CRSP) at Loughborough University has carried out development work to investigate the feasibility of carrying out a national survey of family expenditures on children.

The objectives the survey include the measurement of family spending on children, the determination of the nature and extent of extra-household support for children, the investigation of variations in childhood living standards with family income and the estimation of the extent and severity of childhood poverty and deprivation. The project was commissioned by the Joseph Rowntree Foundation and is being carried out in association with CPAG.

The aims of the development phase (reported on in Middleton et al, 1994) were:

- \* to develop instrumentation for measuring expenditures on children;
- \* to derive minimum budget standards for children of differing ages using groups of parents as 'budget standards committees'; and,
- \* to explore the experiences and aspirations of children and the extent to which these could be incorporated into the national survey.

These goals have been achieved and the development phase report published. The intention was to proceed with a national survey using a pre-stratified sample of 1280 children, but the results of that research were not available before this study went to print.

In terms of the conceptual framework of this report, the budget standards estimates derived in the developmental phase clearly address the needs question while the survey itself addresses the expenditure question. The 'minimum essential' budget standard is somewhat similar in content to Piachaud's. It includes food, clothing, possessions (including colour TV costs allocated per capita and an allowance for baby equipment), activities, some furniture and decorating, laundry and toiletries. No allowance was made for transport, housing, fuel or pocket money.

A feature of the results shown in Table 5.3 below is that there is no clear pattern of child costs increasing with age as there is in most other estimates of child costs, irrespective of method.

**Table 5.3**

Middleton et al (1994) results in 1992 NZ dollars

Age of child	under 2	2 - 5	6 - 10	11 - 16
1994 pounds	26.41	31.49	27.90	31.06
1992 NZ \$	62	74	66	73

## New York Community Council (1982)

The NYCC budget standard approach<sup>3</sup> used eight categories in its process of estimation: food, clothing, fuel, personal care, household equipment, leisure/education, transport and miscellaneous. Various methods were employed to derive the expenditure required for each component. The food budget was built from an existing dietary schedule and consumption patterns revealed by New York survey data. Clothing budgets were based on survey data for quantities and types of clothing and then were priced taking into account average replacement rates. Fuel and household equipment were allocated on a per capita basis, assuming no significant variation with age. The personal care and leisure/education components were based on survey data, while the transport and miscellaneous components were simply given a certain percentage of the total budget. No transport costs were allowed for children under twelve. Healthcare and housing costs are not taken into account for any age. The estimate for children under eleven is \$63 per week (1992 NZ dollars) and for older children is \$102.

The main reason for including the NYCC estimates in this report is that Henderson (1975) in Australia and Easton (1974) in New Zealand used it as a basis for their budget based equivalence scale estimates (see chapter ten).

## Social Planning Council of Metropolitan Toronto (1987)<sup>4</sup>

The SPCMT budget gives costs for children for food, clothing, personal care, public transportation, school needs, recreation, housing, health and home maintenance, baby sitting and child care. The food budget is 'designed to ensure adequate nutrition at a moderate cost' and is based on recommendations from the Department of Health and Welfare.

The Toronto estimate uses the terms babysitting and child care in the same way as this study. Child care is purchased to allow both parents to be in employment. Child care costs for preschoolers ('daycare') are set at around \$8,000, some 40% higher than the total direct costs budget for that age-group if babysitting is included in the budget and 80% higher when it is excluded.

The budget allows for higher food costs for older teenage males than for females of the same age, but the reverse holds for clothing. Overall, 16 year old females are allocated just under 5% less than their male counterparts. This difference is in the opposite direction to that of Piachaud's finding noted above.

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<sup>3</sup> The primary source was not available. This section is based on the summary and conversion for UK conditions by Mitchell and Cooke (1988).

<sup>4</sup> The primary source was not available. The summary is drawn from Browning (1991: pp16f and Table 3.1.1).

The figures in the table below (Table 5.4) are those for female 4 and 10 year olds and for the average of male and female figures for the 16 year olds. The \$110 pw estimate for 4 year olds includes a fairly generous \$24 pw for babysitting costs.

The source did not give any indication of what standard of living the budget is reflecting.

**Table 5.4**

Child costs based on the budgets of the Social Planning Council of Metropolitan Toronto

Age of child	4	10	16
1986 Canadian \$	72	73	94
1992 NZ \$	110	112	143

## Oldfield (1992)

Nina Oldfield's study emerges from a two year research programme carried out under the leadership of Jonathan Bradshaw at the Family Budget Unit (FBU) of the Department of Social Policy and Social Work of the University of York.<sup>5</sup> The FBU program is much more ambitious than that of Piachaud and Lovering and indeed any other budget standards type study that was found in this literature search. It was set up to develop a detailed UK budget standard which promotes a healthy lifestyle at a 'modest-but-adequate' standard of living. In seeking to give some substance to 'modest-but-adequate', Oldfield notes that it is intended to be similar to what the Watts Committee in the United States called the 'Prevailing Family Standard' which was defined as:

[a] standard which affords full opportunity to participate in contemporary society and the basic options it offers. It is moderate in the sense of lying both well above the requirements of survival and decency and well below the levels of luxury as generally understood (Watts, 1980: vii).

Watts used the median income of a families with two children to represent this standard. The FBU standard appears similar in that the standard of living described by 'modest-but-adequate' is that of families with three children who have an income that is 'within the third quintile' (Bradshaw 1993: 176). In New Zealand terms this would be a pre-tax household income of around \$35,000.

<sup>5</sup> A comprehensive report of the results of the FBU research program is given in Bradshaw (1993). A trimmed down version of Oldfield (1992) is included as chapter 12 in Bradshaw. The numerical estimates are the same in each.

## Details on variables and methodology

The FBU has developed budgets for six different household types at the 'modest-but-adequate' standard of living:

- single man, aged 30
- single woman, aged 72
- two adults, man 34, woman 32
- two adults, two children - man 34, woman 32, girl 4, boy 10
- two adults, two children - man 37, woman 35, boy 10, girl 16
- one adult, two children - woman 32, girl 4, boy 10

To derive budget standards for model families many assumptions have to be made regarding patterns of behaviour for these families, the more obvious being in relation to work, school, housing circumstances and leisure activities. In this study

it is assumed that all of the adults of working age are engaged in full-time employment, with the exception of the mothers in the two parent families who work part-time ... The teenager is in full-time schooling ... households have access to a moderately priced second-hand car ... and the housing tenure of the families owner-occupier or local authority renters (p3).

The budgets are net consumption budgets which means that the figures produced describe the total spending from a variety of 'income' sources such as savings, loans and credit as well as net income after deductions for tax and pensions. Within-family transfers of money through gifts, loans, pocket money and the like are not separately identified as such, but are represented by items of expenditure in the relevant expenditure category.

Oldfield uses the IV method although some comparison with the DV is given from time to time. Thus, the major challenge is to find some means to reasonably allocate to the child(ren) the appropriate proportion of the cost of each budget category which is to some degree shared.

The following schedule gives an indication of the makeup of each expenditure category, how the cost of each was estimated and the method used for apportioning child costs in the case of shared goods. The FBU focus was on two-child families and the average cost per child in that context. Oldfield has a section (pp97ff) where she makes adjustments for the one-child family. This allows her to check if there are any economies of scale as family size increases.

### *Housing*

For each of the three household types containing two adults, Oldfield gives three housing figures: one for rented accommodation, one for owner-occupied with a new mortgage and one for owner-occupied with an established mortgage (about 10 years). For the latter two, the figures include allowances for principal and interest repayments, mortgage protection premium,

insurance, water and sewerage rates, community charge<sup>6</sup> and housing decoration and repair. The choice of dwelling for each household type, whether rental or owner-occupied, is determined by local and central government guidelines. Each component of the housing cost is considered separately in relation to determining the proportion to be allocated to child costs, with some like external maintenance being ignored and others like the mortgage repayments being allocated on a marginal cost basis, with the costs for two adults taken as the reference. Overall, around 10 to 12 percent of housing costs are allocated to each child in a two child household and the housing component represents about 12 to 14 percent of the total child costs estimate. Given that one child families are assumed to live in the same size dwelling as two child families, this costing method has a considerable economy of scale built in. Unfortunately, this study does not provide estimates for households with more than two children.

### *Fuel*

The total household fuel bill is estimated using 'expert normative' methods on the assumption that people should be warm and comfortable in their homes - this is the 'modest-but-adequate' standard compared with Piachaud's 'modern minimum'. The FBU study makes use of a computer simulation model called BREDEM 8<sup>7</sup> which takes account of a range of factors including dwelling construction, dwelling size, room sizes and number of people in the household. Oldfield recognises the difficulty of deciding on a reasonable method of allocating the child-induced component of the total fuel bill, settling in the end on a modified BREDEM approach. The major adjustment is to assume that the two-adult household lives in the same size dwelling as the families with children, thus removing the extra cost arising from the increased house size as distinct from those arising in a more direct manner from the presence of children. In the end about 11 to 16 percent of the total fuel bill is allocated to each child, depending on the sort of dwelling and the family 'age'.

### *Food*

The FBU food budget standard is determined from behavioural evidence about what household food consumption is in reality and from expert judgements about what household food consumption should be. Surveys such as the National Food Survey and the Family Expenditure Survey are used to generate a diet profile which is adjusted by nutritional experts with the result that the profile shifts towards a diet that is lower in fat and sugar and higher in dietary fibre, for example. A proportional approach is used to estimate the weekly food cost of a child, the proportions being determined by the distribution of energy and nutrient need within households. The proportions are gender and age dependent with a greater allowance for males and older children.

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<sup>6</sup> A component of 'rates' in New Zealand terms

<sup>7</sup> BREDEM = Building Research Establishment Domestic Energy Model.

### *Clothing*

The FBU clothing budgets are estimated from a set of seasonally adjusted clothing lists for each individual according to age, gender, and the family's work, school, home and leisure activities. School uniforms are included and the wardrobe is made up of new clothes only. It is assumed that there are no hand-me-downs, no sharing between siblings and no home-made<sup>8</sup> clothes. Given that the individual budgets are already in place, the allocation of child costs is relatively simple. The main issue is which figure to use for the annual cost - is it simply the total spending in the year or should some allowance be made for expected lifetimes of the items when they go beyond a year? Oldfield (and the FBU) opt for the latter approach, a decision which has an interesting gender implication. Oldfield accepts that at 16 years, girls' aggregate clothing costs are considerably more than for boys of the same age. However, when lifetimes are taken into account, the trend reverses as boys have a higher growth rate than girls and this results in a high replacement rate. For households with two adults and two children the clothing estimate is more than twice that for two adults alone.

### *Household goods and services*

In contrast to Piachaud and Lovering, Oldfield makes a substantial allowance for expenditure in this category - around 11 percent of the total budget for households with children. Her list includes furniture, floor covering, appliances, stationery, cleaning products, pet food and accessories, telephone costs and drycleaning. For the household goods the estimated lifetimes are determined by informed guesses from experts. In allocating the appropriate proportion to child costs, an item by item approach is used. For example, the capital cost of a particular child's bedroom furnishings is allocated 100 percent, whereas only a small percentage of general furniture costs are counted and none of the pet costs.

### *Child care*

Oldfield recognises that her decision to include child-care costs to the extent that she does is debatable in that it flies in the face of extensive behavioural information which indicates that the most common arrangement overall in families with working mothers is informal, unpaid child-care. The child care estimates are split into 'child minding' during the period that the mother is at work (around 800 hours per year) and 'babysitting' costs for leisure pursuits. Older teenagers are assumed to provide some 'free' labour in this latter area. The allowance of around 15-20 hours a week for employment-related child minding for younger children lies somewhere between the assumptions of 'no allowance' and 'full care for employment hours including travel'. In terms of the conceptual framework of this report, the child-minding component is an indirect cost, but it is included here for completeness.

### *Transport*

The FBU budget figures for transport are 'based largely on normative judgements informed by behavioural data from sources such as the 1985-86 *National Transport Survey*' (p63). Each

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<sup>8</sup> The household goods and services budget includes an allowance for a sewing machine. Presumably this is for repairs to clothes or 'hobby' sewing?

household is assumed to own a small to medium sized five year old car and each child has its own bicycle. The costs for these cycles for the younger children is included in the leisure budget. In estimating the child cost component of transport costs the FBU and Oldfield are aware of the great variation in circumstances for each household - location relative to common destinations, quality of public services, tastes and so on. By limiting the analysis to families with only two children this study does not have to include any allowance for the purchase of a larger vehicle 'to fit all the kids in'.

#### *Leisure goods and services*

The study recognises that because of the great diversity of preferences and abilities 'leisure is a difficult component to construct within a family budget' (p71). The general approach is that of intelligent estimates informed to some degree by behavioural data from surveys.

#### *Personal care*

The personal care budget for a child is small both in comparison to other components of the child's budget and in relation to the amount allocated for adults. Oldfield identifies two reasons for this - the state meets healthcare costs and cultural norms encourage simple personal hygiene ideals and 'no cosmetics' for younger children and males.

## Results

Table 5.5 shows how child costs increase with age as long as child-care costs are excluded. Once these are included the only age-factor conclusion is that 'middle-aged' children are somewhat less costly than their younger and older counterparts. In line with the focus of the FBU work the figures are average amounts per child in a two child family. Regarding the effect of family size, Oldfield found that 'economies of scale are greatest in housing costs for children of all ages' (p 100). Table 5.6 shows that the economies of scale are not very great when housing and childcare are excluded.

Only minor gender differences were found in costs for children of similar ages, with boys costing slightly more in the older age-groups (in contrast to Piachaud, but similar to Toronto).

**Table 5.5**

Oldfield (1992) results by age, with and without childcare costs (average cost per child).

Age of child	4		10		16	
	total	no child care	total	no child care	total	no child care
1991 pounds	60	42	55	50	64	64
1992 NZ \$	156	109	141	129	164	164

**Table 5.6**

Oldfield (1992) results by age for family size variation(excluding housing and child care)

Age of child (sibling numbers)	4		10		16	
	(1)	(2)	(1)	(2)	(1)	(2)
1991 pounds	37	35	47	44	59	57
1992 NZ \$	93	87	116	110	145	142

## Summary of Results

The results of the budgets reported above are summarised in Table 5.7 below. To make meaningful cross-national comparisons is a challenge in itself (*pace* purchasing power parities) but the exercise is further complicated by the inclusion or exclusion of shared goods, the different treatment of housing, the inclusion or exclusion of child care, the amounts of child care included and the standard of living that each budget reflects. The figures in the table need to be treated with care. Given the comprehensive nature of the FBU study, it will be used as a benchmark at times in the rest of the report.

**Table 5.7**

Various budget-based results compared in 1992 NZ dollars

Source	Budget detail	Age of child (yrs)		
		4/5	10/11	14/16
Piachaud - modern minimum	virtually no shared goods	43	56	101
Lovering - low income	virtually no shared goods	43	55	82
Middleton - minimum essential	virtually no shared goods	74	66	73
Lovering - middle income		56	91	137
Toronto (babysitting deducted)	no housing or childcare	61	81	118
Oldfield - modest-but-adequate	no housing or child care	85	103	137
Toronto (babysitting included)	with housing & childcare	263	112	143
Oldfield - modest-but-adequate	with housing & child care	156	141	164

For non-teenagers, given that Lovering broadly followed Piachaud, one would expect comparable figures for Piachaud and Lovering's low income estimates. This is indeed the case. Middleton is higher than both these, but the use of parents as the experts makes the methodology a little different. Lovering's middle income figures are higher than her low income ones, a result that is consistent with the observation that parents spend what they can on their children. That Oldfield's results are somewhat higher than Lovering's middle income ones for these younger children can (at least in part) be explained by the fact that Oldfield includes a wider range of items in most of her expenditure categories (eg an allowance for some durables and school uniforms).

Not too much should be read into the apparent discrepancies in the teenage results. In the first place quite different methodologies were used. Piachaud used a survey of 91 teenagers (and their parents), while Lovering used 'guesstimates' and guidelines developed by the University of Melbourne for students and Oldfield used a range of methods (including 'expert' sources) to estimate teenage costs. Secondly, the University's guidelines allowed nothing for either clothing or general household provisions and in the low income option were particularly miserly regarding gifts, pocket money and entertainment.

## Evaluation and Commentary

The budget standards option fell out of favour mainly because it was perceived to be too 'subjective', too likely to be culturally conditioned, likely to date too quickly, open to political manipulation and likely to be out of kilter with how families actually lived. Its demise coincided with (and was undoubtedly aided by) two closely related phenomena: the abandonment of an absolute concept of poverty and the rise of the relative view, and the coming into favour among economists of the view that it was more 'scientific' and more 'objective' to use behavioural data rather than the opinions and judgements of experts (cf Stanton, 1973; Nicholson, 1976).

Many in the academic community (especially economists) ignored the approach altogether. The quote below comes from the final paragraph of an otherwise helpful paper from Jaques van der Gaag (1982) of the University of Wisconsin's Institute for Research on Poverty. While accepting the place of the subjective method ('direct measurement' in the quote) there is no place in his scheme of things for a budget method:

The approaches that do not fit within the utility-maximising framework are all based on questionable or imprecise definitions of the cost of a child. It seems unlikely that further work in these directions will lead to better estimates of a child's costs. It is more likely that improvements of the cost estimates will come from further developments in consumer demand analysis and in the direct measurement of individual welfare functions (van der Gaag, 1982: 107).

Even as late as 1990, when the Canadian Family Law Committee called for proposals on how the costs of raising children in Canada should be estimated, each of the three contenders explicitly opted for a behavioural method based on expenditure data rather than a budget standards approach (Family Law Committee (Canada), 1992).

In the last decade or so, 'expert opinion over the value of budget standards has begun to change' (Saunders, 1996: 8), given momentum to a considerable degree by the work of Jonathan Bradshaw and others at the Social Policy Research Unit (SPRU) of the University of York (cf Bradshaw *et al*, 1987). Using this research programme as a model, the Social Policy Research Centre of the University of New South Wales has begun to develop a set of budget standards for Australia. This work was commissioned by the Department of Social Security and is due for completion in late 1997. The use of budget standards has also featured prominently in recent American work on family budgets (eg Renwick and Bergmann, 1993) and as a basis for revising the US poverty line (Ruggles, 1990). The extent to which the method has been revitalised in recent poverty research is illustrated by the fact that the World Bank has used a version of the budget standards methodology for advising developing countries on minimum income standards (World Bank, 1990; Chen, Datt and Ravallion, 1994).

The attraction of this approach is its relative simplicity and clarity. Although Oldfield's report shows the very detailed nature of the decisions about what does and does not go on the various lists, it is still a reasonably commonsense approach. It is also flexible enough to be able to include various child variables such as age and gender and the data requirements are not demanding.

Although the more positive evaluation of the method 'is indicative of its underlying strength' (Saunders, 1996: 13), the approach does have its limitations.

### **Shared goods and services**

Piachaud, Lovering, Middleton and the NYCC omit almost all the costs of shared goods. This can be seen as a decision to put the issue in the 'too-hard' basket (Lovering 1984: 9) or as representing an essentially philosophical position which assigns most of the shared costs to the adult(s). The FBU work tackles the allocation problem using a marginal cost approach informed in many circumstances by surveys and previous research.

### **Subjectivity**

The charges of subjectivity and ad hoc judgement are two of the more common criticisms of the budget method *per se*. There is no doubt that judgement is involved and that the experts' values and perception of society's dominant cultural norms have a significant effect on the

content of the various lists. This acknowledgement is not, however, the same as accepting that the method is 'fatally flawed'.

Firstly, the view has sometimes been expressed that the budget standards approach claims objectivity and scientific rigour, then arguments are mounted to show the claim to be incorrect and the method itself is dismissed. For example, when reviewing the potential contribution of budget standards to social security reform in Australia, Stanton (1973: 25) argued that '[t]he various arbitrary judgements that have to be made rob the budgetary approach of its claim to be based on scientific rigor with minimum attention to value judgements'. There have no doubt been those who in the past have made such claims about the strategy, but to raise it today would be to erect a straw man. It is widely accepted that the method requires judgements to be made and the issue becomes 'not how to avoid judgements, but rather how the judgements are to be formulated and articulated, and how they are to be tested against prevailing social attitudes and values' (Saunders, 1996: 15).

Secondly, and providing counterpoint to the first, the alternative methodologies are themselves not purely objective. Thirty years ago Harold Watts could claim (with impunity) of the Engel methodology that 'the procedure's most certain advantage lies in its objectivity - it can be calculated directly from measures of observable household behaviour as reflected in available data' (Watts, 1967: 6). In many quarters today, such a claim would be viewed with suspicion if not incredulity given the arbitrary nature of the choice of proxy for well-being (food-share). Piachaud (1979) gives the salutary general reminder that 'there is no such thing as a rational, scientific or objective basis for deciding what a child requires ... [t]here must be judgements' (p6). This line of thinking will be developed more fully in chapter nine. A point in favour of the budget approach is that the methodology itself makes the judgements explicit and open to scrutiny. They can therefore be challenged and the lists modified to fit a somewhat different set of current values and preferences or to keep in step with social values and expectations as they change over time.

A third factor to be taken into account when considering the matter of subjectivity is that the researchers are well aware of the subjective element in their work and wherever possible they use national survey results and other behavioural information to set bounds on or at least to temper their judgements. There is, however, a significant difficulty with this otherwise commendable strategy in that it involves an element of circularity which puts the budget developer in a catch-22 situation. If the budget standards are not tested against consumer behaviour and community opinion<sup>9</sup> then they are vulnerable to the criticism that to too great a degree they reflect the personal judgements of the researchers or other experts and not the values and patterns of the wider community. On the other hand, if the standards are modified to reflect actual behaviour, there is a weakening of the claim that they represent an independent

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<sup>9</sup> Pushed to the limit, these two checks on the judgements of the experts would appear to lead to methods which use HES type expenditure data and community opinion respectively as their starting points.

assessment of what is required to satisfy a given level of needs. In discussing this issue in relation to the Australian project, Peter Saunders observes that:

... there is a fine line between ensuring that the budgets are grounded in, and validated against, actual patterns of behaviour, whilst at the same time avoiding allowing existing patterns of behaviour, much of which is severely constrained for those on lowest incomes, to dominate the determination of the normative judgements which underlie the budget standards. It also has to be acknowledged that although this will never be achieved perfectly, getting the right balance between the normative and the behavioural is a challenge for those who will develop and those who will use the standards once they have been developed. (Saunders, 1996: 16f).

These considerations are closely related to those surrounding the issues of the budget constraint, separability and changing adult preferences. As these are primarily related to the iso-welfare family of strategies, further analysis will be delayed until the DV budget standards approach is discussed in chapter ten.

### **Development and updating costs**

The very detailed work in the FBU methodology is clearly very costly in terms of the person-hours required. Nevertheless, once it is done, updating is relatively cheap in the short-run (say, 5 to 10 years) as the CPI can be used with reasonable confidence. In the long-run, the whole exercise has to be reworked as society's norms and relative prices are very likely to have changed significantly. Even so, the long-run update would not be as costly as the initial setting up phase.

## 6 The Expenditure Question

The second set of studies seeks an answer to the descriptive question - what do parents actually spend on children? Although at times both budget and expenditure methodologies have common issues to face - for example, they both have to deal with the challenge of shared goods - the mindsets are quite different. Rather than prescribing what should be spent on what according to certain criteria, the expenditure approach seeks to report what is spent on children without consideration of whether this is deemed too generous or too miserly according to some imposed standard.

The most obvious or 'direct' indirect method is simply to regress household expenditure on numbers of children and other relevant variables as described in chapter three. The expenditure on particular goods by families without children can then be compared with expenditure by similar (in the sense of income and other socio-economic characteristics) families with children. Douthitt and Fedyk (1990)<sup>10</sup> followed this approach using the 1982 Canadian FAMEX data to estimate spending for Canadian families with the same income streams and ages of parents, interpreting the differences in expenditure as being due to the presence of children. In spite of the superficial simplicity and attractiveness of the procedure, it has a serious flaw deriving from the way that it deals or fails to deal with the budget constraint. The simple accounting fact is that expenditures on individual categories add up to total expenditure. Assuming that net income is unaffected by the presence of children, then an increase in spending on some goods (presumably for children) implies an equal reduction in spending on some other goods, giving an estimate of child costs as zero. This method can tell us a great deal about how families adjust their spending if children are present, but tell us very little about child costs as the sum of the adjustments is always zero. Browning argues that because 'the critical step in going from net expenditures that add to zero to all positive costs is not discussed ... it is impossible to assess the validity of the method these authors use' (Browning 1991a: 23). Van der Gaag (1982) considers that the strategy is misleading, while Nelson (1993) is also highly critical of such approaches, claiming that the researchers:

... have given in to the temptation to regard the coefficients in demand equations on dummies representing children as representative of expenditures on children. However, if income is also on the right hand side of the estimated equations, some coefficients will be negative, and the researcher must apply some ad hoc adjustments to get sensible looking results. Holding income constant, children will increase household purchases of some goods and decrease purchases of others ... (Nelson, 1993: 478).

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<sup>10</sup> I was unable to obtain a copy of this study and have had to rely on secondary sources, including Fedyk (1991).

The usual reaction to this 'adding up' problem is to exclude some goods from the analysis. Douthitt and Fedyk leave out durable goods, housing and child-care. However, even if consensus could be reached as to what to exclude, it is still not certain that the results actually capture expenditures on children. To do so requires the further assumption that the presence of children does not affect the consumption behaviour of adults (except through an income effect). There is a need, yet again, to invoke the separability assumption. Fedyk herself (1991) acknowledges these issues and agrees that such an approach will underestimate true child costs.

The alternative way out of the problem could be to suggest that adult consumption is maintained at approximately the same level when children are added to the family. This could be done by accepting that some costs are spread over the household lifecycle. The implication of this is that methods which focus only on within period spending will underestimate costs, the same conclusion that was drawn in the previous paragraph.

## US Department of Agriculture (1993)

The USDA's Family Economics Research Group (FERG) provides estimates of expenditures on a child from birth through to the age of seventeen by husband-wife and sole-parent families. For the former, estimates are for three income groups across four regions. Sole-parent family estimates are for two income groups and because of sample size limitations are provided only for the whole of the United States. The estimates are given separately for six age groupings: 0-2, 3-5, 6-8, 9-11, 12-14 and 15-17.

Both the discredited method discussed above and the FERG strategy draw their primary data from consumer expenditure surveys which reveal the actual consumption behaviour of households. However, in contrast to the former which adopts a marginal cost approach by comparing the estimated spending of similar households with and without children, the latter estimates the individual commodity spending for a particular family type (with children) and allocates these expenditures among the various family members according to certain rules. In short, whereas the former runs up against the challenge of the budget constraint, changing adult preferences and the need to invoke the separability assumption, the latter is vulnerable to criticisms of arbitrariness in the allocation rules.

### **Variables and methodology**

#### *Estimating expenditures*

The Consumer Expenditure Survey (CE) collects overall household expenditure data for some budgetary components (housing, food, transportation, health care, and miscellaneous goods and services) and child-specific expenditure data for other components (clothing, child-care and education). Using the 1990 CE data, the first step was to use multivariate regression analysis

to estimate household and child-specific expenditures, controlling for income level, family size, and age of the younger child so that estimates could be made for families with these varying characteristics. For two-parent families a dummy variable for regional factors was included. The preliminary analysis was done for two child families with the focus on the younger child. Adjustment of expenditure for the older child and number of children was done later. The income groups were determined by dividing the two-parent household sample into equal thirds. Because of sample size limitation, the upper two groups were collapsed into one for the sole-parent households, with 84 per cent coming into the bottom third as defined by the two-parent sample. Each expense was estimated separately, thereby assuming that each expenditure was made independently of the others.

#### *Allocating expenditures*

Once the overall household and child-specific expenditures were estimated, these total amounts were then allocated among the four family members. The child-specific expenditures were simply halved. Other studies on food and health care spending were used to apportion cost shares in these areas. 'Unlike food and health care, no authoritative base exists for allocating estimated household expenditures on housing, transportation, and other miscellaneous goods and services among individual household members' (p6). The study opted for the per capita approach rather than the marginal cost method because of the sorts of difficulties given in the 'complications' section of chapter three above (eg changing adult preferences as children are added and childless couples making excessive purchases in anticipation of having children). Employment-related travel costs were removed and assigned to the adult(s) before the allocation of transport costs was carried out.

#### *Adjustments for household size*

The expense estimates determined above are averages per child in a husband-wife or sole-parent household with two children. The study repeated the procedure above for families of different size and it was found that two-parent households spent 26 per cent more on the single child and 22 per cent less on each child when there were more than two children. For sole-parent households the corresponding figures are 37 per cent and 28 per cent respectively.

## **Results**

Although based on the 1990 CE, the FERG study gives updated figures in 1993 US dollars. The update used the all-items CPI for income level updates and the category-specific CPIs to update expenditure. Child-rearing expense estimates for the younger child in a two-child family for the two family types are presented in Table 6.1 below<sup>11</sup>. It appears that expenditures on children do not differ very much between the two family types. What does differ is the number of people sharing the household income and the total household income actually available.

<sup>11</sup> The income range is the 'lower' one which has an average of \$20,000 (US dollars). This corresponds to about \$31,000 (NZ). This figure is near the bottom of the third quintile for the incomes of families with dependent children in NZ.

Eighty-four per cent of the sole-parent households are represented in the lower 'third' and these households fall into the bottom of this lower income range to a much greater degree than do the husband-wife households. Average income for the sole-parent families was \$13,700 (NZ\$21,400) compared with \$20,000 (NZ\$31,000) for husband-wife families.

The study also confirms the generally accepted result that 'parents spend what they can on their children'. For a ten year old younger child in a two child husband-wife family the weekly expenditure increases from \$153 to \$209 and \$306 across the three income groups. This is typical of the trend for expenditure in other age groups.

**Table 6.1**

USDA (1993) results in 1992 NZ dollars for the 'low income' group

	Age of child					
	0 - 2	3 - 5	6 - 8	9 - 11	12 - 14	15 - 17
Sole-parent households	\$129	150	172	150	161	192
Husband-wife households	\$148	158	165	153	165	187
Oldfield (without childcare)	-	156	-	141	-	164

### Commentary and evaluation

The USDA figures in Table 6.1 include child-care spending, but the amount involved is much less than that allowed for by Oldfield for children under ten years. Therefore, to make a fair comparison the 3 - 5 year old figure of \$156 in Oldfield should be reduced. This adjustment puts the USDA figures consistently above those of Oldfield. An explanation for this difference is not hard to find. Firstly, by using the per capita rather than a marginal approach to allocate housing expenditure, this spending category becomes much larger for the USDA study. Secondly, given the different means of funding the health-care systems in the two countries, it is not surprising that the US study reports health related spending at a higher level than Oldfield's UK based one.

### *Shared goods and services*

Two methods of allocation are used: reliance on previous research for food and health-care and the per capita approach for the rest. In opting for the latter instead of a marginal approach the FERG study notes that 'although the per capita method has its limitations, these limitations were deemed less than those of the marginal cost approach' (p6). It is somewhat surprising that there is no indication in the report that the researchers were aware of how their per capita approach considerably inflates the child portion of housing costs. This omission is all the more

strange in the light of their criticism of some marginal methods for not taking into account such well-known real-life factors as 'couples without children often [buying] homes larger than their present needs in anticipation of children' (p6).

#### *The budget constraint and separability*

The report explicitly acknowledges that each expense was estimated separately on the assumption that each expenditure was made independently of the others (p3). As the above discussion has indicated, one of the arguments presented in the USDA study against the marginal method for allocating expenditure on shared goods touches on the matter of the preferences of the adult(s) changing as children come into the family. Yet strangely (again) there is no mention of the potential for this methodological problem undermining the 'economies of scale' interpretation that they give for their results on the variation in spending per child as family size increases. The claimed economies of scale for larger families may well be somewhat illusory. A major proportion of the perceived 'savings' may be due to the reality of a family having to live within a budget constraint that has only limited potential for expansion. It may be that there is a drop in the material standard of living for the existing family members, rather than any great economies of scale. It is not disputed that larger families usually spend less per child. The issue is in the interpretation of that result.

#### *Subjectivity*

This type of analysis is relatively free of subjectivity in the sense of value-judgements but is open to the criticism of subjectivity in the sense of ad hoc and arbitrary rules for allocating spending on shared goods.

#### *Data requirements*

The data requirements are more demanding than for the budget standards method but are still reasonable. The CE is based on interviews with 20 000 households over a year.

#### *Development and updating cost*

The time costs for development are not as great as for the detailed budget standards approach of Oldfield especially given the efficiency of modern statistical analysis packages. Updating in the short-run can use the CPI and in the long-run it is simply a matter of accessing a fresh data set.

## Bruce (1987)

In contrast to the relative complexity of studies like that of the USDA (1993) and others, there are those which are very simple in concept. An example of this is found in a paper by Bruce (1987) of the Department of Economics at the University of Calgary in Alberta. The background to it is an 1885 decision of the Supreme Court of Canada which ruled that damages may be awarded in fatal accident claims only if those damages are 'capable of a

pecuniary estimate'. In his paper Bruce argues that the value which parents place on a child is capable of pecuniary estimate, and in the process he briefly summarises results from various studies on the costs of children. On the basis of these studies he concluded that the direct costs of raising the first child were 'about 20% of family income' (p349). As his own check on the appropriateness of the figure he adopted a very simple methodology. Using 1982 FAMEX data from Statistics Canada he first of all established an expenditure profile for the average Canadian family of two or more persons. Using his own judgement he then estimated (on a conservative basis) the percentage of spending in each category that would be devoted to the first child. The results are shown in Table 6.2 with the third column figures being the product of those in the first two.

**Table 6.2**

Percentage of family expenditures on consumption devoted to the first child

Expenditure Category	Expenditure profile (%)	Estimated % of category devoted to child	Estimated % of total consumption devoted to child
Food	20.7	25	5.2
Shelter	22.7	15	3.4
Household Operation	5.8	25	1.5
Household Furnishings	4.9	10	0.5
Clothing	8.4	20	1.7
Transportation	16.3	20	3.3
Health Care	2.6	30	0.8
Personal Care	2.5	20	0.5
Recreation	6.2	25	0.4
Reading	0.7	15	0.1
Education	1.0	30	0.3
Tobacco and Alcohol	4.3	0	0.0
Miscellaneous	3.9	15	0.6
<b>Total</b>	<b>100.0</b>	<b>-</b>	<b>18.3</b>

Source: Bruce (1987: 350)

Given the age dependence of child-costs reported in the literature he settled on 15 per cent for under six year olds, 20 per cent for ages six to twelve and 25 per cent for ages twelve to eighteen. From the same literature he estimated a reduction by one-third for second and subsequent children.

### Commentary and evaluation

As noted above, this study was included as an example of a reasonably simple approach to the question. The second column in Table 6.2 is in the main based on intelligent 'guesstimates', so the subjectivity criticism has some weight. His 'one-third' economies of scale for second and subsequent children are fairly optimistic relative to general trends in other scales.

There is unfortunately a flaw in his analysis - he is comparing apples and oranges. As it happens it has no great effect on the conclusion (in fact if the calculations had been done correctly they would have fitted even better!) but it is still worth noting and getting right. He has interpreted the equivalence scale literature as if a ratio of 1.20 for a one child two parent household means that the cost of raising the first child is 20 per cent of the family expenditure. Not so. A ratio of 1.20 means that such a family needs to spend 20 percent more than a childless couple in order to maintain their standard of living. The cost is therefore nearer 17 per cent (ie  $0.20/1.20$ ) of the family expenditure which is very close to his 18 percent. In equivalence scale terms his 18.3 percent implies a child component of about 0.22 for the ratio (ie  $0.183/0.817$ ).

### National Survey - Middleton *et al* (1994a)

Waiting on the report - see chapter five for the results of the preliminary research.

### Lazear and Michael (1988)<sup>12</sup>

Lazear and Michael adopt a quite different approach which attempts to use information on expenditures on 'adult only goods' to work back to identify spending on the children. This line of reasoning is often seen as going back to Rothbarth (1943) although he was addressing the iso-welfare question. The classification of Lazear and Michael (1988) as an expenditure rather than an iso-welfare estimation follows Browning (1992: see p 1446)

Household spending can be divided up in one of two ways as shown below in Figure 6.1 (Figure 3.2 reproduced for convenience). The practical difficulty for researchers is that the right hand scheme can never be observed directly because of the presence of shared goods and therefore there is a great difficulty in producing an estimate for 'C'. A simplified account of the strategy adopted by Lazear and Michael to circumvent this problem begins with the

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<sup>12</sup> The primary source was not available - the information was drawn from Browning (1991a, 1991b and 1992), Phipps (1991a)

observation that where there are no children, 'A' can be taken to be the couple's total expenditure. Assuming that there is an identifiable set of goods that is consumed only by (individual) adults (they use adult clothing, alcohol and tobacco) the ratio  $AO/A$  can be determined for the childless household. Lazear and Michael then make the further crucial assumptions that the ratio  $AO/A$  is independent of the presence of children (the separability assumption) that the ratio  $C/A$  is independent of total household expenditure. Given that 'AO' is measurable for a couple with children and given the assumptions just mentioned, 'A' can be calculated for the couple-with-children household. This allows 'C' for that household to be calculated as  $A+C = \text{total spending}$ , which is known.

**Figure 6.1**

Two ways of categorising household expenditure

adult-only goods (AO)	adult goods (A)
shared goods (S)	
child-only goods (CO)	child goods (C)

## Results

Using this approach on the 1972-73 US Consumer Expenditure Survey, the authors found that on average a child receives about 40 percent as much as an adult in the same household. In equivalence scale form this is the same as a value 1.20 for a one child two parent family.

## Commentary and evaluation

The usefulness of the method depends crucially on the assumptions regarding the ratios  $AO/A$  (separability) and  $C/A$  (same for all expenditure levels). At an intuitive level neither seem well-founded. They remain untestable assumptions which are nevertheless necessary to the method. As Phipps (1991: 26) observes, '[they] basically choose to assume that public goods are allocated in the same ratio as expenditures on private goods.'

# 7 Equivalence Scales and the Cost of Children - an Introduction<sup>1</sup>

## Introduction

What expenditure level would make a family of two adults plus three children as well off as a couple household which spends \$20,000 pa? Questions of this sort ask for welfare comparisons between households of different types and have led to the development and use of household equivalence scales which seek to succinctly answer them. Such questions lie at the core of the third concept of child costs, the iso-welfare concept.

By way of illustration, if by some means or other<sup>2</sup> the answer to the above question was found to be \$32,500 pa, then the scale value for the larger family would be 1.63 (ie 32,500/20,000). In this case the couple household has been used as the reference one (scale value = 1.00). Using the iso-welfare concept, the children would be seen to 'cost' \$12,500 in total and account for 38 percent (0.63/1.63) of the total family expenditure. By contrast, if all household members had equal weighting, the answer to the opening question would have been \$50,000 with the three children absorbing 60 percent of the budget and the scaling factor being 2.50.

### Modular scales

The other way of approaching the issue is through the development of modular<sup>3</sup> based scales. It is possible to generate a 'reasonable' set of ratios without any direct reference to household consumption data or indeed to any other comprehensive empirical work at all. On the basis of informed judgement and/or intelligent guesses, household members can be assigned weightings in terms of adult equivalents and the necessary calculations done to make a complete scale.

As an example of the modular or building block approach, assume that second and subsequent adults may be given a 60 percent weighting and that children under 16 may be counted on average as being equivalent to 40 percent of the first adult who naturally counts as 100

<sup>1</sup> This chapter aims to give a relatively non-technical and accessible introduction to equivalence scales as they relate to the costs of children. More detail at a technical and conceptual level is given in chapters 8 to 10 (especially chapter 9).

<sup>2</sup> See Table 3.3

<sup>3</sup> Coulter *et al* (1992a) use the term 'pragmatic scales', Nelson (1992b, 1993) refers to them as 'ad hoc rules of thumb' or 'ad hoc definitions', Buhmann *et al* (1988) call them 'expert statistical scales' because many are used by experts for statistical purposes, while others refer to them as 'arbitrary scales'. The term 'modular scales', which is coined here, captures the approach's simple building-block element by which scales are built up from basic units or modules.

percent. The resulting scale for selected household types is shown in the first line of Table 7.1 below. The second line in the table gives the scale converted to the alternative of the childless couple as reference.

**Table 7.1**

An illustrative scale generated from arbitrary but 'sensible' adult equivalent building blocks

	A	2A	2A+1	2A+2	2A+3	2A+4
Single adult as reference	1.00	1.60	2.00	2.40	2.80	3.20
Childless couple as reference	0.63	1.00	1.25	1.50	1.75	2.00

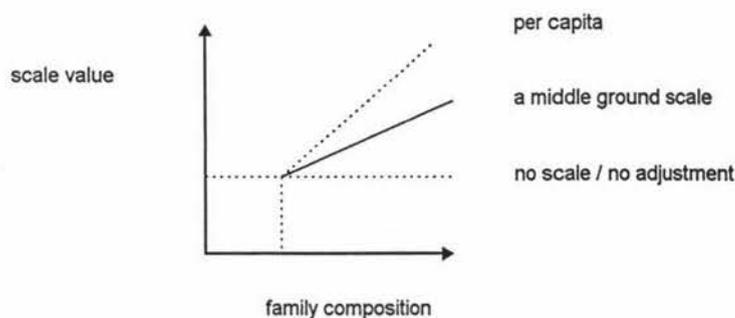
Note: A = one adult household, 2A+1 = two adult plus one child household, etc

The modular approach has the twin advantages of costing nothing to produce and of being transparent as regards the implicit judgements about the relative weightings of different household members. Many such scales are in use throughout the world, the most well-known probably being the OECD one which takes the second adult as 70 percent and each child as equivalent to 50 percent of the first adult (chapter 10 has other examples).

### Between the extremes

Equivalence scales are consistent with the notion that two can live more cheaply together than they can apart, even though two may be not able to live as cheaply as one. In much the same way that educational institutions count students in terms of both individuals and EFTS (equivalent full-time students), scales can be understood as a sophisticated way of head counting when comparing the living standards of families of different sizes and composition.

Plausible equivalence scales will therefore lie in some reasonable middle ground between the two extremes of 'full per capita adjustment' and 'no adjustment' as indicated in the sketch below. The latter is consistent with assuming that children are consumption goods and that the



decision to have children is simply a rational economic one. In the making of welfare comparisons, no adjustments for family size or costs of children are made, nor according to this

philosophy should such adjustments be made. On the other hand, the per capita approach not only makes no distinction between the consumption needs of adults and children, but also ignores all economies of scale as family size increases. Whereas the 'no adjustment' philosophy is seen to underestimate needs as family size increases, a per capita adjustment is seen to overadjust, thus overestimating how much a larger family needs to be as well off as a smaller one. The trick is to know whereabouts to draw the line in the in-between territory.

The table below illustrates the point with the use of the McClements' (1977) scale and Whiteford's (1985) geometric mean scale (GMS), using the single adult household as reference. For Whiteford, the second adult clearly has more weight (0.56) than the children who seem to average out at around 0.30 of an adult equivalent. In McClements' case the second adult has a 0.64 weighting and the children around 0.38 each. In neither case are there any significant economies of scale as more children are added. If there were such economies the slope of the line would diminish and it would tend to be somewhat concave as viewed from the horizontal axis. The literature generally assumes that there are economies, there being very little mention (Coulter *et al*, 1992a: 84 is one exception) and even less exploration of the possibility of diseconomies as household size increases (due to congestible goods, overcrowding, etc).

**Table 7.2**

Two extreme scales and two in between (scale: single adult = 1.00)

	A	2A	2A+1	2A+2	2A+3
household size	1	2	3	4	5
per capita	1.00	2.00	3.00	4.00	5.00
McClements	1.00	1.64	2.02	2.39	2.77
Whiteford GMS	1.00	1.56	1.88	2.16	2.48
no adjustment	1.00	1.00	1.00	1.00	1.00

## An Anatomy of Equivalence Scales

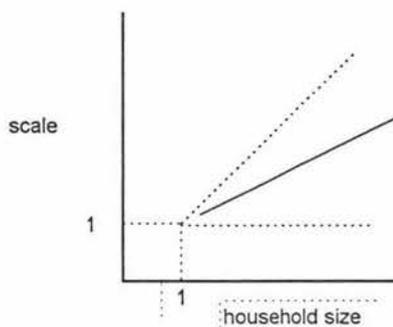
Given the wide range of scales that have been produced it would be helpful for comparison purposes to be able to summarise the basic characteristics of each by the use of one or at most two or three parameters.

Characteristics of interest are:

- \* the weight given to the second adult;
- \* the weight given on average to the children; and,
- \* the extent of the economies of scale (if any) as the number of children increase

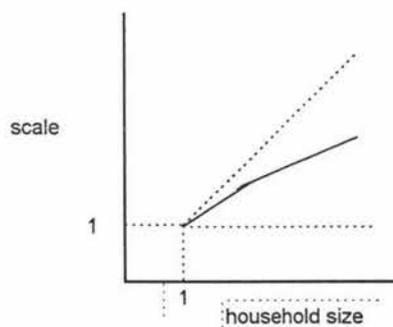
Mathematical functions are required which are consistent with one or more of the following -

Graph A



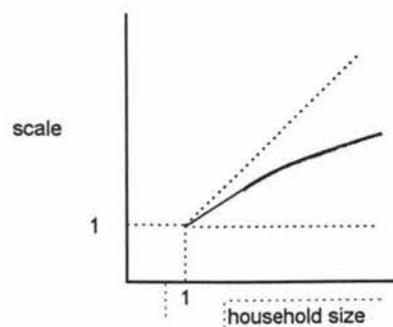
- \* equal weight to all after the first
- \* no distinction between second adult and children

Graph B



- \* children weighted less than second adult
- \* no extra economies of scale for more children

Graph C



- \* children weighted less than second adult
- \* further economies of scale for more children

The following symbolism will be used.

NA = number of adults in the household

NC = number of children in the household

HS = household size (total number in the household)

Thus,  $HS = NA + NC$

a = weight given to the second (and subsequent) adults, relative to the first adult

c = average weight given to the children, relative to the first adult

ES = equivalence scale or ratio

For expositional convenience the single person household is taken as the reference in this section.

### Single parameter summary

Let  $ES = ES(HS; \theta)$  where  $\theta$  is the summarising parameter.

- The simplest specification is a linear one of the form

$$ES = 1 + \theta(HS-1) \quad (1)$$

This gives the same weighting to second and all subsequent household members, thus not making any allowance for differences between the second adult and the children nor allowing for any economies of scale as the children are added. This is a most unusual distribution of weights, producing a straight line in the graphical representation of the scale (Graph A above). The only one that fits that description is the atypical one of O'Higgins *et al* (1989) which weights each household member after the first adult as equivalent to 0.50 of an adult.

- An alternative one parameter specification that allows for some continuing economies of scale as household size increases is a power function of the form

$$ES = HS^\theta \quad (2)$$

This class of scales has been widely used over many years (Prais and Houthakker, 1955; Singh, 1972; Buhmann *et al*, 1988; Coulter *et al*, 1992a, 1992b; Förster, 1993; Atkinson *et al*, 1995). They are characterised by a constant elasticity ( $\theta$ )<sup>4</sup>, so that for a 1% increase in household size, the scale value changes by  $\theta\%$ . The smaller  $\theta$  is, the greater are the assumed economies of scale. Table 7.3 below shows that using different values of  $\theta$ , the formula generates figures very close to the four representative scales. The power curve cannot quite

<sup>4</sup> Elasticity =  $(\delta ES / \delta HS) \cdot (HS / ES) = \theta \cdot HS^{\theta-1} \cdot (HS / HS^\theta) = \theta$

cope with the extra weighting given to the second adult compared to the children but the fit is nevertheless very good. It is surprising how well the power relation fits even a scale like the OECD one which is linear as the children are added.

**Table 7.3**

Examples of single parameter power relation approximation to various scales.

	A	2A	2A+1	2A+2	2A+3	2A+4
per capita	1.00	2.00	3.00	4.00	5.00	6.00
$\theta = 1.00$	1.00	2.00	3.00	4.00	5.00	6.00
OECD	1.00	1.70	2.20	2.70	3.20	3.70
$\theta = 0.73$	1.00	1.66	2.23	2.75	3.24	3.70
McClements	1.00	1.64	2.02	2.39	2.77	-
$\theta = 0.64$	1.00	1.56	2.02	2.43	2.80	-
Whiteford (1985)	1.00	1.56	1.88	2.16	2.48	2.72
$\theta = 0.56$	1.00	1.47	1.85	2.17	2.46	2.73
Goedhart et al	1.00	1.23	1.40	1.53	1.63	-
$\theta = 0.30$	1.00	1.23	1.39	1.52	1.62	-
No adjustment	1.00	1.00	1.00	1.00	1.00	1.00
$\theta = 0$	1.00	1.00	1.00	1.00	1.00	1.00

Buhmann *et al* (1988) have pursued this matter in some detail and 'we are reassured by [their] demonstration that [this specification] provides a good approximation to virtually all the different scales currently used in empirical studies of income distributions in developed countries ...' (Coulter *et al*, 1992a: 1069). More recently Atkinson *et al* (1995) have updated and expanded the list which is reproduced in Appendix C.

As noted, the calculations in this section are done on the basis of a single adult household as reference. There is no difficulty, however, in modifying the power relation to fit the more common reference of a two adult couple household - (2) above becomes

$$ES^* = (HS/2)^\theta \quad (3)$$

Table 7.4 shows the ratios from the final example in Table 7.3 (Goedhart *et al*) converted to the childless couple reference. The modified formula (3) clearly works well.

**Table 7.4**

Showing that the single parameter power relation 'works' for the childless couple reference.

	A	2A	2A+1	2A+2	2A+3	2A+4
Goedhart <i>et al</i>	0.81	1.00	1.14	1.24	1.33	-
ES' for $\theta = 0.30$	0.81	1.00	1.13	1.23	1.32	-

## Two parameter summary

The one parameter summary is particularly useful for conducting sensitivity analysis for the effect of different scales on measures of income distribution, poverty and inequality, but not entirely relevant for the cost of children. An alternative is needed that indicates the (average) weighting per child and the degree to which there are economies of scale as more children are added to the household. Equation (4) below is a possibility (cf Graph B above).

- The simplest specification is a piecewise linear one of the form

$$ES = 1 + a + c(NC) \quad (4)$$

where  $a$  = weighting for second adult (relative to the first, who has a unitary weighting)  
and  $c$  = average weighting for a child (relative to the first adult)<sup>5</sup>

In Table 7.5 below, this specification is applied to the four scales as in Table 7.3. A perfect fit can be obtained with the OECD scale as the generating formula (4) is precisely that for modular scales with all children weighted equally. The fits for the others are very good, even for the one for Goedhart *et al* which has some economies of scale as the children are added.

<sup>5</sup> Care is needed here. Many studies produce child weightings relative to the average weighting per adult of the adults in a couple, but express the result in a way (eg '30% of an adult') which can lead the unwary to use that weighting as if it were relative to the first adult (ie to an adult living alone). If the second adult had a weighting of, say, 0.60, then the average adult weighting for an adult in a couple is 0.80. If a child cost study reported that average child cost was equivalent to about 40% of adult spending (by adults in the couple), then  $c=0.32$  not 0.40. There are several instances in the literature where this misunderstanding occurs. One example is found in Cutler and Katz (1992) who in an inequality study adjust for family size using a two parameter formula to 'parameterize equivalent persons (E) as  $E = (A+cK)^e$  where  $c$  is a constant reflecting the resource cost of a child relative to an adult' (p548) - cf formula (6) below. They go on to choose a value for  $c = 0.40$  on the basis that Deaton and Muellbauer (1986) estimate child costs 'at about 40% of adult costs' (p549). A closer look at Deaton and Muellbauer reveals that their figure is about 40% of the average adult costs for each adult in a couple. This equates to about 30% of the first adult, as shown in the first part of this note. The interpretation by Cutler and Katz of the 40% figure is not surprising in that in an interim conclusion Deaton and Muellbauer themselves report that 'children cost about one-quarter of an adult (p734), when it would have been better to say 'one quarter of the average cost per adult of adults in a couple'. Banks *et al* (1991) appear to make a similar mistake with their Table 2 which according to the text gives the cost of an additional child in terms of the cost of one adult. For example, they claim that Deaton *et al* (1989) produced a scale of 0.21 for a three year old. The original source does say that such a child is equivalent to 21% of an adult, but on a closer reading, it is an adult in a couple household, not an adult living alone that is the reference.

**Table 7.5**

Examples of two parameter sectionally linear approximation to various scales.

	a	c	A	2A	2A+1	2A+2	2A+3	2A+4
OECD			1.00	1.70	2.20	2.70	3.20	3.70
Two parameter summary	0.70	0.50	1.00	1.70	2.20	2.70	3.20	3.70
McClements			1.00	1.64	2.02	2.39	2.77	-
Two parameter summary	0.64	0.38	1.00	1.64	2.02	2.40	2.78	
Whiteford (1985)			1.00	1.56	1.88	2.16	2.48	2.72
Two parameter summary	0.56	0.30	1.00	1.56	1.86	2.16	2.46	2.76
Goedhart <i>et al</i>			1.00	1.23	1.40	1.53	1.63	-
Two parameter summary	0.23	0.15	1.00	1.23	1.38	1.53	1.68	-

- *An alternative two parameter specification* that allows for some continuing economies of scale as household size increases *is a power function of the form* of (6) or (7) below.

The power relation summary formula (as in (2) and (3) above) can be refined by replacing the household size variable (HS) with one that takes account of the different weighting needed for children compared with adults. The new variable is sometimes referred to as notional household size (NHS) and can be defined as

$$\text{NHS} = \text{NA} + c.\text{NC} \quad (5)$$

where  $c$  is an average weighting factor and  $c < 1$ . The generating formulae thus become ...

$$\text{ES} = (\text{NA} + c.\text{NC})^\theta \quad (6) \quad \text{single adult as reference}$$

$$\text{ES}^* = ((\text{NA} + c.\text{NC})/2)^\theta \quad (7) \quad \text{childless couple as reference}$$

Just as in (2) and (3) above, so also here, values of  $\theta$  and  $c$  can be chosen so that there is a good fit with sets of scales determined by other means.

Jensen's approach is discussed in more detail elsewhere (chapter 12), but it is worth noting in passing that 'the Jensen equivalence formula' (Jensen 1978: 56 and 1988: 13) takes the form of (7) above. The only difference is that whereas (6) and (7) are considered useful simply because they work, Jensen attempts (unsuccessfully in the view of this report) to give a theoretical basis for his summarising or generating formula.

## Moving from equivalence scales to weekly dollar values

There appear to be three methods that can be used to calculate weekly child costs given a set of equivalence scales, which for illustrative purposes this section will assume to be 1.00, 1.21, 1.37, 1.51 for a two parent household with one, two and three children.

### Method 1

A simple approach is to nominate an (after-tax) income for the reference household and use the child portion of the appropriate ratio to calculate the extra income required to maintain the household at the same standard of living. This figure is taken to be the cost of the child - see Table 7.6 below. The key assumptions here are that the scales used are relevant across the income range used and that income equals expenditure over the year.

**Table 7.6**

Estimates of weekly child costs using equivalence ratios and low to modest reference household after-tax incomes

After tax income for reference household	Child cost per week (\$)		
	first child 0.21	second child 0.16	third child 0.14
\$16 000	\$65	49	43
\$20 000	\$81	62	54
\$24 000	\$96	74	65
\$28 000	\$113	86	75

### Method 2

This is a variation of the first approach and starts with the income of the household that has child(ren) rather than that of the one without. For instance, in the one child household the first child accounts for 17 per cent of the income use ( $0.21/1.21$ ). For a household income of \$28,000 this converts to \$92 per week. For the two child household the average cost per child is 14 per cent ( $(1/2)(0.37/1.37)$ ) or \$73 per week

### Method 3

A third method starts with expenditure data for a given household type and applies the equivalence ratios as in the example above.

### Special note on 'the Jensen child expenditure formula'

Jensen (1988) derives the 'Jensen child expenditure formula' which can be written as:

$$\text{expenditure per child} = [(1/NC) \cdot (ES^h - ES^r) / (ES^h)] \cdot [\text{expenditure of household } h] \quad (8)$$

This formula is simply a generalised algebraic version of the straightforward algorithm used for method 3 above (and for method 2 with [expenditure for household  $h$ ] in (8) replaced by [after-tax income for household  $h$ ]). In contrast to the intuitive derivation used above, Jensen (1988) gives a detailed account of the derivation of (8) over several pages. The need for the length and detail arises in the main because of his claim that what is available in the literature are sets of income equivalence ratios, not expenditure equivalences. Starting with this observation and adding the assumption that households with the same savings ratios are likely to be experiencing the same standards of living, he follows a rather tortuous path to (8), in which for him  $ES^h$  and  $ES^r$  are income equivalences.

The distinction he makes between income and expenditure scales is not one that is easy to find in the literature<sup>6</sup>. On the contrary, the oft-repeated assumption is that income and consumption expenditure are identical over the period of analysis (ie the savings ratio is very small). Furthermore, in terms of the way equivalence scales are defined and derived in the utility function methods, such scales are clearly expenditure scales as they are simply the ratio of various cost or expenditure functions. Scales based on the DV budget method are also expenditure equivalence scales. It would appear, therefore, that the fundamental assumption that creates the need for the long derivation is both unnecessary and invalid.

However, even if the distinction were accepted, the further assumption that the savings ratio is a good proxy for standard of living is highly suspect on the grounds that the savings ratio is likely to depend on household composition and/or the position of the household in its lifecycle as much as standard of living. Take for example a one child household which has a savings ratio of 6 per cent. When a second child is added the ratio may well drop to, say, 3 per cent as the effect of the budget constraint bites in and the family seeks to maintain an unchanged standard of living (cf Pashardes, 1991).

These arguments suggest that there is no need for or value in such a detailed derivation. It is preferable to assume that 'income equals expenditure' over the year and to proceed from there. Whether this is a realistic assumption or not depends partly on empirical evidence and partly on the definition of savings. If savings exclude the principal component in mortgage repayments

<sup>6</sup> Pashardes (1991) distinguishes between expenditure and (lifetime) income scales, but this is a different distinction from that that Jensen (1988) is attempting to make. For Pashardes it is equivalent to a contemporaneous/intertemporal distinction not a distinction between two types of contemporaneous (within period) scales.

then according to HES data for 1992/93, a two parent household with dependent children typically had savings running at only 4 to 5 per cent of its total expenditure (Statistics New Zealand, 1994). On this basis the assumption is reasonable.

Jensen's formula is a useful one, but the basis given for it is dubious. The same result can be obtained on the much simpler and empirically testable assumption that for households with dependent children, the savings ratio is on average fairly low.

## Formal Analytic Framework

The iso-welfare concept of the costs of children is that child costs are the extra household consumption (or income) required to bring the household with children up to a standard of living equivalent to that of one without children (the reference household). Clearly one of the most important elements in this approach is the specification of what constitutes an equivalent standard of living. As noted in chapter three, a number of methods have been developed for estimating scales, each with its own way of determining when households are equally well off (recall Table 3.3).

In order to give a coherent account of the different approaches, it is helpful to develop the rudiments of a formal framework, one which has parallels with that of the consumer demand theory of microeconomics. This similarity can be misleading. Indeed it has the potential to seduce the unwary into assuming that the two models sit comfortably with each other or even 'naturally' belong together. Some would argue for that position but it is far from a universally held view as later discussion<sup>7</sup> should make clear. The use of a common notation and some overlap of terminology masks the fact that the derivation of equivalence scales from econometric based utility function methodology built on consumer demand theory is only one way of producing estimates. It has become a favoured methodology with economists, many of whom would claim that it is more 'objective' than other methods. However, the compatibility of the two frameworks (consumer demand theory and welfare economics) is hotly debated (Pollak and Wales, 1979; Blundell and Lewbel, 1991).

### A general framework for equivalence scales

'Household equivalence scales are deflators by which the budgets of different household types can be converted to a needs corrected basis' (Muellbauer, 1980: 153). The purpose of an equivalence scale is to enable a comparison of the economic resources, relative to needs, of different households. In developing a general framework for analysis and discussion of the various approaches to estimating scales, a good place to start is with a *cost or expenditure*

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<sup>7</sup> Chapter nine.

*function*  $E(\cdot)$ . The minimum expenditure that a certain household type requires to reach a given level of welfare<sup>8</sup> is assumed to depend on three main factors: the standard of living or level of well-being to be attained ( $W$ ), the household characteristics ( $z$ ) and the prices faced ( $p$ ). So, we can write

$$E = E(W, p, z) \quad (8)$$

For any household ( $h$ ) the equivalence scale ( $ES^h$ ) can be defined as the ratio of the expenditure it needs to reach a welfare level ( $W$ ) to that required by the reference household ( $r$ ) for the same welfare level. Formally

$$\begin{aligned} ES^h &= \text{Spending by } h \text{ to reach } W / \text{Spending by } r \text{ to reach } W \\ &= E(W, p, z_h) / E(W, p, z_r) \end{aligned} \quad (9a)$$

An equivalent definition can be framed by inverting (9a) to rewrite the relationship in the form of an 'indirect welfare function'  $W(\cdot)$  and noting that any household ( $h$ ) has to spend  $ES^h$  times as much as the reference household ( $r$ ) to achieve the same welfare level ( $W$ ). It is conventional to put income ( $y$ ) in the indirect welfare function although there is nothing technically incorrect to use total spending ( $x$  or  $c$ ) as it is assumed that income = total consumption spending. The alternative definition is:

$$W = W(y_h, p, z_h) = W(y_r, p, z_r) \quad (9b)$$

where  $W$  = a given welfare level  
and  $y_h = ES^h \cdot y_r$

There are several issues arising from this definition that call for comment.

First, it is general enough to be able to encompass the full range of methods used to estimate scales. It is not specific to the utility function methodology.

Second, for scales to make any sense in their normal applications, it is necessary to assume an equitable intra-household allocation of resources. Even if this assumption is reasonable for most family households, it clearly does not apply to some others (eg most flatting arrangements) where the degree of sharing of resources is much less. Thus, the definition is potentially useful for only a subset of households, albeit a large one.

<sup>8</sup> The current rallying call of New Zealand's Department of Social Welfare - 'from welfare to well-being' - uses welfare in a different sense. There it refers to 'being on welfare' (less desirable) and well-being refers to 'being off welfare' and 'being self-reliant' in some sense. In this paper welfare and well-being have their traditional meanings and are used interchangeably.

Third, given that cross-sectional rather than longitudinal data is usually used, the prices that various households face are usually assumed to be near enough to the same, so the definition simplifies to

$$ES^h = E(W, z_h) / E(W, z_r) \quad (10)$$

The most serious challenge to the reasonableness of this assumption arises in the housing area, where, for example, regional differences in prices can be considerable (as in New Zealand).

Fourth, any set of equivalence scales can only be interpreted in the context of existing patterns of state and community non-cash-based resource flows. Changes in these areas will to varying degrees alter the spending patterns of families for other goods and services.

Fifth, the definition allows for the possibility that the scale values depend on the level of well-being. In practical terms this means that for a family of two adults and one child the scale may be, say, 1.25 for an expenditure level of \$25,000 and 1.18 for one of \$50,000. The 'cost' of the child is therefore \$6250 and \$9000 respectively. On this scenario, the 'richer' family spends more, but not proportionately so, and the costs of a child are greater (relative to income) in low-income families. The almost universal practice in comparative and policy related welfare studies is to assume that a set of scales has a constant value over a wide range of income. The possibility of the dependence of scales on income (or welfare level) has significant policy implications and is discussed at the end of chapter ten.

Sixth, a decision has to be made as to what contributes to the two remaining elements in the expenditure function, namely, standard of living or well-being ( $W$ ) and household characteristics ( $z$ ). The predominant practice is to limit household characteristics to the number of adults and the number and sometimes the ages of the children. Well-being is usually limited to material well-being, but even that strategy is contested. The analysis becomes further complicated by the issue of whether the well-being is that of the household as a whole or that of only the adult(s) involved. A full discussion of these matters will be held back until chapter nine.

Finally, the formal analysis of equivalence scales has often drawn on the parallel with that of price indices<sup>9</sup>. The latter measure the change in the cost of reaching a certain welfare level when costs vary, while the former seek to measure the change in costs when household composition varies. Household welfare levels, however, are not observable. To get around this difficulty the price index strategy simply and reasonably assumes that the welfare the household derives from a given bundle of goods is not affected by the price change. This assumption cannot be applied in the case of demographic changes as the same bundle of goods is assumed to generate different levels of welfare as the household changes. Since there is no direct way of comparing the welfare levels of households of different compositions, various

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<sup>9</sup> eg 'Equivalence scales are to welfare comparisons across households with different characteristics what cost of living indices are to welfare comparisons for a given household facing different prices'. (Muellbauer, 1980: 155)

indirect strategies have been devised (see Table 7.9). In the symbolic format of (8) above, assume that the cost function for a household is  $c = C(W, p, z)$ , where  $W = W(q, z)$  and  $q$  represents the bundle of goods consumed by the household. A change in prices ( $\Delta p$ ) will produce a change in cost ( $\Delta c$ ) while leaving  $W$  unchanged. However, a change in household composition or other characteristics ( $\Delta z$ ) will simultaneously lead to a  $\Delta c$  and a change in welfare level ( $\Delta W$ ) of the household, thus making 'cost-of-demographic-change' analysis very difficult. The different methods of comparing household welfare can be seen as different functional forms for  $W$ .

### Which household as reference?

There are two serious contenders for the role of reference household - that of the single adult and that of the childless adult couple. Both have already been used in this chapter. There are other alternatives such as the couple with one child family (Smeeding, 1989), the couple and two child family (Brashares and Aynsley, 1990) and a household of size four (Jorgenson and Slesnick, 1987), but these are not typical. The table below (Table 7.7) shows the Whiteford (1985) Geometric Mean Scale (GMS) in both the single adult and couple formats.

**Table 7.7**

The Whiteford GMS using different household types as reference.

reference household	A	2A	2A+1	2A+2	2A+3	headcount unit
one adult	1.00	1.56	1.88	2.16	2.48	'adult-equivalents'
adult couple	0.64	1.00	1.20	1.38	1.59	'couple-equivalents'

Taking the single adult household as the reference has much going for it. In the first place, it allows the weighting of other household members to be given in 'adult-equivalents'. The actual numbers for these weightings can be deduced at a glance from the first line of a table like that above or decided on by an intelligent guess and then used to generate a set of scales as discussed above ('the modular approach'). Furthermore, when a ratio is being used as a deflator to convert unadjusted incomes to equivalent incomes, the unit of measurement for the latter has a reasonably easily understood interpretation as the household's 'per adult-equivalent income'. Using the Whiteford example above, if the family of two adults and three children has an unadjusted per annum income of \$40,000 then their equivalent income would be around \$16,000 ( $\$40,000/2.48$ ) or to be precise '\$16,000 per adult-equivalent'.

On the other hand, the almost universal practice in the literature on the cost of children and the predominant practice in general is to use the alternative base of the two adult couple. In contrast to the single adult base, it has the drawback of not producing a sensible unit for equivalent income or expenditure. It is not that easy to make sense of 'dollars per couple-

equivalent'. In its favour, at least for use in cost of children studies, it could be argued that there is a naturalness about it as children are (almost always) 'produced' by a couple and most children are in the care of a couple. This latter claim loses some of its impact in the New Zealand environment where around a quarter of all families with dependent children are headed by a sole-parent. This proportion would no doubt be even greater when considering those families for whom the cost of children is of importance in policy settings.

There is however a simple technical matter which seems to tip the balance in favour of using a couple household as the reference, at least for child cost studies. The issue can be illustrated by a comparison of two hypothetical but plausible scales which will be referred to as the Hypo A and Hypo B. The only difference between the two when in the original format (childless couple as reference) is the ratio for a single adult household which for Hypo A is 0.65 in contrast to Hypo B's lower 0.55 - see the first two lines of Table 7.8 below. When the conversion is done to the single adult reference, the scales diverge considerably as illustrated in the bottom half of the table. This means that two sets of scales, derived empirically and in full agreement except for their conclusion about the relative weighting of each of the adults in a childless couple household, can be made to look quite different simply by changing the reference. This does not seem that helpful.

**Table 7.8**

Comparison of two hypothetical scales using different reference households.

Reference		A	2A	2A+1	2A+2	2A+3
childless couple	Hypo A	0.65	1.00	1.23	1.46	1.69
childless couple	Hypo B	0.55	1.00	1.23	1.46	1.69
single adult	Hypo A	1.00	1.54	1.89	2.25	2.60
single adult	Hypo B	1.00	1.82	2.24	2.65	3.07

This study will therefore stay with the established practice in the literature and will adopt the childless couple reference as the default mode of reporting. This does not exclude the use of the alternative on certain occasions, the most obvious example being in the description and development of modular scales.

## A Best Method?

In chapter three, the range of criteria that have been and are used to identify the circumstances when households are 'equally well off' were identified. For convenience the summary given in Table 3.3 is reproduced below as Table 7.9.

**Table 7.9**

The means used to identify when households are at the same or similar standards of living

Iso-welfare Method	Means of identifying 'equivalent welfare'
Engel	equal food-share
Extended Engel	equal 'necessities'-share
Sophisticated Engel (PH)	weighted average of all commodity scales
Rothbarth	same absolute amount on 'adult goods'
Consumption Theory	same 'utility'
Subjective	perception of sampled citizens
Savings Ratio	same savings ratio <sup>1</sup>
Budget (DV)	informed judgement of experts
Relative deprivation	index of relative deprivation
Modular/arbitrary	informed judgement/intelligent guess

Notes 1 The savings ratio = savings / total after-tax spending

Each of the associated estimation strategies have been applied many times and even the most cursory perusal of the literature reveals a potentially dismaying range of resulting scales. For example, Whiteford's (1985) extensive critical review of some thirty studies and fifty-five scales reports ratios ranging from 1.00 to 1.47 for a household made up of a couple and one child! There do not seem to have been any implausibly low scales produced lately, but whether this is due to better methodology or a reputation-sensitive pre-publication filtering process is not clear. Table 7.10 below gives some indication of the range of scales reported in various studies. It is no surprise therefore to find Gronau noting that while 'adult equivalence scales have recently celebrated their first centenary ... the debate on how to estimate them and their welfare implications has not yet subsided' (Gronau, 1988: 1183).

**Table 7.10**

A selection of scales

	A	A+1	A+2	A+3	2A	2A+1	2A+2	2A+3	2A+4
per capita	0.50	1.00	1.50	2.00	1.00	1.50	2.00	2.50	3.00
Banks & Johnson (1993) <sup>1</sup>	-	-	-	-	1.00	1.37	1.70	1.99	-
Tran Nam <i>et al</i> (1990) <sup>1</sup>	0.71	0.90	1.14	1.45	1.00	1.27	1.61	2.03	-
Jensen (1978)	0.60	0.92	1.20	1.46	1.00	1.27	1.53	1.77	2.00
FBU <sup>2</sup> (1992)	0.89	1.15	1.39	-	1.00	1.28	1.48	-	-
Henderson (1975) <sup>3</sup>	0.75	0.91	1.13	1.42	1.00	1.15	1.37	1.66	1.81
McClements (1977)	0.61	-	-	-	1.00	1.23	1.46	1.69	1.92
Jensen (1988) = RJS <sup>4</sup>	0.65	0.91	1.14	1.34	1.00	1.21	1.41	1.58	1.75
Whiteford (1985) = GMS <sup>5</sup>	0.64	0.90	1.10	1.31	1.00	1.20	1.38	1.59	(1.74)
Ray (1986) <sup>6</sup>	-	-	-	-	1.00	1.21	1.42	1.63	-
Tran Nam <i>et al</i> (1990) <sup>6</sup>	0.52	0.81	0.94	1.28	1.00	1.20	1.27	1.44	-
Townsend (1979) <sup>7</sup>	0.71	0.88	1.13	1.29	1.00	1.17	1.42	1.58	1.83
Tsakloglou (1991) <sup>8</sup>	-	-	-	-	1.00	1.13	1.29	-	-
Danziger <i>et al</i> (1984) <sup>9</sup>	-	-	-	-	1.00	1.12	1.23	1.32	1.40
unadjusted	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

- Notes
- 1 (Extended) Engel method
  - 2 A budget-standards based scale from the Family Budget Unit (FBU), University of York.
  - 3 Budget based
  - 4 RJS = Revised Jensen Scale
  - 5 GMS = Geometric Mean Scale
  - 6 Full utility function method
  - 7 Relative deprivation method
  - 8 Rothbarth method
  - 9 Subjective method

The difficulty is further illustrated in the results produced by Tran Nam and Whiteford (1990) who used different methods to estimate equivalence scales from the 1984 Australian Household Expenditure Survey (HES). In Table 7.11, the differences between the rows arise solely from the different theoretical assumptions adopted in the estimating technique.

**Table 7.11**

Same data set, differing results (based on the 1984 Australian HES)

	A	A+1	A+2	A+3	2A	2A+1	2A+2	2A+3
Engel	0.59	0.75	0.96	1.23	1.00	1.29	1.66	2.16
Canadian	0.71	0.90	1.14	1.45	1.00	1.27	1.61	2.03
Full utility function	0.52	0.81	0.94	1.28	1.00	1.20	1.27	1.44

Source: Tran Nam and Whiteford (1990), Table 3.1 and Table 5

A similar result was produced by Bradbury (1992a) using the Australian 1988/89 HES and is shown in Table 7.12. The relative flatness of the utility function scale compared to the Engel based one is a typical result. The erratic nature of the Rothbarth results (in this case, very high values for the 'adult clothes plus alcohol' version and the violation of the usual progression in the 'adult clothes' one) is not unusual for the method.<sup>10</sup>

**Table 7.12**

Same data set, differing results (based on the 1988/89 Australian HES)

	2A	2A+1	2A+2	2A+3
Engel	1.00	1.37	1.56	1.82
Rothbarth (adult clothes)	1.00	1.22	1.63	1.51
Rothbarth (adult clothes and alcohol)	1.00	1.62	1.97	2.12
Full utility function	1.00	1.22	1.30	1.56

Source: Bradbury (1992a), Table 4.3

It would be very helpful if a particular method or resulting scale could be identified as 'correct' or 'the best' on solid theoretical, empirical or other grounds. However, the one result that has unanimous support in the whole field is that 'no clearcut 'winner' or theoretically most satisfying equivalence scale has yet emerged' (Buhmann *et al*, 1988: 139). What is even more disconcerting is that the apparently most theoretically sophisticated and complete methodologies can give implausible or erratic results (Whiteford, 1985; Smith, 1989).

An optimistic view might be that, given the vastly expanded computational power now available and the increasing mathematical sophistication of the microeconomics based models, it is only a matter of time before there is a convergence to some sort of consistency of result especially for the models built on consumption theory. While there is hope that some of the problems may be overcome, the issues identified in the analysis thus far (and more rigorously expounded in chapter nine) seem to be so fundamentally embedded in either the data or the methodology itself (or both) that it may well be that this technique is fatally flawed, at least as far as the claim of being superior because it objectively produces scales showing revealed relative need. All the other methods have their problems too.

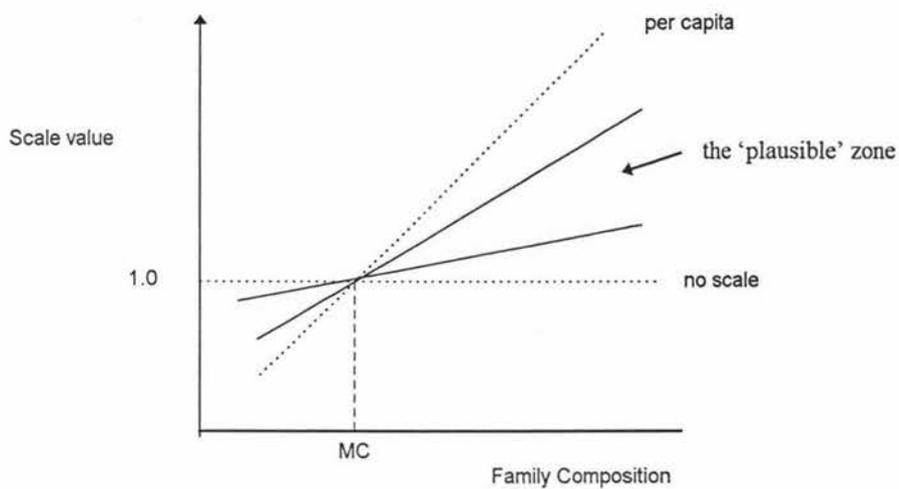
The policy and research communities are therefore faced with a dilemma. The use of equivalence scales is unavoidable in social policy research and analysis, but the theoretical,

<sup>10</sup> Bradbury accounts for the high values for the second Rothbarth results (alcohol plus adult clothing) by noting that there is a large fall in the consumption of alcohol among families with children, which leads to a high estimate of these costs of children. He adds the general caution that because of the large standard errors involved in the estimates, his statistical tests were 'unable to reject the hypothesis that the equivalence scales for each family size are equal' (1992a: 37).

conceptual and practical difficulties involved in their derivation in any 'scientific' way are at present overwhelming - and may always will be so. Judgements about relative family needs are unavoidable, but neither treating all families as if they had the same needs regardless of composition nor using a crude per capita scale which assumes that adults and children are equivalent is acceptable. What is needed is a set of scales between these two extremes (see Figure 7.2 below) but there is no flawless method of deciding just where within these boundaries the 'correct' scale should lie: we end up 'between a rock and a hard place'.

**Figure 7.2**

A 'plausible' range of scales?



## Between a Rock and a Hard Place

### The dilemma ... and a way through?

Not surprisingly, symptoms of this dilemma are evident in the literature itself where over and over again there is reference to 'plausible and sensible results' and the like. In his work on the Barten model, Muellbauer (1977) estimates a set of scales which on average come out to be 1.00, 1.14, 1.27 and 1.38 for a couple with zero to three children respectively. His immediate comment is that 'these scales seem to me to be quite *implausibly low*' (p 471, emphasis added). In one of the 'classic' child costs papers, Deaton and Muellbauer (1986) conclude from their study of expenditure patterns in Sri Lanka and Indonesia that 'child costs are 30-40 percent of expenditure per adult, *figures that seem to us to be appropriate and defensible*' (p741, emphasis added). In their discussion of issues and methodology in preparation for estimating scales for Australia, Tran Nam and Whiteford (1990) justify their choice of a particular functional form for the Engel estimation on the grounds that it provided not only the best fit of the data but also *the most plausible scales*, and their use of the ELES method on the grounds that 'it is a well-tried procedure that is *likely to give sensible results*' (pp227f, emphasis added). Oxley *et al* (1991) express a similar sentiment in their observation that while the techniques involved in producing scales can be based on fairly complex statistical analysis, 'the final judgement as to the validity of an equivalence scale often falls to whether or not it *makes intuitive sense*' (p13, emphasis added).

In his work based on New Zealand Household Expenditure and Income Survey data, Smith (1989) is refreshingly frank in his questioning whether any scales produced by the economics-based utility function method (whether full form or reduced form) would be any better than the simple intuitive notions of what the values should be. And these, of course, form the benchmark of plausibility and reasonableness against which the scales are being judged in the first place!

As a final illustration it is worth quoting Whiteford at some length:

The foregoing discussion should make it readily apparent that no single method for deriving equivalence scales can be regarded as entirely satisfactory, nor can any of the estimated scales be regarded as indubitably correct. Nevertheless it is possible to distinguish between methods on the basis of such criteria as the realism of the underlying theories, the consistency of the estimated results, and *the plausibility of the derived scales*. In assessing the implications of equivalence scale research, however, it would seem unwise to place too much emphasis on the results of any one method, whatever its comparative advantages or strengths. For example, how is one to weigh scales from the Canadian approach - which are not detailed and, a priori, must be biased - against the McClements scales - which are detailed and *plausible*, but derived in an unsound way - against the extended linear expenditure system scales - which have a

sounder base in theory, and in which some of the results are *implausible*? Indeed it is possible to develop *plausible equivalence scales* without recourse to theory, measurement or any data at all. A *quite sensible* set of scales can be derived from the square root of household size<sup>11</sup> (Whiteford, 1985: 102, *emphasis added*).

### A case study in the application of the plausibility rule

Many OECD countries have a scale that is either formally or informally accepted as 'official'. In the UK for example this mantle has fallen on the scales developed by McClements (1977, 1978). In New Zealand the 1988 revised Jensen scale (RJS) is the likely contender for the *de facto* official status, although the Whiteford GMS is often used too. In what follows, key elements of the basis of the RJS are examined as an illustration of the application of the plausibility rule as a strategy to escape the dilemma identified above.

The essence of Jensen's approach is the construction of a formula which generates a full range of ratios for households of varying composition once the ratios for two household types are determined by other means. In a graphical sense, the Jensen formula can be seen as a smoothing mechanism for determining the 'shape' of the equivalence scale curve once three anchor points are chosen. How were the anchor points decided on? In 1978, nine equivalence scales were inspected with two being set aside because of 'reservations'. The other seven (which included McClements (1977)) suggested a ratio of around 0.60 for a one adult household and 2.00 for a two parent four child family. For the 1988 RJS these two key ratios were chosen to bring the scale into line with the Whiteford GMS which gives the average of some fifty-five pre-1984 scales that Whiteford found in his international literature search.

**Table 7.13**

Anchor points for Jensen (1978, 1988)

	1 A	2 A + 4 C	Conforming to
1978	0.60	2.00	The rough average of 7 other scales
1988	0.65	1.75	Whiteford (1985)

In terms of the theme of this part of the study, both Jensen scales are determined by considerations of 'plausibility and reasonableness', rather than some more rigorous criteria. Jensen is very aware of this and freely acknowledges that 'the assignment of anchor values has an unavoidable element of arbitrariness, depending as it does on an informed judgement' (1988: 14). Furthermore, in contrast to the scientism of some who may use such scales as if they were as definitive as, say, a physicist's determination of the resistivity of copper, he described his

<sup>11</sup> In terms of the earlier analysis in this chapter, a square root scale is simply the constant elasticity model with  $\theta = 0.5$ .

earlier version as simply 'a useful rough-and-ready indication of equivalences in New Zealand' (1978: 65)

Nevertheless, the question that has to be asked is this: is the 1988 judgement about plausibility 'better' than the 1978 one? Given that the RJS is based on the GMS which in turn draws on the combined wisdom of some fifty-five scales developed in previous research, a 'yes' would seem to be in order. Or would it? Should not the component scales be weighed as well as counted? This is in fact what was done in 1978 when only seven of the nine available scales were accepted as being 'plausible'. In Whiteford's (1985) report, there are over one hundred pages of very thorough analysis covering all of the studies that are included in his three page numerical summary from which the GMS is calculated. No scale emerges unscathed in these one hundred pages which are full of very helpful material which can inform one's judgement. However, the GMS itself has somewhat less value for this purpose given that the process of averaging a set of flawed results does not itself necessarily produce a less flawed final result. Examples of highly implausible ratios that are included are the very low value of 1.01 for a couple-plus-one-child from a US study, the very high value of 0.94 for a single-person household in another and the very low value of 0.49 for the same in yet another.

There are further problems with using the GMS to inform one's judgement. For example, Whiteford includes the Jensen (1978) scale even though it is itself dependent on some of the other included scales. As one of his selections from the budgetary method, the scales implicit in the cost of children estimates of Lovering (1984) are used. Her work explicitly excludes the costs of housing, transport, school fees, uniforms, child care, holidays and medical expenses. There would probably not be a great deal of support for such a study contributing to an informed judgement, yet it is included in the data that makes up the GMS. Another study (Podder, 1971) since been found to have computational errors (Tran Nam and Whiteford, 1990).

A further serious issue arises when it comes to Whiteford's estimates for sole parent families. Most of the studies reported on do not produce scales for such households, an omission which is in part a reflection of the prevailing family arrangements in the 1950's to early 1970's, the time period from which the data was drawn for the bulk of the works he analyses. In order to fill these gaps the cost of children to a two parent household is simply added to the study's scale value for a single adult, where it exists. This is a dubious approach as Whiteford (1991) recognises.

This analysis and the many more points of a similar nature that could be made are not intended as a wide-ranging criticism of Whiteford's very thorough and helpful paper. In the text he seeks to weigh the value of the various methods and results very carefully. The point being made is that the grounds for taking the GMS as an indication of 'plausibility' are somewhat shaky to say the least. There is no escaping the need to make an informed judgement in deciding on a scale, and while Whiteford's paper as a whole is an excellent place to which to turn for guidance, his GMS itself may not be that helpful. It is certainly quite misleading to

suggest that '[his] geometric mean method is, in effect, an averaging of a number of equivalence scales that all fall within *acceptable ranges of tolerance*' (Department of Statistics, 1991: 59 - emphasis mine). No scale was excluded from his calculation of the GMS, no matter how flawed the methodology or implausible the ratios. The GMS may not therefore be the best guide in the seeking of an informed judgement.

## 8 The Iso-welfare Question I

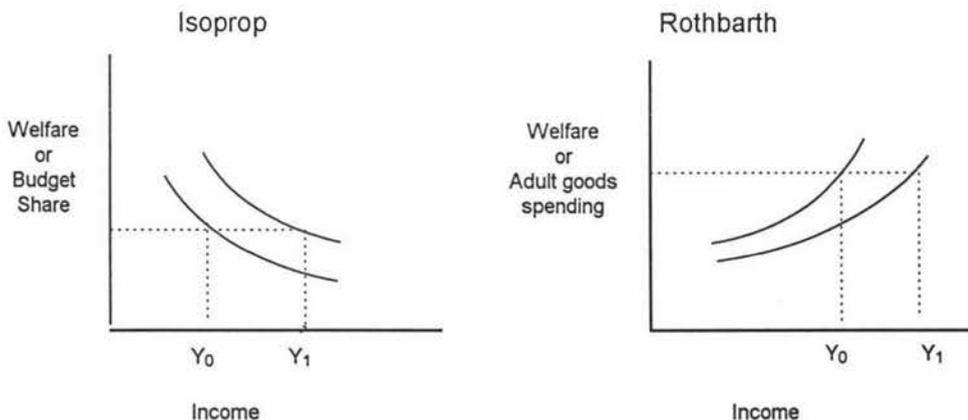
### Iso-prop and adult goods methods

The iso-prop<sup>1</sup> (Engel and extended Engel) and the adult goods (Rothbarth) strategies are two of the simplest and most popular iso-welfare methods for producing estimates of child costs. Both methods can be implemented by estimating a single equation from cross-section data and for this reason, these models 'are likely to have continued popularity, if only on computational grounds' (Deaton and Muellbauer, 1986: 340). Muellbauer (1974, 1977) has shown how both the iso-prop and adult goods models can be incorporated into a full utility function framework as special cases having particular assumptions about preferences (cf Blackorby and Donaldson, 1994). This aspect will be discussed in the next chapter.

The graphs below give a geometrical interpretation of the two approaches with the cost of the first child represented by  $Y_1 - Y_0$  in each case. For the Engel case the lower line is that for the reference household comprising a childless couple. The upper line represents the situation for the household with a child. For the Rothbarth case the situation is reversed with the upper line representing the couple household. To maintain the same amount of adult goods spending the income must increase as a child is added.

**Figure 8.1**

Simple graphical interpretation of the iso-prop and adult goods approaches



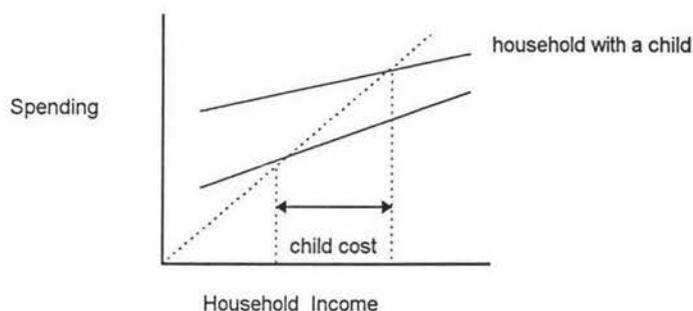
An alternative graphical interpretation of the iso-prop methodology can be given by drawing Engel curves for the two households. The dashed diagonal line is the constant proportion line

<sup>1</sup> The term 'iso-prop' appears to have been first adopted by Watts (1967). The literature sometimes refers to this more general class of estimators as the Engel method. This report will restrict the use of 'Engel method' to refer only to the food-share model.

and can be set to any suitable ratio. The difference in income when the proportion spent on the chosen commodity is the same for both households is the cost of the child.

**Figure 8.2**

Alternative graphical interpretation of the iso-prop approach



## Engel method

The iso-welfare Engel method has its genesis in the same soil as the proportional approach for estimating child-costs. In particular, two widely accepted findings underpin the food-share methodology. The first is that as family income increases (*ceteris paribus*) the budget share for food declines even though total food expenditure increases. This is usually referred to as Engel's Law as it was Ernst Engel who made the observation in a study of the economic development of Saxony in 1857<sup>2</sup>. The second widely found empirical regularity is that the budget share for food increases with family size. Starting from this base, the Engel method for estimating child costs proceeds by assuming that the food budget share can be used as an indicator of welfare for families of different composition.

The method has been applied recently by Espenshade (1984), Lee (1989) Tran Nam and Whiteford (1990), Tsakoglou (1991), Bradbury (1992a), Banks and Johnson (1993, 1994) and Phipps and Garner (1994).

### Espenshade (1984) and Lee (1989)

The first two studies selected to illustrate the method will be looked at together. While working under contract to the Australian Institute of Family Studies (AIFS), Lee (Deakin University) applied a methodology similar to Espenshade's to the 1984 ABS Household Expenditure Survey. The Institute publishes updated figures each quarter using average weekly earnings rather than the CPI to make the adjustment. The results reported from Lee are drawn from McDonald (1990) and AIFS (1993).

<sup>2</sup> The reference given in most of the literature is Engel (1895). This contains a reprint of the original work as an appendix (see Browning, 1992: 1472)

## Methodology

Thomas Espenshade's work was conducted under contract with the Center for Population Research, National Institute of Child Health and Human Development while he was a senior research associate at Washington's Urban Institute. The main motivation for the study was to contribute to 'parenthood education' (pp 20, 103), although it recognises that there are other practical uses for information on parental expenditure. As it turned out, it provided the rationale for the new US child support guidelines (Phipps, 1991). The study is a very comprehensive one which uses data from the 1972-1973 Consumer Expenditure Survey (CE) and takes account of the impact on spending on children of parents' socio-economic status (SES), number of children and wife's employment status. The analysis covers only husband-wife type households who had lived in their current dwelling for more than a year and whose children, if any, were under 25 years. The sample they ended up with had 8547 such consumer units.

The study is also comprehensive in its estimation procedures. A major feature is the creation of a micro-simulation model for projecting total family consumption in each year over the life cycle. Espenshade does this for a range of prototypical family types using synthetic life cycle consumption streams generated from the cross-sectional data. To discover how total spending is distributed across major consumption categories, Engel functions are estimated by regression techniques, one for each category. These equations describe the dependence of the various expenditures on total family spending, family size and family composition. After considering various options, Espenshade settles on a foodshare definition that is the ratio of spending on food consumed at home to total consumption expenditure. By reworking the Engel equation for food at home, foodshare is made the dependent variable. This then becomes the standard of living (SoL) function since foodshare is taken as the index for welfare.

For a particular family type (with children) the process begins by estimating the total family consumption ( $C_1$ ) from the micro-simulation model. Then, using the SoL equation the foodshare is calculated. Using this value for foodshare, the SoL equation is solved for total consumption ( $C_0$ ) for a household consisting of a couple of the same ages and SES as those for the adults in the family in question. The expenditure on the child(ren) is taken to be equal to the difference  $C_1 - C_0$ . If there are two children the expenditure on each can be ascertained by repeating the procedure for a reference family of one child and comparing results. A similar process allows the estimates to be carried out for a family with three or more children.

## Results

Espenshade's methodology allows a very detailed analysis. A clear finding is that 'parental expenditures on children ... exhibit great variation depending on the parents' SES, number of children, and wife's employment status ... [and] of the three factors ... number of children has the greatest impact on expenditures per child' (p 3). A consequence of this is that a low SES

family with one child and the mother not employed outside the home spends about as much per child as a high SES family with three children and the wife working full-time.

Both Lee and Espenshade found that spending on children increases with family income, but that the rise in spending is not proportional<sup>3</sup>. Thus children in poor families have more spent on them proportionately ('cost more') than children in middle and high income families.

Another solid result for Espenshade is that 'as children age they tend to become more expensive'. Dividing the 18 years of 'childhood' into equal portions, the study found that around 26 per cent of total child-related expenditures occur at ages 0-5 years, 36 per cent for 6-11 and 38 per cent for the teenagers. Lee broadly agrees except that for him there are higher expenditures in the under 2 years age-group.

The Espenshade study revealed only modest economies of scale related to increasing family size, what did exist being concentrated in the under six age-group. Lee's work showed up quite significant economies with the relative spending per child being 1.0, 1.55 and 2.0 respectively for one, two and three child families. By way of comparison the figures for the revised Jensen (1988) scale are 1.0, 1.83 and 2.52.

The expenditures were able to be disaggregated using the Engel equations. Seven major categories were used by Espenshade - food, clothing, housing, transport, recreation, medical care, miscellaneous. Housing here includes shelter, fuel, utilities and household goods and services. For the US study, transport (25 per cent), housing (24 per cent) and food (23 per cent) make up about three-quarters of the total. Lee used similar categories, with his figures for the three being of the order of 22, 26 and 17 per cent respectively.

**Table 8.1**

Lee (1989) and Espenshade (1984) results in 1992 NZ dollars with a comparison with USDA (1993) and Oldfield (1992)

Age of child	0 - 1	2 - 4	5 - 7	8 - 10	11 - 13
Lee - middle income	\$207	169	183	221	246
Espenshade - medium SES	\$188	188	274	274	280
USDA - middle income	\$260	273	282	264	279
Oldfield - modest-but-adequate	-	174	-	162	-

In Table 8.1 the findings for a one-child two-parent one-income family with an income around the average are set out for Lee and Espenshade and for comparison the comparable figures for

<sup>3</sup> Lee (1989) reports that spending on food for under 14 year olds is relatively inelastic with respect to family income (0.25) while that on 'other (including education)' was much more elastic (just over 1.0). On average the elasticity was around 0.45.

the FERG USDA and Oldfield studies. The figures for the latter two include corrections for the one child situation.

*Banks and Johnson (1993, 1994)*

A more recent work using data from the 1989 and 1990 FES data in the UK has been carried out by James Banks and Paul Johnson, Senior Research Officers at the Institute for Fiscal Studies (IFS) in London. The data set consisted of 8941 households, about the same size as that used by Espenshade. The IFS work uses total food expenditure and real non-durable non-housing expenditure as the components for their ratio whereas Espenshade (and Lee) used food at home and total consumption expenditure.

This appears to be a particularly useful work and several findings emerge. First, the estimated scales depend on how the effects of children are allowed to enter the model - in other words, on the parametrisation of children. Table 8.2 gives an indication of the variation that results from the choices made. To decide on the best option there has to be a judgement made regarding the trade-off between parsimony and the regression information as to which one best explains the data. For Banks and Johnson it is #3, which allows for there being a fixed cost component of having a child (0.08) plus age-related elements on top for the first and subsequent children.

Second, the range of values in the table is higher than with most other methods. This is consistent with the generally held theoretical prediction that the Engel method tends to overestimate the costs of children.

Third, the research found that equivalence scales depend on the expenditure level. Specifically, child costs (in equivalence scale form) decrease as expenditure increases

**Table 8.2**

Engel equivalence scales using different parametrisation of children (same data)

Method	2A	10 yr	9, 12 yr	6, 9, 12	Description of parameters
Banks & Johnson					
1	1.00	1.29	1.56	1.85	No. of children
2	1.00	1.30	1.65	2.00	No. of children (age-banded)
3	1.00	1.37	1.70	1.99	No. of children (age-banded) plus fixed cost
4	1.00	1.33	1.56	1.79	Presence and no of children (age-banded)
5	1.00	1.23	1.57	1.67	Non-parametric technique

## Commentary and evaluation for the Engel method

Table 8.3 provides a summary of several Engel based scales, adding those of Phipps and Garner (1994), Tran Nam and Whiteford (1990), Tsakloglou (1991) and Bradbury (1992a) to those already mentioned<sup>4</sup>. In terms of the single parameter iso-elastic summary formula discussed in the previous chapter, the Engel based scales reported here appear to have a 'high'  $\theta$  (around 0.7<sup>5</sup>) with average child costs equivalent to around 60% of that of the each adult (on average) in the couple.

**Table 8.3**

Equivalence scales using the Engel methods

Author	Data	Country	2A	2A+1C	2A+2C	2A+3C
Banks and Johnson (1993, 1994)	1989-90	UK	1.00	1.37	1.70	1.99
Phipps and Garner (1994) <sup>a</sup>	1986	Canada	1.00	1.36	1.73	2.06
Tran Nam & Whiteford (1990)	1984	Australia	1.00	1.27	1.61	2.03
Bradbury (1992a) <sup>b</sup>	1988-89	Australia	1.00	1.37	1.56	1.82
Espenshade (1984)	1972-73	US	1.00	1.24	1.41	-
Tsakloglou (1991) <sup>c</sup>	1981-82	Greece	1.00	1.33	1.76	-
<i>Geometric mean of the above</i>			<b>1.00</b>	<b>1.32</b>	<b>1.62</b>	<b>(1.97)</b>

Notes (a) This study controls for household size only. To derive child costs, it has to be assumed that n-person households consisting of 2 adults and n-2 children dominate the respective categories to such a degree that the approximation is warranted or that households of the same size have approximately the same 'needs' regardless of composition.

(b) From Table 4.3

(c) Tsakloglou reports some diseconomies of scale

Although a certain degree of technical competence is required, the estimation techniques involved in the food-share iso-welfare method are relatively straightforward. Only one

<sup>4</sup> From the sources used there was no straightforward way of deriving a set of scales for Lee (1989) as the ratio for a two adult household was not given. A rough estimate can be produced on the basis that the cost of an 8-10 year old is \$190 pw for a household with a gross income of \$597 (AIFS, 1993). Assuming an average tax rate of 20%, child costs account for 40% of total spending for the one child family. This translates to an equivalence ratio of 1.66 which is even higher than a per capita scale. The child therefore consumes more than the per capita amount for the adults in the household. This seems on the high side relative to other studies, yet the commentaries in McDonald (1990) and AIFS (1993) do not discuss the matter.

<sup>5</sup> Without the scale value for a single adult a more precise estimate of the elasticity is not justified. The scale values are similar to the OECD modular ones ( cf Tsakloglou, 1991: 350).

equation has to be estimated whereas full utility methods require the estimation of many equations in a demand system then integration back to the utility function. Furthermore, the data requirements are not demanding and the concept of the costs of children used has an inherent attractiveness to it. These virtues, together with its intellectual linkage with the Orshansky methodology which lies behind the definition of the 'official' US poverty line<sup>6</sup>, will probably ensure that it remains on the research agendas of various institutions. There are however three significant problems with the method.

First, the assumption that the food budget share can be used as an indicator of welfare for families of different sizes cannot be said to be established. Deaton and Muellbauer (1986) go so far as to say that '[w]e can construct no plausible defense for the belief that the food share correctly indicates welfare between households of different size, and do not believe that credence should be given to estimates based on that belief' (p741). The claim has perhaps gained its credence from the good company it keeps - namely, Engel's Law, which is itself not in question here. Any isoprop index has a numerator and a denominator and it is not obvious which measures to have in each. Espenshade presents a systematic discussion of the issue considering nine possibilities for the 'necessities' numerator and three for the 'income' denominator (ie 27 options in all). On the basis of reasonable criteria he settles on 'food at home' and 'total expenditure' as the components for his ratio. This, however, does not deal with the more fundamental question as to why *any* isoprop index is acceptable. On this, Espenshade simply notes that 'of the numerous ways of establishing equivalencies in diverse families' standards of living, one that has gained popularity over the years is reliance on budget shares.' This version of the age-old 'everyone's doing it' argument is not persuasive in the face of the sort of solid evidence that the iso-prop the isoprop estimate of child costs can be very sensitive to the choice of measures for necessities and income (eg Browning, 1991a; cf Whiteford, 1985: 45).

The second problem is that there are some theoretical grounds that suggest that the Engel method may over-estimate the costs of children (Nicholson, 1976; Deaton and Muellbauer, 1986). On the assumption that a child's budget is more food intensive than an adult's, the overall household budget is somewhat more food intensive when children are present. This means that the household with children has to have a larger compensating income rise than it would if the child's food share was the same as that for an adult. As a result, the household as a whole is over-compensated or, to put it another way, child costs are overestimated. This argument has particular weight in developing countries where children are definitely food intensive, but may be somewhat diluted in the developed world where children are less food intensive and 'may be relatively intensive consumers of other commodities (such as housing) and so the direction of the Engel bias may be less clear' (Bradbury, 1992b: 121; cf Phipps, 1991).

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<sup>6</sup> 'However, the official status of this measure is currently under review. It has been subject to much criticism and its future is uncertain' (DSS, 1995: 44; so also Ruggles (1990) and Mayer & Jencks (1988)).

This claim of overestimation has to be tempered also by an implication of the third problem for the method, a problem that it shares with most iso-welfare methods - namely that of changing adult preferences as children are added to the household. The issue was identified and discussed earlier in chapter three where it was argued that such a change could well lead to an underestimation of child costs. On a closely related theme it can also be argued that it may not be reasonable to model the reference household as if it really were a childless couple. Rather, it is a currently childless couple whose preferences and behaviour are already being shaped to a degree by the anticipated presence of children<sup>7</sup>. For example, many couples purchase a house that is larger than their initial requirements in anticipation of having children later. The effect of this sort of behaviour on the iso-welfare estimate is in the same direction - the costs for the first child will be underestimated, in this case because some of its costs are already being borne by the childless couple.

These issues make it difficult to reach a firm conclusion about the direction of the bias. There are factors which lead to underestimation and at least one which leads to overestimation but the relative strength of these effects is not quantifiable.

## Extended Engel (or 'Canadian') method

One way of seeking to avoid the problem of overestimation inherent in the pure food-share Engel method is to extend the bundle of 'necessities' to include categories such as clothing, shelter and household operations. Given that children's expenditure shares in the latter two categories are less than those for adults, the overall children's share for all four 'necessities' can be expected to come closer to the household's figure than when only food is taken into account. This refinement of the Engel approach is similar to that used by Statistics Canada in the estimation of its low-income cut-offs (LICOs) - hence the method is sometimes referred to as 'the Canadian method'. Recent applications of the strategy include the Canadian LICOs, Tran Nam and Whiteford (1990) and Phipps and Garner (1994).

### *Phipps and Garner (1994)*

The motivation for this study arose from the observation that, given the sensitivity of policy analysis to the equivalence scale employed, and given that country-specific scales can vary substantially, it is often difficult for a researcher to decide whether to use the same scale for all countries studied or to use each country's own scale. This led to the research question that

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<sup>7</sup> Muellbauer (1977) is one of the few places in the literature where this issue is acknowledged. He discusses it in relation to data limitations in the usual data sets which 'do not distinguish which families are intending to have children and therefore may be investing in a durable good' (p484).

Phipps and Garner sought to answer: 'Are equivalence scales the same for Canada and the United States when we use exactly the same methodology to obtain them?'

The study uses the data from the 1986 Statistics Canada *Family Expenditure Survey* (FAMEX) and the 1986-88 US *Consumer Expenditure Survey* (CES) and the answer to their question was a clear 'Yes, they are the same - there is no statistically significant difference between the scales for the two countries'. Given this clear finding, it makes sense to avoid repetition by focusing on just one of the sets of data and results - say, Canada's. FAMEX records household expenditure across the following major categories: food, shelter, household operation, household furnishings and equipment, clothing, transportation, health care, personal care, recreation, reading materials, education, tobacco and alcohol and miscellaneous. Of these, the researchers considered three different necessity bundles: food purchased for home consumption; food for home consumption, clothing and shelter; the previous three plus health care expenditures.

As for the food-share approach, the extended Engel method assumes that households spending the same proportion of their total budget on necessities are equally well-off. If two households differ only in that one consists of a childless couple while the other consists of a couple plus one child, then by finding the levels of spending at which the two households devote the same share to necessities, the cost of a child can be estimated. Unfortunately the report is not explicit about the level of income share at which the scales are calculated. Phipps and Garner did their estimates for income both before and after income tax. The results could not be distinguished statistically so they followed their preference and framed the report in terms of net after-tax income.

Since household composition varies over the course of a year defining the number of household members is not easy. Their solution was to exclude households where composition changed. This led to 9 per cent of the Canadian sample being deleted, a situation which they consider unsatisfactory. Given that the functional form chosen was a log-log one, further deletions from the original data set were necessary - namely, consumer units with negative incomes or reported after-tax incomes less than<sup>8</sup> their spending on necessities. Mainly as a result of these two sets of decisions, the sample size was reduced from 10,356 to 9,214.

The regression allowed for 'size of household' but did not directly take into account the presence of children. Therefore, to derive estimates of child costs one has to assume that a very large proportion of the households of size three or more have two adults and one or more children. Table 8.4 summarises the results for the three 'necessity bundles'.

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<sup>8</sup> The paper actually has 'exceeding' here - I assume that this is an accidental flip of the inequality sign??

**Table 8.4**

Equivalence scales for Canada using income after tax (Phipps and Garner, 1994)

'Necessity'	Number of persons (likely composition)			
	3 (2A + 1)	4 (2A+2)	5 (2A+3)	6 (2A+4)
Food	1.36	1.73	2.06	2.40
Food, shelter, clothing	1.27	1.54	1.75	1.89
Food, shelter, clothing, health care	1.27	1.53	1.73	1.88

*Tran Nam and Whiteford (1990)*

Tran Nam and Whiteford review equivalence scales previously derived for Australia and derive new estimates based on the 1984 *Household Expenditure Survey* (HES). In many respects the research is like that of Phipps and Garner: they use a range of necessity bundles for the numerator and net after tax income for the bottom line of the ratio, and the Engel equation is given double-log form. The sample size is smaller though, consisting of 4,492 households and the larger necessity bundles have fuel in place of health care. The basic results are summarised in Table 8.5 and a comparison with Table 8.4 shows that there is considerable similarity for these 'extended Engel' results.

**Table 8.5**

Equivalence scales for Australia using income after tax (Tran Nam and Whiteford, 1990)

'Necessity'	Family composition		
	2A + 1	2A+2	2A+3
Food at home	1.27	1.61	2.03
All food	1.23	1.52	1.88
Food at home, housing, clothing, fuel	1.27	1.61	2.05
All food, housing, clothing, fuel	1.25	1.57	1.97

The study also confirms the widespread finding that an older child costs considerably more than a younger one. An attempt to investigate the variation of scale with income is reported but the standard errors were in general so large that it seems to be unwise to draw any conclusions.

## Commentary and Evaluation for the Extended Engel studies

Table 8.6 below provides a convenient summary of the above results along with Canada's 1986 LICOs (Ruggles, 1990: 74). The elasticity is still 'high' but as expected is lower than for the pure Engel approach. The child costs appear to be around 50% of that for each adult (on average) in the couple.

Taken on their own the above results (Tables 8.6) support a positive view of the method's ability to produce consistent results. This would be a hasty conclusion as there are other earlier studies (see Whiteford, 1985) using the method which produce slightly lower results (40% to 45% of each adult (on average) in the couple).

**Table 8.6**

Equivalence scales using the extended Engel methods: a summary

Author	Data	Country	2A	2A+1C	2A+2C	2A+3C
Phipps and Garner (1994)	1986	Canada	1.00	1.27	1.53	1.73
Tran Nam and Whiteford (1990)	1984	Australia	1.00	1.26	1.59	2.01
Canadian LICOs (Ruggles, 1990)	1986	Canada	1.00	1.27	1.46	1.60
<i>Geometric mean of the above</i>			<b>1.00</b>	<b>1.27</b>	<b>1.53</b>	<b>1.77</b>

The criticism regarding overestimation raised in association with the food-share method is probably less applicable to the extended Engel method, but the other two problems raised for it remain. All iso-prop methods have to (arbitrarily) decide on a proportion of 'necessities' as the level at which the calculations are done, but there is some assurance from Whiteford (1985) that for the studies he surveyed, 'the choice ... did not have a significant effect on the equivalence scale estimates' (p46).

## Rothbarth (adult goods) method

The Rothbarth methodology assumes that the level of well-being experienced by adults in a household can be gauged by the level of expenditure on what most of the literature (a little carelessly, perhaps) calls adult goods. In terms of the definitions given in chapter three, 'adult goods' in the literature is equivalent to this study's 'adult-only goods' - goods consumed

exclusively by adults (Figure 3.1 is reproduced below as Figure 8.3 for convenience)<sup>9</sup>. On the narrow economic understanding of welfare there can be no real quibble with adult welfare being seen as a function of total adult consumption. The proposition on which the Rothbarth method depends is that a portion of total adult consumption, namely that of adult-only goods, is consistently proportionately related to the whole.

Contrary to the popular view, Rothbarth (1943) originally did not use 'adult goods' (AO) for his calculations. Rather he used a concept of excess income, defined as the residual after expenditure on rent, rates, state insurance, travel, income tax, food, fuel and clothing. Most subsequent applications use only adult clothes and/or alcohol and tobacco to proxy adult welfare. The definition of child costs then becomes the additional income required to restore expenditures on adult goods (AO) to the level previously enjoyed by the childless couple. The Rothbarth procedure is applied in very much the same way as the Engel procedure with the estimation of an Engel curve for the adult goods, and the subsequent use of this to calculate the income required to nullify the negative effects of additional children on the adult goods total.

**Figure 8.3**

Two ways of categorising household expenditure

adult-only goods (AO)	adult goods (A)
shared goods (S)	
child-only goods (CO)	child goods (C)

Rather than the usual pattern of a detailed analysis of one or two studies followed by a commentary and evaluation, on this occasion there will be a general discussion and evaluation drawing on various works. The results section then follows.

### **General discussion and evaluation.**

The Rothbarth method has been applied recently by Deaton and Muellbauer (1986), Lazear and Michael (1988), Bradbury (1989a, 1992a, 1994), Deaton *et al* (1989), Nelson (1990), Fedyk (1991) and Tsakloglou (1991). The strategy is built on three assumptions, each of which is open to criticism:

<sup>9</sup> This section follows the general convention in speaking of adult goods when adult-only goods is really meant. The context will usually make the meaning clear. If there is the possibility of ambiguity then the fuller descriptor will be used.

- adult welfare can be narrowly identified with spending on adult-only goods;
- pure adult goods can be correctly identified as such; *and*
- the consumption of adult-only goods is separable from that of consumption by the child(ren) and shared goods consumption (in other words, the presence of children has only an income effect on adult only consumption).

The criticism of the first assumption takes the same form as that of the comparable one for Engel method (and to a lesser extent, the extended Engel method). Why should adult welfare be so narrowly identified with the amounts spent on adult-only goods? The proposition depends on the claim that spending on adult-only goods, is consistently proportionately related to the total adult spending. This is simply an (untestable) assumption made to provide some way of identifying the standard of living across households. The issue becomes one of judgement as to whether such an assumption is as convincing as any other (eg those made for the Engel or extended Engel strategies).

The second related problem also echoes the critique of the Engel method - it is not obvious which goods to choose as adult goods. Choices have ranged from the minimalist alcohol, tobacco and clothes through to a very long list of twelve goods (Deaton *et al*, 1989). This latter list included transport and entertainment which are hardly pure adult goods (AO).

Third, the validity of the Rothbarth method stands or falls on the assumption of separability to an even greater degree than do the other iso-welfare methods. Empirical investigation of the implications of this assumption at the very least erode its credibility, perhaps even doing more serious damage (Deaton *et al*, 1989; Nelson, 1992b; cf Phipps, 1991). Gronau (1988) is cautiously optimistic that although at first glance it seems a hard assumption to defend, 'after consideration, it looks like an assumption one can live with (though not without reservations)' (p1189). On the other hand in her extensive investigation of the theoretical and empirical support for the assumption, Nelson (1992b) argues that 'the presence of economies of scale in the form of a pure public good means that the addition of children has a price as well as income effects on the adults' consumption ... [which] ... invalidates the separability assumption in theory. Empirical evidence tends to suggest that biases in results drawn from the Rothbarth method are more than just a minor theoretical possibility' (pp301ff). Browning (1992) is quite clear that 'separability is not tenable' (p1446).

Beyond these telling theoretical difficulties, there are three very practical hurdles for the Rothbarth technique. First, if the adult goods chosen have alcohol and tobacco as major components, there can be a problem in that 'neither category seems to be typically very responsive to changes in income so that the income effects required to measure the compensation are hard to establish' (Deaton and Muellbauer, 1986: 731). Second, it is well-known that alcohol and tobacco consumption are 'notoriously underreported' in expenditure surveys (Bradbury, 1989a; Fedyk, 1991a). This calls into question the precision of Rothbarth results that have these two as their prime adult goods. Third, it is not likely that politicians and others will be persuaded to approve an income support regime for children that justifies its

levels of payment on the grounds that such a level will allow parents to go on drinking and smoking as they would if they did not have children (Browning, 1991a).

Given all these drawbacks, it is somewhat surprising to find that two of the leading experts in the field (Deaton and Muellbauer, 1986) recommend it. Why is this? Their starting point is the view that the truth about child costs is probably represented by Barten's (1964) model as modified by Gorman (1976). However, given the practical reality that the parameters of this model will always be very difficult to estimate and their stated goal of confining themselves to measures of child costs that can be estimated from a single household expenditure survey, they conclude that the Engel and Rothbarth methods are likely to have continued popularity. Of the two, there is no doubt for them that 'the Engel method is not well-based ... and the Rothbarth method with corrections for substitution effects is much to be preferred in any context' (p 741). Their favourable evaluation of Rothbarth rests on the assumption that 'the parents' preferences are separable between their own consumption and that of their children' (p 732) - ie on the separability assumption. This assumption is necessary because Rothbarth requires that consumption of adult goods is a good proxy for consumption of all the goods consumed by adults. In their study based on data from Sri Lanka and Indonesia the composite adult good was made up of adult clothing, tobacco and alcohol.

Gronau (1988) also argues for the Rothbarth method, but his logic is much more succinct. He argues that separability is a necessary condition for the estimation of equivalence scales and that the Rothbarth method is the only one consistent with that assumption. In other words, in contrast to the conditional preference for Rothbarth given by Deaton and Muellbauer, Gronau's preference is unconditional. In his view, the underlying assumptions of the equivalence scale model within the theory of consumption generate the Rothbarth method. There is no other choice. Gronau is not mentioned in the results section as there is no application of the method to any data set in his 1988 paper.

Fedyk (1991a) presents a review of the various iso-welfare methodologies and likewise concludes that the Rothbarth technique is the best option. Her support for the method is based on arguments like those of Deaton and Muellbauer and Gronau above. However she refines the analysis by acknowledging that the separability assumption probably does not hold fully in that there is likely to be some change in spending behaviour by parents that is due to changing tastes rather than to the changed income available. To mitigate the effect of this loosening of separability she argues that a composite adult good should be chosen in the hope that 'some changes in taste can be tolerated, provided that not all taste changes operate in the same direction' (p6). In her analysis of Canadian FAMEX data, she chooses a composite adult good comprising adult clothing, gifts to charity, interest on personal loans, dues to unions and professional associations, and lottery tickets. Alcohol and tobacco are deliberately not included. She creates a synthetic family life cycle to get an estimate of the total costs of children from birth to 17 years.

Bradbury (1989a) has also produced a helpful discussion of the Rothbarth approach and applies the technique to 1984 data from the Australian Household Expenditure Survey. He considers several possible contenders for adult-good status (clothing, alcohol, tobacco, gambling, adult food) and concludes that 'the most stable results are likely to be obtained from clothing and alcohol'.

Finally, it is worth briefly noting the work by Lazear and Michael (1988) referred to in the previous chapter. They use a slightly modified Rothbarth approach on data in the 1972-73 US Consumer Expenditure Survey with their composite adult good being adult clothing, alcohol and tobacco. Key assumptions are that shared goods are allocated in the same ratio as private goods and that the ratio of expenditure on adult-only goods to that on total adult goods is independent of income and household composition.

## Results

Before summarising the main findings of the above research, there is a general result to note. There is reasonable agreement that whereas it is likely that the Engel food-share method tends to overestimate child costs (at least for younger children), the Rothbarth technique tends to underestimate them<sup>10</sup>. The theoretical grounds for expecting this downward bias have their origins in the claim of Barten (1964) and others that the presence of children makes goods that are shared with children relatively more expensive than adult-only goods, so that there may be substitution toward adult goods in households with children. As the Rothbarth method will compensate parents only to the point where the consumption of adult-only goods is unchanged, it will underestimate the costs of the children as some of the consumption 'lost' through the income effect has already been 'gained' through the substitution effect (Deaton and Muellbauer, 1986; Gronau, 1988; Tsakloglou, 1991; Bradbury, 1992a). When Deaton and Muellbauer incorporate an adjustment for the effect of this substitution into their model their child cost estimates rise from around 20% to about 30 to 40% of each adult (on average) in the couple (as shown at the top of Table 8.7 below - adjusted figures in parentheses). This is a little higher than the mean of the reported studies which is around 30% of each adult in the couple.

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<sup>10</sup> Empirical confirmation, however, is elusive without an agreed standard that the two methods are either to exceed or fall short of. What can be shown is that using the same data the Engel results are almost always higher than the Rothbarth ones (eg Barnow, 1990; Tsakloglou, 1991).

**Table 8.7**

Results using the Rothbarth (adult goods) technique

Study	Composite Adult Good	Country	Year	One child <sup>1</sup>		Two child
				0-5 yrs	6-13 yrs	
Deaton & Muellbauer (1986)	adult clothing, alcohol, tobacco	Sri Lanka	1969-70	1.10 (1.20)	1.12 (1.22)	1.21 (1.34)
	<i>(adjusted ratios - see text)</i>	Indonesia	1978		1.12 (1.22)	1.20 (1.33)
Fedyk (1991)	adult clothing, gifts to charity, miscellaneous spending	Canada	1986 low inc	1.18	1.20	1.35
			high inc	1.12	1.14	1.23
Lazear & Michael (1988)	adult clothing, alcohol and tobacco	US	1972-73		1.20	
Nelson (1990)	adult clothing, alcohol and tobacco	US	1972-73		1.13	
Bradbury (1989)	adult clothing or alcohol	Australia	1984		1.20	1.40
Bradbury (1994)	adult clothing	Australia	1988-89		1.16	1.28
Tsakloglou (1991)	meals out, alcohol, tobacco, adult clothing & footwear, entertainment	Greece	1981-82	1.09	1.13	1.29
Deaton <i>et al</i> (1989)	adult clothing, adult education, alcohol, entertainment, health, meals out, personal care, transport	Spain	1980-81	1.11	1.15	
<b>Geometric mean of the above</b> <i>(excluding D&amp;M's adjusted figures)</i>				<b>1.12</b>	<b>1.15</b>	<b>1.28</b>

<sup>1</sup> For those studies that do not provide an age analysis, the child is assumed to be ten years

## 9 The Iso-welfare Question II

### Full Utility Function Methods

Although each of the approaches in the previous chapter fits comfortably within the simple general analytic framework for the iso-welfare strategy, none of them can be said to have a rigorous theoretical foundation. The 'economic approach' seeks to meet this challenge through the application of the well-established consumer demand theory to household welfare comparisons. Despite the fact that there is considerable debate as to whether the underlying theory and the practical application are compatible, this method has proved increasingly popular for many reasons, not least of which is the claim that it avoids many of the subjective and *ad hoc* elements of the other approaches. Recent applications of the utility function method to estimating equivalence scales include McClements (1977, 1978), Muellbauer (1977, 1979), Kakwani (1977), van der Gaag and Smolensky (1982), Ray (1986), Jorgenson and Slesnick (1987), Tran Nam and Whiteford (1990), Blundell and Lewbell (1991), Pashardes (1991) and Phipps (1992).

The literature uses a variety of alternative terms when referring to the microeconomics based approach. For instance, it is sometimes called the econometric method (eg Coulter *et al*, 1992a), although it would be misleading to conclude from this that no other methods use econometric techniques. Some refer to it as the (full<sup>1</sup>) utility function method since consumption theory uses the economist's theoretical construct of 'utility' and yet others speak of it as the consumption (theory) method because of its theoretical base. Finally, it is also called the behavioural approach as the method purports to be based on individual and household behaviour rather than on the view of experts and so on. The discussion in this report will reflect the diversity of description in the literature but not the optimism about the superiority of the method that is espoused in some quarters.

Building on the work of Barten (1964), Muellbauer (1974, 1977, 1980) and Deaton and Muellbauer (1986) have shown how the Engel, Rothbarth and Prais-Houthakker models can be incorporated into the consumption theory framework and given a utility interpretation. The essential feature of this integrated approach is to show how the assumptions of each of those models can be represented by a specific form for the utility function and the associated cost function.

This chapter begins with an exposition and preliminary critique of the formal analytic framework for the general strategy and the various models within it, then moves on to a more general critique. The goal is to provide a mediated access to the issues and the relevant literature with a view to encouraging a more informed and circumspect evaluation and use of

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<sup>1</sup> 'Full' in contrast to the 'reduced form' approach of the Engel and Rothbarth type methods (Browning, 1992)

scales derived by this method. It is easy to be seduced not only by the tidy rows of numbers but also by the claims of a 'scientific' or 'more objective' economics based methodology of deriving scales with the result that a healthy critical perspective can be lost. Put another way, the goal is to demystify the microeconomic framework and thus empower the interested non-expert. The chapter finishes with a selection of results from the studies that use the full utility function strategy.

## A Formal Analytic Framework and Preliminary Critique

The economics literature on equivalence scales starts with the assumption that households seek to maximise a utility function  $U(.)$  subject to a budget constraint (C). To facilitate the discussion it is important to have clarity regarding key concepts and symbolism.

It is assumed that the household budget is divided into  $k$  commodity groups<sup>2</sup> with the price and quantity of the  $i$ th good being  $p_i$  and  $q_i$  respectively. In keeping with current practice any variable having 'components' will have its vector nature represented by the use of bold face. For instance, prices  $p_1, p_2, \dots, p_k$  are represented as  $\mathbf{p}$ . This contrasts with scalars like utility  $U$  and total after tax income  $y$ , total spending  $x$  (or  $C$ ), and so on. So,

- $\mathbf{p}$  =  $(p_1, p_2, \dots, p_k)$  a vector of prices for the  $k$  commodity groups
- $\mathbf{q}$  =  $(q_1, q_2, \dots, q_k)$  a vector of demands for the  $k$  commodity groups
- $\mathbf{z}_h$  = a vector of characteristics of household 'h' (the subscript is usually dropped)
- $x_i$  =  $p_i q_i$  = expenditure on the  $i$ th commodity group
- $x$  = total consumption expenditure =  $\sum p_i q_i$  (= income,  $y$ )<sup>3</sup>
- = total budget constraint (C)

Household preferences over consumption and characteristics are represented by a utility function  $U(.)$ , where

$$U = U(\mathbf{q}, \mathbf{z}) \quad (1)$$

Recalling the definition developed in chapter three ... for any household (h) the equivalence scale ( $ES^h$ ) is the ratio of the expenditure it needs to reach a welfare level ( $W$ ) to that required by the reference household (r) for the same  $W$  ... and applying it for ' $W = U$ ',

<sup>2</sup> The division does not necessarily have to be along HES lines of food, clothing, housing, etc. It could be that other distinctions are appropriate on some occasions - for example, an adult goods/other goods one.

<sup>3</sup> As a simplifying assumption, this report (in line with the common practice in the literature) usually assumes that income = expenditure. This assumption is relaxed from time to time to examine the effects of saving, dissaving, borrowing and the treatment of housing on the estimates of child costs.

$$\begin{aligned}
 ES^h &= \text{Spending by h to reach W} / \text{Spending by r to reach W} \\
 &= \text{Spending by h to reach U} / \text{Spending by r to reach U} \\
 &= E(U, \mathbf{p}, \mathbf{z}_h) / E(U, \mathbf{p}, \mathbf{z}_r) \quad (2)
 \end{aligned}$$

The utility function methodology seeks to provide a theoretically grounded means of determining the cost function  $E(\cdot)$  from the expenditure data. The centrepiece of the theory is the assumption that a household seeks to maximise its utility  $U$  subject to the budget constraint  $C$ . Put more formally, the constrained maximisation problem facing households is to maximise  $U(\mathbf{q}, \mathbf{z})$  subject to  $\sum p_i q_i = C$ , where  $C =$  a given expenditure limit or budget constraint. The optimisation problem can also be expressed as one of minimising  $C = \sum p_i q_i$  subject to  $U(\mathbf{q}, \mathbf{z}) = U$  where  $U =$  a given utility level.

Solving these involves the use of some reasonably straightforward algebra and calculus which is nevertheless beyond the scope of this report. The two important results for the purpose of this section are that the process produces a cost function  $E(\cdot)$  as in (2) above and a set of demand equations  $D_i(\cdot)$ , one for each commodity group.

$$C = E(U, \mathbf{p}, \mathbf{z}_h) = x \quad (3)^4$$

$$q_i = D_i(\mathbf{p}, \mathbf{z}_h, y) \quad (4)$$

The cost function indicates how much expenditure (income) is needed by a certain household to reach a particular utility level in a given price regime. The demand functions indicate how the quantity consumed of each commodity depends on the price regime, the household characteristics and the household income.

Equations (1), (2) and (3) involve direct utility which is unobservable, but associated with them is a system of demand equations,  $D_i(\cdot)$ , linking commodity spending to total spending, the price regime and household characteristics, all of which are observable. Estimation of scales therefore consists of three main steps:

- the specification of the functional form of the utility function (ie preferences) and hence of the associated cost and demand functions;
- the estimation of the demand equations from the household budget data and hence the calculation of the unknown coefficients in the utility and cost functions; and
- the calculation of the scales ( $ES^h$ ) using (2).

Within the wider microeconomics based estimation strategy there are a variety of models which can be distinguished by the different ways in which they incorporate household characteristics ( $\mathbf{z}_h$ ) into the cost function (or the utility function), and much of the economic literature on child costs is concerned with the generation of plausible models of the relationship between household (adult?) preferences and demographic structure. The rest of this section reviews

<sup>4</sup> In practice, the indirect utility function,  $V(\cdot)$ , is used in the estimation process.  $V(\cdot)$  is the inverse of the cost function, so that if  $C = E(U, \mathbf{p}, \mathbf{z}) = x = y$ , then  $U = V(y, \mathbf{p}, \mathbf{z})$ .

some of the more commonly used models, and in each case identifies the form of the utility, cost and demand functions, describes the way that the effect of the addition of children is modelled and notes some of their alleged advantages, limitations, similarities and differences.<sup>5</sup>

### The Engel model

The Engel model does not have its origins in the consumption based methodology. As indicated in chapter eight it simply assumes that two households have the same material well-being when they each allocate the same proportion of their total expenditure to food. However, it can be given a utility interpretation as a special case of the Barten model described in due course below.

For the Engel approach, the cost of the children relative to the adults is the same for each commodity group. When household composition changes the increase (decrease) in cost is equivalent to an equal percentage increase (decrease) in each price. The cost function therefore takes the form:

$$E(U, p, z) = ES(U, z) \cdot \hat{E}(U, p) \quad (5)$$

The link between behaviour and welfare for the Engel model can be formalised by writing demand per equivalent household as a function of total spending per equivalent household (instead of having, say, demand per capita a function of total spending per capita). The Engel curves are:

$$\frac{q_i}{ES^h} = D_i \left( \frac{x}{ES^h} \right) \quad (6)$$

Rearranging (6) gives the expenditure on commodity group  $i$ ,

$$x_i = ES^h p_i D_i \left( \frac{x}{ES^h} \right) \quad (7)$$

Simple manipulation shows that the budget share ( $w_i$ ) - whether 'food' for Engel or some other 'necessity set' for the iso-prop in general - is an indicator of welfare in money metric form,  $x/ES^h$ :

$$w_i = \frac{x_i}{x} = \frac{ES^h p_i D_i \left( \frac{x}{ES^h} \right)}{x} = F_i \left( \frac{x}{ES^h} \right) \quad (8)$$

The utility function will be of the form:

<sup>5</sup> The section draws on Muellbauer (1974, 1977, 1980), Phipps (1991), Bradbury (1992a) and Coulter *et al* (1992a).

$$u = U(\mathbf{q}, \mathbf{z}) = U\left(\frac{q_i}{ES^h}\right) \quad (9)$$

### The Prais-Houthakker (PH) Model (or 'sophisticated Engel' model)

Sydenstricker and King (1921) argued that the Engel model was too restrictive and that each commodity  $i$  ought to have a different scale (the commodity specific scale  $ES_i^h$ ) in recognition of the differing relative needs of adults and children across commodity groups<sup>6</sup>. For example, a child might be equivalent to 60% of an adult for food consumption, 40% for clothing and 25% for transport costs, and so on. On this basis, the Engel model would rate a child as 0.60 of an adult, whereas the suggestion of Sydenstricker and King is that all the commodity groups should be taken into account and a weighted average calculated<sup>7</sup>. Their 1921 paper is rather obscurely written without any mathematical modelling and (perhaps because of this) the idea 'fell into obscurity' until it was proposed again by Friedman (1952) and independently rediscovered by Prais and Houthakker (1955). They generalised (6) above to:

$$\frac{q_i}{ES_i^h} = D_i\left(\frac{x}{ES^h}\right) \quad (10)$$

and,

$$q_i = ES_i^h \cdot D_i\left(\frac{x}{ES^h}\right) \quad (11)$$

(11) has a simple interpretation. The addition of an extra child to the family increases spending on commodity  $i$  by the commodity specific scale factor  $ES_i^h$ , but also reduces available income by the overall or 'income' scale factor  $ES^h$ .

Like the Engel model, the PH model was not originally set in the framework of consumer demand theory. To do so, a helpful place to start is with the cost function  $E(\cdot)$  that is consistent with (10) and (11):

$$x = E(\mathbf{u}, \mathbf{p}, \mathbf{z}) = \sum p_i q_i = \sum p_i ES_i^h \cdot D_i\left(\frac{x}{ES^h}\right) \quad (12)$$

If  $x/ES^h$  is understood as a 'money metric indicator of utility' (ie let  $\beta_i(\mathbf{u}) = D_i(x/ES^h)$ ), then, making prices explicit, the cost function can be written as:

$$E(\mathbf{u}, \mathbf{p}, \mathbf{z}) = \sum p_i ES_i^h \cdot \beta_i(\mathbf{u}, \mathbf{p}) \quad (13)$$

<sup>6</sup> In the interests of avoiding visual clutter, the 'h' superscript may be dropped from  $ES_i^h$  and  $ES^h$  for parts of what follows.

<sup>7</sup> Bruce (1987) in effect uses the PH method with the commodity scales determined by 'intelligent guesses' rather than econometric techniques based on HES type consumer surveys (see p71, this report).

Muellbauer (1980) argues that for the PH model described by (10) to (13) to fit within a utility maximising framework, either all the commodity specific scales must be equal, or the utility function must be of the equal proportions type as in (14) below:

$$u = \min_i \left( \frac{q_i^*}{\alpha_i(u)} \right) \quad (14)$$

where,  $q_i^* = q_i/ES_i$  and  $\alpha_i(u) = \beta_i(u)/u$ .

The former condition leads back to the Engel model and therefore defeats the purpose of the PH generalisation, while the latter means that there is no substitution between the commodities (the  $\beta_i(\cdot)$  are independent of prices). This is a highly implausible restriction.

The model has been applied or attempted to be applied by a number of researchers including Singh (1972), McClements (1977), Muellbauer (1980) and Bardsley and McRae (1982). The strategy has an identification problem which arises because there are  $k$  commodity scales to be estimated but only  $k-1$  independent Engel curves available as the budget constraint ( $\sum p_i q_i = C$  or  $x$ ) means that once the first  $k-1$  are determined the  $k$ th one can be calculated. To solve the problem of underidentification, some further data or assumptions have to be brought into the model. McClements (1977) uses an iterative method suggested by Singh and Nagar (1973) which requires a reasonable prior guess as to the likely range of the scales. In a study based on Australian data from the 1974-75 Household Expenditure Survey, Bardsley and McRae (1982) found that the resulting scales depend crucially on these starting values or 'priors', a criticism with which Muellbauer (1979, 1980) also made. Muellbauer himself experiments with forcing identification on the system by defining the food scale independently using data and expertise on nutrition. Other methods have been suggested or employed to solve under-identification, but none have proved satisfactory. It would be difficult to overturn Whiteford's (1985) judgement that 'it can be concluded with some confidence that [the PH model] is not an appropriate way to derive equivalence scales' (p64).

### **The Barten model (demographic scaling)**

One of the most intuitively appealing ways of modelling demographic effects on demand and cost functions in a consumption theory framework was originally expounded by Barten (1964). Like the PH model, the Barten model uses commodity specific scales on the reasonable assumption that children's' relative needs vary across commodity groups. However, unlike the PH model, it allows the presence of a child to have a substitution effect as well as the expected income effect - the demographic change alters the pattern of consumption as well as reducing effective income. It does suffer from an identification problem which, in the few times the model has been estimated, has usually been solved by using the price changes from pooled cross-sectional data from several years.

The utility, demand and cost functions for this model (which is firmly set in a utility maximising framework) are set out below.  $q_i^* = q_i/ES_i$  and the household shadow prices are  $p_i^* = p_i \cdot ES_i$ .

$$u = U \left( \frac{q_i}{ES_i} \right) \quad (15)$$

$$q_i = ES_i \cdot D_i \left( \frac{p_i^*}{x} \right) \quad (16)$$

$$x = E(u, p_i^*) \quad (17)$$

The most common interpretation of (15) is that it represents the welfare of the parents, with the  $q_i^*$  being 'the consumption of goods that actually reaches the parents when an amount  $q_i$  is purchased for the family as a whole' (Deaton and Muellbauer, 1986: 735ff). The larger is the value of  $ES_i$  the more the family needs of that commodity relative to the reference family for that commodity to have the same input into the utility function.

The demand equations (16) are similar to the PH versions (12) in that the addition of children increases consumption through the commodity scale factor ( $ES_i$ ). They differ in the way in which they model the effect of the budget constraint. The PH model allows the demographics to enter as an effective income decrease, whereas in the Barten model the shadow or effective prices ( $p_i^* = p_i \cdot ES_i$ ) increase. This opens up the possibility that a family might substitute away from commodities whose shadow prices increase<sup>8</sup>.

However, the substitution effects can be implausibly large (Muellbauer, 1977) and, because the model ignores the interdependence of utilities of household members, can be in the wrong direction. Bradbury (1992a) argues that:

[e]ven if a child-related commodity does become relatively more expensive in larger households, if that commodity has a large input into the parents' perception of the child's welfare function, and if the parent places a relatively high weight on the child's welfare, then substitution towards that commodity may be possible.' (Bradbury, 1992b: 14).

A further problem is that if families do not make large reductions in their purchases of goods made relatively more expensive by the presence of children, the resulting estimates will be biased downwards (cf Phipps, 1992). Furthermore the model cannot handle the situation where a family  $h$  purchases a good that family  $r$  did not.

<sup>8</sup> The  $ES_i$  are assumed to be exogenous - independent of the quantities consumed, prices and income. Nelson (1992) has produced compelling evidence that argues for the commodity scales being endogenous.

## Demographic Translation Model

A simple alternative to the Barten demographic scaling model is the demographic translation model (eg Pollack and Wales, 1981). Rather than dividing quantities demanded by commodity scales ( $ES_i$ ), the translation model assumes that households first consume 'socially acceptable minimum' amounts (SAMs)<sup>9</sup>, then behave in the same way as the childless reference family.

If  $\gamma_i$  are the SAM quantities, with  $q_i^* = q_i - \gamma_i$  and  $x^* = x - \sum p_i \gamma_i$  then the utility, cost and demand functions for this model are:

$$u = U(q_i^*) \quad (18)$$

$$x = \hat{E}(U, p) + \sum p_i \gamma_i \quad (19)$$

$$q_i = \gamma_i + f(x^*, p) \quad (20)^{10}$$

The advantage of the translation model over the Barten model is that it can deal with the situation in which the household consumes a commodity that the reference household does not. However, like the PH model, the overall demographic effect comes through the income variable, and no substitution is possible. Also, the model implies that the cost of a child is fixed, irrespective of the income of the family. While this may be reasonable from a normative point of view when considering what 'ought' to be given for income support, for example, it is an implausible assumption for positive analysis. Wealthy families are likely to spend more on their children than poorer ones.

## Rothbarth (adult goods) model

The adult goods model relies on there being a clear distinction between adult goods ( $q^A$ ) which are demographically separable from children (ie demographic changes among the children (more of them, age changes, and so on) exert only income effects on the consumption of adult goods)<sup>11</sup>, and non-adult goods ( $q^B$ ), which include child goods. These demands are assumed to arise from a household utility function that has a separable form:

$$u = U[(U^A(q^A, z^A), (U^B(q^B, z^B))] \quad (23)$$

<sup>9</sup> The SAMs are also referred to as 'pre-committed quantities' and 'subsistence quantities'.

<sup>10</sup> A popular functional form is  $q_i = \gamma_i + \frac{b_i}{p_i} \left( y - \sum_j \gamma_j p_j \right)$ . Only after the SAM quantities have been purchased do preferences (represented by the  $b_i$ ) come into operation.

<sup>11</sup> These adult goods are better described as adult-only goods as there are goods that adults consume (eg shared goods) that are not adult-only goods.

The associated cost function has two components: the first,  $\alpha(\cdot)$ , represents the 'fixed costs' for adults irrespective of the household composition, and the second,  $\beta(\cdot)$ , the 'variable costs' that may change with household composition.

$$E(U, p, z) = \alpha(U, p, z) + \beta(U, p, z) \quad (24)$$

### More sophisticated models

Gorman (1976) proposed a hybrid version of the demographic scaling and demographic translation models, so that in (18)  $q_i^* = q_i - \gamma_i$  becomes  $q_i^* = (q_i - \gamma_i)/ES_i$ . Even if the behavioural assumptions of this more sophisticated version are more realistic, the general difficulty remains that any model which uses Barten scaling has significant data requirements which make it impractical for many countries to use to make estimates.

Bradbury (1992a) develops a 'generalised translation model' which incorporates income and price effects into the SAM expenditure terms and shows that it nests both the PH and the Rothbarth models.

### Conclusion

The analysis above has shown that there are many ways of incorporating the effect of demographic change into the cost and utility functions, each of which represents a different set of assumptions about the way in which the presence of children affects adult (and household) preferences. This undermines the claim of some that the economic methods rate better than other methods in terms of their relative objectivity and their not displaying use of *ad hoc* assumptions and value judgements.

## General Critique

The strength of the utility function model is that it provides an explicit and systematic theoretical link between household choices, well-being and household characteristics. In contrast to the situation for many of the other methods it can appear that the scope for arbitrary decision and value judgements is quite limited. This claim of 'objectivity' is one of the reasons for this approach proving to be 'heavily favoured' (Coulter *et al* 1992a: 79) by economists and others. McClements' (1978) assertion regarding his Prais-Houthakker based estimation strategy is representative:

[My] commodity and income scales estimated from household expenditure data ... are more objective than those [tabulated later] because the latter,

which are based on the Beveridge subsistence budgets, involve a much greater element of judgement. (McClements, 1978: 5)

There are three sets of considerations that provide grounds for questioning this positive assessment. The first is the wide range of results that have been produced using the technique. An optimistic view might be that, given the vastly expanded computational power now available and the increasing mathematical sophistication of the models, it is only a matter of time before there is a convergence to some sort of consistency of result. There is no sign of this happening as yet.

Whether or not such optimism is justified, there is a second set of considerations that present an even more serious obstacle for the methodology. It is fairly clear that the budget standards method and the welfare proxy techniques (isoprop, Rothbarth) make assumptions about how to measure household well-being. The problem is that the more sophisticated full utility function approaches do so too but, as the previous section has clearly shown, they have some of their assumptions hidden in the mathematics. Many of the value-judgements and crucial assumptions are able to enter by the back door, as it were, and can catch unawares those not sufficiently economically or mathematically inclined (cf Banks and Johnson, 1993; Coulter *et al*, 1992a).

The third set of issues that raise questions about the claimed superiority of the approach are of a more general nature and the purpose of this section is to bring these matters to the light. The structure of this part of the critique takes its cue from the ES definition as in (2) above -

$$ES^h = E(U, p, z_h) / E(U, p, z_t)$$

and includes analysis and discussion of:

- the process of going from the data to the determination of the cost function  $E(.)$  - the identification problem;
- the concept of welfare assumed, including the issues of 'whose welfare?' and the separability assumption, and the fit of the practical applications to the underlying consumer demand theory.
- some key issues about the data itself (do the usual data sets tell the whole story?);
- the question of the neglect of 'time' (both the inter- and intra-period aspects); and
- the effect of the choice of household characteristics  $z$ .

The first two of these will be given more substantial treatment than the latter three.

# From household budget data sets to cost function: the identification problem

## The identification problem

The identification problem from which the PH model suffers has already been discussed above. The form that the under-identification takes for the full utility function strategy expresses it self somewhat differently but the central issue remains: to solve the identification problem requires data from outside the model which weakens the claims of 'objectivity' and dependence on consumer behaviour alone.

For the utility function strategy the problem is that 'many different cost functions and hence many different equivalence scales may be recovered from the same expenditure data set' (Coulter *et al*, 1992: 90), an 'identification problem' which was first given formal treatment in the literature by Pollak and Wales (1979). To put it another way, '[it] is now well established that not all the components of equivalence scales required to make welfare comparisons are identifiable from demand data alone' (Dickens *et al*, 1993: 359). There is no unique set of scales associated with a given set of demand equations, as 'any value of equivalence scales can be rationalised by any demand system' (Blundell and Lewbell, 1991: 66). World Bank economists Lanjouw and Ravallion recently summed up the situation:

It is now recognised that the empirical implementation of ... utility-based methods of welfare measurement ultimately rests on untestable identifying assumptions. In general there will exist more than one possible set of utility functions for household members which can account for their observable demands and supplies. (Lanjouw and Ravallion, 1995: 1415f).

## The source of the problem

To understand the basis for these strong claims requires a consideration of the way economists understand the central concept of utility. The term 'utility function' is so embedded in the economics literature that it is unlikely to be expunged despite it being a potentially misleading phrase<sup>12</sup>. The difficulty is that it gives the impression that the household's actual level of well-being or standard of living is itself somehow being measured and assigned a unique number. This is the older 'cardinal utility' concept and is not how most economists currently use the notion (at least when speaking and writing 'correctly'). The full description is 'ordinal utility

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<sup>12</sup> There are a number of examples in the literature of various disciplines where the concepts have moved on but the old language has been retained despite the incongruity of the situation and the potential for it being misleading. One of the best illustrations is in physics where current is still conventionally drawn as going 'from positive to negative' in a circuit outside the power source - despite the fact that the established model has it that the (negative) electrons move 'from negative to positive' and 'carry the current'.

function' - in contrast to a 'cardinal utility function' - and  $U(\cdot)$  is simply a mathematical formula which can give a numerical representation of the preferences of the household, ranking them in order (hence, 'ordinal').

The crucial point is that there are many different utility functions that are equally good as representations of a given household's utility (ie preferences). For the sake of simplicity consider the limited situation of a household consuming one good (quantity  $q$ ) and having its characteristics represented by the number of children ( $n$ ).  $U$  and  $U^*$  below are two (highly stylised) mathematical representations of the household's preferences. Table 9.1 shows the numbers ('utility levels') associated with three different combinations of goods and numbers of children for these two functions.

$$U = 8q - 15n \quad (25)$$

$$U^* = 9q - 40n \quad (26)$$

**Table 9.1**

Comparison of two utility functions

q	n	U	U*
40	1	305	320
45	2	330	325
60	3	435	420

For both  $U$  and  $U^*$ , the three child option is about a third higher than the one child option. It would be a mistake, however, to conclude from this that the household is therefore a third better off in that circumstance. Nor can anything be taken from the fact that the  $U^*$  numbers are not consistently greater or less than those for  $U$ . The key point is that both  $U$  and  $U^*$  give the same ranking of the combinations - 60 units of consumption and 3 children is the top preference in both cases and so on. Therefore if one of the functions is satisfactory the other will be too. This seemingly innocuous phenomenon lies at the core of the identification problem.

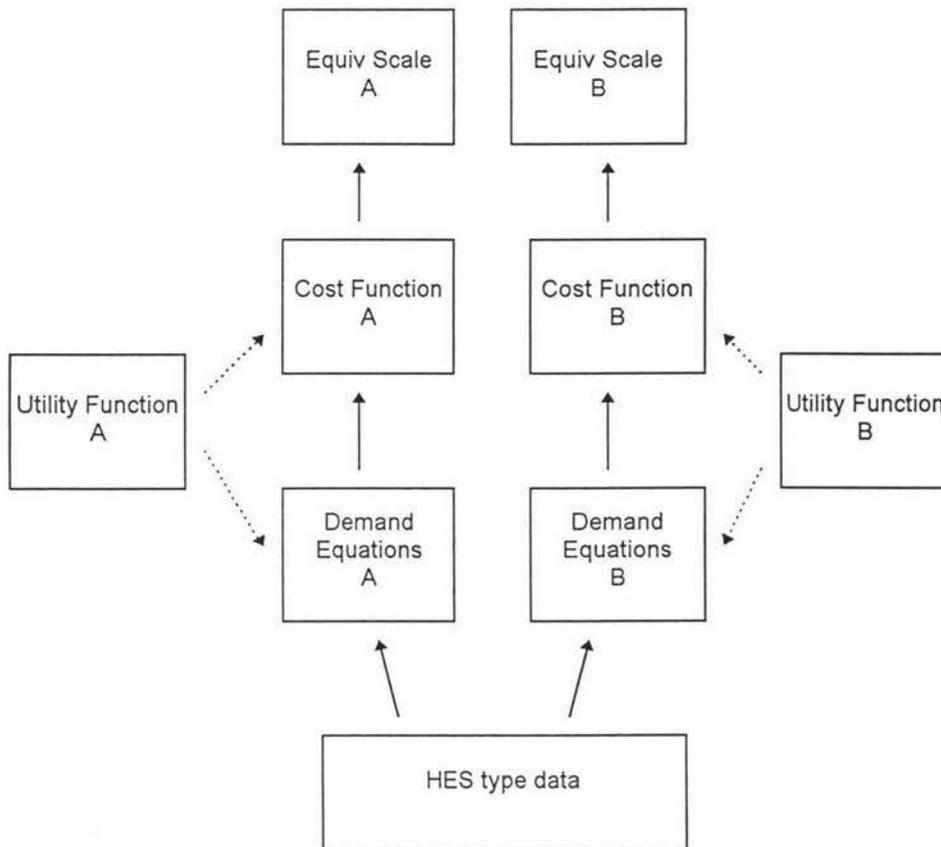
The dilemma is illustrated schematically in Figure 9.1. It is possible to choose two utility functions (mathematical models of preference orderings)  $A$  and  $B$ , each of which has its own associated cost function and demand equations and therefore set of scales.

In terms of our formal analytic framework, household preferences that are described by  $U$  can equally well be described by  $U^*$  provided that  $U^* = \phi[U(q, z), z]$  is increasing in its first argument  $U(\cdot)$  - in other words, provided that  $\phi$  is a monotonically increasing transformation of

$U^{13}$ . If  $U$  and  $U^*$  are related in this way, then both will generate (be consistent with) the same set of demands  $q(\cdot)$ . Unfortunately they generate different cost functions  $E(\cdot)$  and  $E^*(\cdot)$  which produce different scales  $ES$  and  $ES^*$ .

**Figure 9.1**

The identification problem for the utility function methodology.



The first formal treatment in the literature came from Pollak and Wales (1979) who argue that all that can be recovered from HES type data are preferences over goods given (ie conditional on) the household characteristics  $z$ , whereas welfare comparisons require the recovery of unconditional preferences (in which case  $z$  is a genuine choice variable). There is no obvious way of obtaining data which reveals the preferences of the household with respect to various bundles of goods *as well as* different household characteristics. In Pollak and Wales own words, 'the expenditure level required to make a three-child family as well off as it would be with two children and \$12,000 depends on how the family feels about children' (1979: 216). When consumption patterns change when household composition changes there is no way of

<sup>13</sup> In simple terms, for  $\phi$  to be increasing in its first argument means that changes in  $q$  or  $z$  that change  $U$  also change  $\phi$  (ie  $U^*$ ) in the same direction. A stylised illustration would be  $U = 20q - 5z$  and  $\phi$  (ie  $U^*$ ) =  $U + 2z$ . This means that  $U^* = 20q - 3z$ . These two functions meet the condition.

knowing whether the former changes are due to the composition changes or to changing adult preferences (or both). To deal with this under-identification an assumption or value judgement has to be introduced from outside the original data.

The issue is significant enough for two leaders in the field to claim that the utility function methodology used for deriving the ratios is 'inherently dishonest or at least uninformative, since in a given price regime, any value of equivalence scales can be rationalised by any demand system' (Blundell and Lewbel 1991: 66). Their analysis shows that the estimated scales are composed of the product of two elements:

$$ES = (\text{factor determined by the data}) \times (\text{factor determined by } \phi)$$

The factor determined by the data is a relative scale which shows by how much the cost of living has changed for a particular household since a reference price regime. The factor defined by  $\phi$  is 'an arbitrary constant that the researcher has implicitly selected by his choice of  $[\phi]$ ' (p54). Their conclusion is unambiguous:

[D]emand equations can be used to construct distinct cost of living indices for households of any given composition, but demand equations alone provide no information about the relative cost of living of changing household composition in any selected reference price regime. (Blundell and Lewbell, 1991: 65).

The positive side of this is that if we know the true values of equivalence scales in one price regime, demand analysis can be used to recover the true values in all other price regimes. On the other hand it is sobering to hear the charge of dishonesty, by which Blundell and Lewbel mean that given all the strong assumptions and well-known limitations of the methodology, it is dishonest to continue with it as if it is able to deliver anything like a 'scientifically' derived set of scales determined by the data - which is the stated aim of the methodology.

### **Possible ways of dealing with the problem?**

If the researcher wishes to go beyond reporting only what can be unambiguously deduced from empirical demand analysis (ie relative changes for each scale over time), then there are a limited number of possible strategies for attempting to cope with this problem of under-identification<sup>14</sup>. All these involve the adoption, either explicitly or implicitly of some assumption or value-judgement from outside the original data. Several have been proposed.

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<sup>14</sup> The following discussion assumes that Pollak and Wales are correct on both counts, namely that (1) only conditional scales are produced and that (2) unconditional ones are needed for welfare comparisons. (1) is not seriously disputed in the literature - the various methods simply seek to get around it via different identifying assumptions.. Some however dispute (2) for some circumstances - see the discussion below in the 'defence of the traditional use of scales'.

- 1 Accept some scales from elsewhere as the 'correct' ones and use the relative scales to bring them through to the current time period. This would have value for checking on trends in a particular set of scales, which is what Banks and Johnson (1993, 1994) do for the McClements scales. They conclude that the relativities in McClements' study have not changed significantly over time so, assuming they were in some sense 'correct' for the 1972 data, they still are now. This option has limited use in cost of children applications.

The various suggestions for solving the identification problem for the PH model can be seen as subtle variations of this first option. For example, the method adopted by McClements of making a reasonable guess as to what the scale values should be and then applying an iterative procedure until there is reasonable convergence, and that of Muellbauer (1979, 1980) who used a nutrition based food scale, both involve assuming a 'correct' overall scale or commodity scale from some other source.

- 2 Make an assumption about the way welfare depends on household characteristics and derive the scales with the open acknowledgement of that (untestable) assumption. In terms of the symbolism of our formal representation, this means choosing and declaring the mathematical form of  $\phi$  (ie  $U^*$ ) and acknowledging that the results depend on that choice.

A special version of this second response is to be found in the assumption that scales are independent of the reference utility level. In effect this means that they are constant across the income range, implying that child costs are proportional to household income. Blundell and Lewbell (1990) call this 'Independence of Base Utility' (IB), Blackorby and Donaldson (1988) 'Equivalence Scale Exactness' and Browning (1991a) relatively mundanely refers to it as the 'constant scale assumption'. IB scales can be viewed as a functional form property of the cost function<sup>15</sup>, since equivalence scales are IB if and only if the cost function  $E(\cdot)$  can be written as:

$$C = E(U, \mathbf{p}, \mathbf{z}_h) = G(U, \mathbf{p}) \cdot \hat{E}(\mathbf{p}, \mathbf{z}_h) \quad (27)$$

yielding scales of the form

$$ES_h = \hat{E}(\mathbf{p}, \mathbf{z}_h) / \hat{E}(\mathbf{p}, \mathbf{z}_r)$$

The effect of the IB assumption is to remove the arbitrariness of interpersonal comparisons by 'imposing a structure on preferences and interhousehold comparisons' (Blackorby and Donaldson, 1994: 65). Many empirical studies in scale estimation use cost functions with the IB property - for example, all Engel strategies are IB and in the utility function approach, it is used by Jorgenson and Slesnick (1984), Ray (1983) and Blundell and Lewbell (1991). For empirical work IB is clearly an attractive property for scales to have because it widens the range of applications of a given scale.

<sup>15</sup> The IB assumption is tantamount to assuming a single specification for  $[\phi]$  (Coulter *et al*, 1992a: 91). Their proof is on p92.

But is it a reasonable assumption? Blundell and Lewbell (1991) have pointed out that the IB assumption has testable implications for demand data. Rejection of these testable assumptions means rejection of the IB assumption, but failure to reject can never guarantee that IB holds. Unfortunately, it has been rejected the few times it has been tested (Blundell and Lewbell, 1991; Dickens *et al*, 1993; Pashardes, 1995; cf Conniffe, 1992; Lanjouw and Ravallion, 1995). These results raise serious doubts about the suitability of the IB assumption as a basis for getting around the identification problem and so producing a unique set of scales. For those who consider that none of the other options being discussed in this section are reasonable, these results are very serious: 'Failure of the IB property results in scales suffering from the ... identification problem which demand analysis does not have an answer for' (Pashardes, 1995: 146).

- 3 The extensive work by van Praag and colleagues of the 'Leyden project' uses psychometric data in the form of an Income Evaluation Question as a means of overcoming the identification problem. This approach and some closely related ones are reviewed in the early part of the next chapter.
- 4 A final option is to move back towards reduced-form approaches which is precisely what Gronau (1988) does in his advocacy of the Rothbarth method on the grounds that it is the only method that is consistent with upholding the separability assumption which on other grounds he argues is necessary for estimating scales. In terms of our analytical framework, this is equivalent to adopting a specific form for the utility function. Thus we are back to option 2 above.

## Concept of Welfare

To make good sense of the equivalence scales that result from any iso-welfare strategy using the definition in (2), the welfare concept needs to be carefully defined. This section will show that for the utility function approach clarity on this matter is crucial yet difficult to achieve.

An unavoidable feature in the analysis and critique of equivalence scale methodology is the significant intertwining and overlap of issues. Much of what follows in this section can be read as an alternative way of discussing the nature and source of the identification problem. Also, the question of the separability assumption links back not only to the identification problem, but also to the assumption of equity in intra-household resource allocation and the assumption that the preferences of all households can be represented by the same utility function.

### Whose welfare?

In the bulk of the current academic literature on the cost of children, and especially in that that is explicitly grounded on consumer demand theory, it is the welfare of the parents (the adults) that is compared. Even when the terms 'household' or 'family' welfare are used what is meant is parental or adult welfare. This narrower focus in part arises from the definition itself (see (2) above). The reference household ( $r$ ) is childless which means that the welfare ( $U$ ) in the cost function in the denominator must be that of the parents, so '[as] the same criterion of welfare has to apply to the numerator, it is only natural to assume that the welfare yardstick in this comparison is the parents' welfare ... Children's welfare is relevant only to the extent that it affects their parents'' (Gronau, 1988: 1188). Deaton and Muellbauer (1986) are just as clear in their acknowledgement that '[t]he measures in this paper tell us about the effects of children on adult welfare, but they do not tell us about the welfare levels of the children themselves' (p742). Browning (1992) is another who acknowledges that 'the iso-welfare question explicitly considers only the welfare of the parents' (p1446).

This distinction between household and parental welfare (or, the identification of household welfare as parental welfare) would be of little consequence if the assumption were made that each member of the household had his or her needs met to (roughly) the same degree. In policy applications and in the earlier literature this equalising assumption *is* made so that the terms adult, child and household welfare are all interchangeable. However in the modern choice-theoretic literature such an assumption is ruled out in any method that accepts in its model of household behaviour the notion that adults can substitute away from goods that children make relatively more expensive (eg milk and lemonade) and towards goods that are relatively cheaper (eg whisky or cigarettes). Such an assumption is an integral part of the Barten and Barten-Gorman models, but the problem appears to have gone largely unnoticed. Nelson (1993) argues the case persuasively and concludes that:

If, on the one hand, households really do act in these ways, then policy questions that assume the rough equivalence of welfare within the household need radical reformulation ... ; if, on the other hand, households (and policymakers) really do consider the welfare of children directly in making consumption decisions, these models can hardly provide good guidelines. (Nelson, 1993: 482f).

### What concept of parental welfare?

Given the focus on parental welfare, the next question is - what concept of parents' welfare is used in the definition? In general, parental welfare depends on a wide range of factors. In chapter two (see Figure 2.1) market and other income, state and local body services, household production, leisure and 'the joys of parenthood' were identified as the primary welfare-relevant resources for parents. The equivalence scale literature generally ignores all but the first and last sources of parental well-being<sup>16</sup>.

If we assume that most parents are parents because they *want* to be, then a standard revealed preference argument would conclude that the compensation that they would have to be paid to restore them to their welfare level prior to the birth of the child would be negative or zero as they are now at least no worse off than they were before! It is here that the often-used analogy between price indices and equivalence scales breaks down (and the identification problem reveals itself again). Price indices measure the change in cost of maintaining a certain welfare level when prices vary, whereas equivalence scales seek to measure the change in costs when household characteristics change. Price changes are usually not controlled by the parents of a household, but compositional changes are. Given the standard economic concept of utility,  $ES_h$  in (2) becomes simply 'a measure of the desirability of the change in family composition' (Gronau, 1988: 1188). If parents derive any net utility at all from the presence of the child, then the cost of reaching the specified utility level decreases and  $ES_h$  drops to less than one! Reworking the Pollak and Wales quote given in the above discussion on the identification problem, 'the level of expenditure to make a three-child family as well off as it would be with two children and \$12 000 depends on how the parents feels about children'.

As this is clearly not a desirable state-of-affairs for either the use of equivalence scales or estimation of child costs, a more restrictive definition of parents' welfare is required. The obvious option is the utility that they derive from the goods they consume and this is the usual

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<sup>16</sup> Van Hoa and Ironmonger (1989) attempt to maintain a wider perspective. They use  $U(Z, A)$  where  $Z = Z(X, T)$  is a Becker function of market commodities  $X$  and own time  $T$ , and  $A$  is some representation of household characteristics. In that extended formulation the price vector includes commodity prices for  $X$  and the prevailing wage rate for  $T$ . Note also Gronau's observation that 'the value of mother's time is often incorporated in the estimates of the cost of children, but is consistently ignored in estimates of adult equivalence scales' (Gronau, 1991: 234). See also Browning (1992) and Apps & Rees (1996). The question of 'time' and 'household production' is raised again below under the theme of the household data sets not telling the whole story.

response by those studies which adopt the iso-welfare concept of child costs. As Deaton and Muellbauer put it:

That parents choose to have children means that the benefits of having them are greater than the costs, but it does not mean that the costs are zero. What is required is a narrower and purely economic definition of parental welfare, and one that excludes the benefits of the children themselves ... it is usual to think of economic well-being as directly related to the individual's level of expenditure. (Deaton and Muellbauer, 1986: 725).

Unfortunately, even this restriction is 'not sufficient on its own to 'save' the scales' (Gronau, 1988: 1189). The narrower concept requires that if parents are observed to consume the same bundle of goods before and after having children, then their welfare remains unchanged. This in turn requires a further assumption to be made, namely, that the existence of children and the composition of their consumption do not in any way affect the utility parents generate from their own consumption - the separability assumption:

In the absence of separability one cannot tell, from comparing the consumption of a certain good by families with and without children, whether a decline in parents' consumption is caused by a diversion of resources from parents to children or by the fact that parents 'lose the taste' for the good once they have children (Gronau 1988: 1197)

The separability assumption is a crucial assumption for several estimation strategies<sup>17</sup> and is equivalent to claiming that the addition of a child has only an income effect on parents' consumption (ie when a child is added, it is as if the parents had remained childless but their income suddenly dropped, while their preferences remained unchanged).

In line with the symbolism already used, the issue can be represented formally in several ways. Two of the more helpful formulations are identified here.

First, let parents' total welfare ( $U_{TOT}$ ) be derived from three sources: their own consumption, their children's consumption and very existence of their children.

$$U_{TOT} = f(U_A, U_C, U_z) \quad (28)$$

$$\begin{array}{lll} \text{where} & U_A = U_A(q_A) & q_A \text{ is a vector of adult goods} \\ & U_C = U_C(q_C) & q_C \text{ is a vector of child goods} \\ & U_z = U_z(z) & \end{array}$$

<sup>17</sup> Browning (1992) argues that 'one link between the expenditure and iso-welfare questions is that the separability of the parents' consumption from children plays a role in both. Note, however, that for the expenditure question it is a conventional econometric identifying assumption that is required if we wish to use expenditures on adult only goods to identify who gets what in the household. The role separability plays for the iso-welfare question is more basic: without it, the idea of a 'narrow' definition of parents' welfare is not well founded. If the consumption of parents is not separable from children (and their consumption) then we must find some explicit way to make interpersonal comparisons in the ... sense of finding some mapping between two sets of indifference curves. If, as I suspect, separability is not tenable, then we have to consciously follow this difficult route' (p1446).

A prerequisite for the measurement of equivalence scales is the separability of  $U_A$ ,  $U_C$  and  $U_z$ . In other words, adult utility derived from their own consumption has to be completely independent of household composition and the children's consumption.

An alternative formulation (eg Bradbury, 1992a) assumes that the utility and cost functions takes the form:

$$u = U(q, z, T) \quad (28)$$

$$C = E(u, p, z, T) \quad (29)$$

where  $T$  is 'some limited parameterisation of non-demographic taste differences which is permitted to vary across families' (*ibid*, p6). If adults in families with children have different tastes to those without children then identification of the separate influences of  $z$  and  $T$  on  $ES_h$  is impossible. To establish an unambiguous relationship between  $ES_h$  and  $z$ ,  $z$  and  $T$  must be independent.

The important implication of this argument for equivalence scale (and therefore cost of children) research is that it is only the Rothbarth method that is consistent with the theoretical foundations of the iso-welfare utility function approach to estimation (Gronau, 1988; Deaton and Muellbauer, 1986; Browning, 1992).

So, the choice is between maintaining the assumption of unchanging preferences by assuming separability (against which anecdotal and more formal evidence exists), and accepting that the presence of children has more than an income (or substitution) effect, which introduces an awkward ambiguity into the iso-welfare concept of child costs.

To sum up, there are two pathways of thought, each starting with a different view of the nature of the utility and cost functions which lie at the heart of the definition of equivalence scales in the economics based approach, and they both end up in difficult *culs-de-sac*. If the wider view of parental welfare (Pollak and Wales, 1979) is considered the appropriate concept (ie  $z$  is a choice variable), then there is a problem because welfare comparisons require unconditional scales and only conditional scales can be recovered from the data because of under-identification. If on the other hand the concept of utility is narrowed to that which parents derive from their own consumption (Deaton and Muellbauer, 1986), then the separability assumption is required and only the Rothbarth method is acceptable (Gronau, 1988). The upshot is that if unconditional scales are required then either the Rothbarth approach has to be selected or one of the 'solutions' to the identification problem has to be adopted. Neither option is an easy path. Both options seriously undermine the claim to that the economics based methods are 'superior'.

## Tensions in the welfare concept: an historical and philosophical perspective

It is already evident from the above discussion that the concept of welfare used in the economic models is not without its problems. In this section these issues are placed in an historical and philosophical context and further developed. Firstly, two significant tensions between the concept of welfare as used by the economic estimation strategies and the assumptions of the underlying consumer demand theory itself are identified and briefly discussed. Then, the tensions between the concept of welfare used both in policy applications and in older theory and that used in the main in current academic literature are discussed. This section draws significantly on Pollak (1991) and Nelson (1993).

First, because the economics based iso-welfare strategy for estimating scales is based on welfare comparisons involving more than one consuming unit, welfare (utility) has to be cardinally measurable and interpersonally comparable (cf Lewbell, 1989). Such an exercise was not considered a problem for the likes of Edgeworth and his fellow utilitarians a century ago for whom utility 'was as real as [their] morning jam' (Pollak, 1991: 36 quoting Samuelson), but both these assumptions were overthrown in the ordinalist revolution of the 1930s (Hicks and Allen, 1934; Robbins, 1937; Cooter and Rappoport, 1984; Lewin, 1996). Pollak (1991) summarises the neo-classical position to be that interpersonal comparisons:

- \* are unnecessary for demand analysis;
- \* cannot be made on the basis of observable demand behaviour; and
- \* are meaningless in the sense that they have no refutable implications and therefore no empirical content.

In contrast to the ordinal assumptions of the theoretical base, the standard practice of economic based equivalence scale estimation strategies is to assume (often implicitly only) that households have the same utility function to describe preferences and that when the utility numbers are equal households are equally well off (for example, Jorgenson and Slesnick (1987); Tsakloglou (1991); Bradbury (1992a); Browning (1992); Coulter *et al* (1992a)). McClements (1978) states his position and the rationale for it thus:

The simplicity and objectivity of theories is furthered by minimizing the number and strength of the assumptions on which they are based ... The fewer and weaker the assumptions the more general and powerful the theory in terms of encompassing a wider range of phenomena. The rejection by economists of interpersonal comparisons of utility and cardinal measurement in favour of compensation tests and ordinality contributed to this process as, for many purposes, these assumptions were unnecessary. But this quest for theoretical elegance can also limit the application of theory ... In the case of personal distribution, inter-household type utility comparisons, cardinal measurement and distributional judgements are required. If these are ruled out then important aspects of personal distribution lie beyond the scope of economic analysis. The redundancy of assumptions in one branch of theory spilled over into another where they were required ... It may be vain to do with more what can be done with

fewer, but it is also purposeless to attempt to do with fewer what can only be done with more ... Most of the problems addressed in this study cannot be answered if cardinal measurement and inter-household comparisons are ruled out ... and for this reason they are accepted as both desirable and feasible. (McClements, 1978: pp5f and 46)<sup>18</sup>.

McClements' pragmatism is commendable, but his discussion does little more than assert that he will ignore the problem of the dissonance between economic theory and applied analysis. Fisher (1987) wrestles more strenuously with the problem and his discussion better illustrates the tensions between the underlying philosophical assumptions and the practical applications in equivalence scale estimation. He sets up the situation of attempting to make a welfare comparison between two individuals who have identical utility functions:

The statement that they are equally well off if they are on the same indifference curve is a normative, not a positive statement. We cannot know that the 'true' utility value associated with a given indifference curve is not much higher for one consumer than for another. Indeed, there is no operational meaning to the proposition that the two numbers are the same. If one is going to treat two such consumers on the same indifference curve as equally well off, it must be because one has decided that they *ought* to be so treated as a matter of distributive ethics ... [That this is done] is not surprising, for some such assumption is required if one is to proceed at all. (Indeed, I have no alternative to suggest). (Fisher, 1987: 520).

Pollak (1991) acknowledges that 'the pendulum of professional opinion among economists has begun to swing back from the positivist view that interpersonal comparisons are meaningless', but observes that '[their] rehabilitation in economics has thus far been formal, not substantive: the validity of interpersonal comparisons has been assumed, not deduced' (p38).

Second, although *individual* preferences are central in the theory of consumer behaviour and welfare economics, *household and family* welfare is the main focus of equivalence scale estimation and public policy discussions. In most empirical implementations, it is simply assumed that the household systematically behaves 'as if' it were a single agent and that the tools of consumer theory applied at the household level. There is a tension here that has drawn the criticism of many economists and others. For example:

To discuss policy in terms of some kind of collective 'household welfare' is inconsistent with the methodological individualism on which conventional welfare economics and its applications, such as optimal tax theory, are based. (Apps and Rees, 1996: 201)

Pollak (1991) puts it even more strongly in observing that 'those who think that making interpersonal welfare comparisons is nonsense are also likely to think that making interfamily

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<sup>18</sup> Some of McClements' sentiments are echoed by Blaug (1980) when he quotes Lancaster approvingly to the effect that consumption theory 'now stands as an example of how to extract the minimum of results from the minimum of assumptions' (p164).

welfare comparisons is - to borrow a phrase from Bentham - "nonsense on stilts" (p 44)<sup>19</sup>. If the notion of household or family preferences is abandoned, two issues that were discussed above are exposed: the treatment of conflicting preferences of adults within the household, and the treatment of children's needs, wants and desires.

Aspects of some of the tensions above are picked up by Nelson (1993). In a very useful contribution to the equivalence scale literature Nelson carefully distinguishes each of three definitions of household welfare according to its historical and philosophical foundations, and goes on to show the importance of distinguishing among the different definitions. Her basic schema is represented in Figure 9.2 and is built around the two distinctions already identified above: the concept of welfare as material or economic welfare as against welfare as subjective utility; and the shift of focus from household to parental or adult welfare.

Nelson argues that both the early history of equivalence scales and both their current and older policy applications define 'household welfare' in terms of a material standard of living, presumed to be shared by all household members. There was never a great issue regarding inter-household comparability of welfare levels as it was simply assumed that people's material needs were fundamentally alike. Falling within this definition are various budget strategies, the original formulation of the Prais-Houthakker approach, the Engel method and the other iso-prop approaches (and more latterly, the subjective approach of the 'Leyden school'). The second definition is associated with the rise of the utility function approach (her 'choice-theoretic' columns) which still maintained a material notion of welfare but limited the focus to adults. To be policy relevant the studies that opt for this definition have to assume common intra-household welfare levels. However, as was shown above, this assumption sits in serious conflict with a core aspect of one of the most theoretically sophisticated models of demographic effects on adult consumption behaviour, namely, the Barten(-Gorman) model. Furthermore, to make estimation possible at all it has to be assumed that inter-household welfare is able to be compared. To assume this is to set up a severe conflict with the ordinalist framework of the underlying theory. Nelson's understated conclusion is that 'the equivalence scale question has come to be situated on an awkward conceptual base' (p 484).

Because of these sorts of tensions, 'it is not surprising that some economists have demanded that the equivalence scale literature be brought more up to date' (p 484) and accept a broader view of utility which includes the direct effect of household composition on household (adult) welfare. Once this definition is adopted and applied consistently, there are grounds to 'ignore the whole equivalence scale literature, either on the basis of disbelief in the basic assumption of

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<sup>19</sup> 'From a theoretical viewpoint, classical results in aggregation theory strongly suggest that a group does not behave as a single individual except under very strong, specific assumptions. Among the few theoretical attempts to reconcile the single-utility framework with the existence of several individuals within the household, one must cite Samuelson's (1956) household welfare index and Becker's (1981) rotten kid theorem. Both, however, can be shown to rely on restrictive hypotheses ... [Also], the empirical support for the unitary approach is rather weak, to say the least' (Browning *et al*, 1994: 1068f).

**Figure 9.2**

Three definitions of household welfare: based on Nelson (1993)

		What concept of utility or welfare?		
		older view and policy applications	choice-theoretic models	
		material, financial or economic well-being (level of consumption)	subjective utility (overall happiness/satisfaction)	
<b>Whose welfare?</b>	<b>child or adult?</b>	Household, adult and child welfare are substitutable because of the assumption of common intra-household welfare levels.  Sometimes policy applications are specially child focused.	adult	adult
<b>Key assumptions</b>	<b>common intra-household welfare levels</b>	yes	Must assume it to be policy relevant, but it is in serious conflict with the substitutability assumption in models such as the Barten and the Barten-Gorman	Not discussed by Nelson
	<b>inter-personal (or household) welfare comparability</b>	No problem - it was assumed that people were fundamentally alike in physical needs	Must assume it to produce estimates, but is in conflict with an ordinalist framework	Holds to theoretical purity and consistency and becomes policy irrelevant

interpersonal comparability of welfare levels<sup>20</sup> or on the basis that, since adults generally choose to have children, the effect of children's presence on adult welfare must be as a net benefit rather than a cost' (p 485).

## Interlude - in defence of the traditional use of scales?

The arguments marshalled above without doubt give substance to the strong claims of Pollak and Wales (1979) that the process is 'illegitimate' and of Blundell and Lewbell (1991), noted earlier, that the utility function methodology used for deriving the ratios is 'inherently dishonest or at least uninformative' (p66). Yet, whether or not the economic strategy is justified from a theoretical point of view, judgements about relative needs are being made all the time. Clearly there is a need for a bridge-building exercise between 'the caution of positive theory and the world of normative decisions' (Bradbury, 1992b: 25).

There are several grounds on which a case can be made for the use of conditional equivalence scales for welfare comparisons with their narrower concept of welfare as material well-being given (conditional on) a particular demographic structure - typically the number and ages of the children, and the number of adults. In terms of our formal model, the issue can be interpreted as seeking circumstances in which key elements of the  $z$  vector can be taken as exogenous rather than as a choice variable. (The defence assumes that inter-household welfare comparisons are valid and feasible.)

First, in the policy or other application of the scales, the concern is often with 'the welfare of those who do not make the demographic choices - the children of the household' (Bradbury, 1992b: 2; cf Nelson, 1993). Viewing children as consumption goods chosen by parents without reference to the children's own well-being is likely to be seen as perverse. Furthermore, while welfare for both children and adults will be a function of total commodity consumption, the benefits that the adults gain from the presence of the children will not be directly relevant to child welfare. Nevertheless, the focus on children does present some problems in the policy applications sphere as many of their consumption decisions are made by their parents. It may in fact be necessary to run the risk of overcompensating parents to adequately meet the children's needs.

A second possible defence of the use of conditional scales is based on uncertainty and irreversibility arguments (cf Muellbauer, 1977). Once a couple has had children the decision is irreversible - they cannot be sold or otherwise got rid of if they prove to be more expensive than

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<sup>20</sup> In contrast, the pre-ordinalist material welfare economists allowed inter-personal welfare comparability on the grounds that introspection is an appropriate empirical tool because there is a common utility structure among people. (cf Cooter and Rappoport, 1984)

expected, or if the household's income falls unexpectedly as a result of illness, unemployment or family breakup. As Banks and Johnson (1993) put it:

[T]he result of what could well have been an optimal decision will possibly be suboptimal in the light of subsequent changes in circumstances, and such unplanned changes might often create the very circumstances in which we want to compensate households with children. (Banks and Johnson, 1993: 22)

A third argument rests on imperfections in the capital markets and relates to the debate as to what is the appropriate time period for estimating child costs. Parents may provide for their children by drawing on savings or borrowing as well as by reducing current consumption. Utility maximising individuals (with lower incomes) will tend to save when they do not have children and borrow or save less when they do. 'If capital markets do not allow this behaviour ... then state intervention to redistribute from those without children to those with can be welfare enhancing' (Bradbury, 1992b: 3).

It would be hard to counter these arguments when they are advanced as grounds for justifying some compensation or transfers. However, the debate is not yet over as to whether there is any role for (conditional) equivalence scales in determining the *actual amount* of socially adequate consumption levels. The disparate views are well-represented by the likes of Pollak and Wales (1979) who see 'no reason to think that conditional scales have any role to play in the determination of socially adequate compensation levels' (p220), and those like Muellbauer (1977), Deaton and Muellbauer (1986) and Bradbury (1989a, 1989b, 1992a, 1992b) who argue that such a position is too negative and that (at least) in the circumstances outlined above, conditional scales have their place, at least as a baseline from which to make decisions.

## Other issues

While the identification problem and questions surrounding the concept of welfare are of fundamental importance, there are other issues which are significant for any assessment of the utility function strategy. Three are considered here.

### **Incorporating time into the model**

The basic model ignores 'time' in both senses: inter-temporal substitution and 'time' as a resource for household production and leisure. Aspects of the inter-temporal issue are discussed towards the end of the next chapter, but there is a dimension of this question that is worth noting at this point. It is clearly stated by Muellbauer (1979) who, in the course of his critique of McClements' methodology, argues that by limiting the time period for analysis to a

year, a bias may enter the commodity scales for reasonably durable goods. His comments apply to the economic model in general:

There is likely to be an investment element in expenditure on these goods which is related to life cycle position. Neoclassical economic theory suggests that expenditure is the wrong concept for goods which are durable and should be replaced by an imputed rent concept. However, this cannot be done for published FES data. If the life cycle position is related to the numbers of children in the household, the latter variables may be picking up not only costs associated with children but elements of life cycle investment which have nothing to do *per se* with whether there are any children in the household. This raises the more general question: to what extent is consumer theory which abstracts from intertemporal and labour market decisions an adequate approximation to observed household behaviour? This is not the place to discuss this question or indeed the even more fundamental ones of the welfare and policy interpretation of equivalence scales. Suffice it to say that the step from some estimated scales to policy applications is not a trivial one. (Muellbauer, 1979: 229)

'Time' in the other sense is likely to be highly relevant to household well-being. For example, a household with children in which both adults are employed (close to) full-time is likely to have a lower standard of living than an otherwise identical single-earner household with the same money income<sup>21</sup>. Apps and Rees (1996) highlight the omission from the basic microeconomic model of 'time' in relation to household production and discuss an enhanced model (in the spirit of Becker (1965)) which allows better grounded consumption and labour supply comparisons between traditional and non-traditional couple headed families. For both types the male partner is employed for more than 500 hours a year. In the traditional household, the female is employed for less than 500 hours a year and in the non-traditional one for 500 hours or more a year. In discussing their findings, they note that:

[The] results illustrate the sensitivity of price situation comparisons between traditional and non-traditional households to the construction of data for missing household production variables implicit in conventional demand models. The literature on family welfare comparisons has tended to ignore this problem. Following from the work of Pollak and Wales (1979), the focus has been largely on the information problem associated with identifying the unconditional cost function for families with varying demographic profiles. Almost no attention has been given to the problem of missing data for household production and the implications for comparisons between traditional and non-traditional households with identical demographic characteristics. (Apps and Rees, 1996: 214f).

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<sup>21</sup> Assuming that it is a matter of free choice for the non-earner in the latter case that he or she is not in paid employment.

### **Household expenditure data sets do not tell the whole story**

It can be argued that HES type data sets tell only a part of the story about both (the allocation of) welfare relevant resources and about consumers' preferences. For the former, the limitation of such data for the construction of equivalence scales shows itself in several ways which have already been discussed. The first overlaps with the comments of Apps and Rees above:

- \* only market transactions are captured - household production and time resources do not appear;
- \* the closely related issue of the assumption of mainstream economics that labour is not produced in the economy is perpetuated; and
- \* there is no inter-temporal perspective from one period's data.

At an even deeper level, one might go further and question the fundamental article of faith that household choices truly reveal preferences. McClements (1978) has remarked that a 'reason some would advance for discarding actual behaviour [as a guide for policy action] is that the existing behavioural pattern is unduly constrained. The incomes of pensioners are generally low and since most receive Retirement Pensions the estimated equivalence scales may simply reflect existing relativities' (p117). Fisher (1987) argues that reliance on observed behaviour effectively makes consumer sovereignty the sole basis for making welfare judgements and that this can lead to ethically unattractive outcomes. For example:

where a particular household attribute is correlated with past income or past social status, the taste differences accompanying differences in that attribute may not be ethically neutral. To treat them as if they were may simply be to build in the results of past inequities as though they no longer matter. (Fisher, 1987: 523).

In a comprehensive review of the paradoxical attitude of economists toward psychology, Harvard University economist Lewin (1996) notes that mainstream economics has failed to address the criticism of utility theory made not only by psychology but also by other social science disciplines - especially sociology. In particular, Lewin argues that the criticism that the theory portrays human beings inaccurately, 'trivialising the role of habit, culture, institutions, social pressure and the like' has not been adequately responded to (p1317). The theory says no more than that people choose what they want and what they want is defined to be what they choose and therefore cannot be falsified. If Lewin's critique (and that of many others besides) is sound, then HES data sets certainly do not tell the whole story about preferences.

The point is this. The claim to objectivity and superiority by the mathematically more sophisticated methods founders not only on the arguments surrounding underidentification and separability, but also on the fact that the very data itself fails to capture key elements in the story. It is not that the budget-standard or other estimation strategies are guaranteed to be

'better' than the economics based ones, but that the claim of the latter to be more objective/less value-laden is not well-founded.

### Which household characteristics?

It was shown earlier that the various economics based models for estimating equivalence scales can be represented as special ways of incorporating household composition variables into the cost function  $E(\cdot)$ . Naturally enough the literature gives considerable attention to this aspect of the estimation strategy (the structure of the cost function), but it is remarkable how little attention has been given to the issue of how to specify functions relating equivalence scales to household characteristics (the  $ES_i(z)$  functions in the Barten model, for example). It is not just a question of functional form, but also of which household characteristics should be used. To start with it is necessary to control for factors, apart from just children, that are assumed to influence the observed demand behaviour of households. Such factors may include the region of residence, the age, education and labour market status of the head of the household and the number of adult members. In addition, a decision has to be made on how to have the explicitly child-related contributions to household composition enter the equation(s). In the formal presentation above,  $z_h$  was taken to represent 'the characteristics of household  $h$ ' and the usual practice is to have  $z_h$  include the number (and sometimes ages) of the children. Other options include, for example, the presence of children and having a fixed cost element for each child.

Banks and Johnson (1993, 1994) have produced evidence which shows how estimates of equivalence scales can change according to the way the economist chooses to specify how household composition enters the estimated equation. They also make use of recent advances in econometric theory to produce 'non-parametric' estimates of equivalence scales. Table 9.2 (Table 8.2 from the previous chapter) below gives a sample of their findings, based on the reduced-form Engel approach.

**Table 9.2**

Equivalence scales using different specifications (same data)

Method	2A	2A+1	2A+2	2A+3	Description of parameters
1	1.00	1.29	1.56	1.85	Number of children
2	1.00	1.30	1.65	2.00	Number of children (age-banded)
3	1.00	1.37	1.70	1.99	Number of children (age-banded) plus fixed cost
4	1.00	1.33	1.56	1.79	Presence and number of children (age-banded)
5	1.00	1.23	1.57	1.67	Non-parametric technique

To ensure reasonable comparability across methods the same family types must be used at each step and to this end the analysis is done for a couple with children aged 10 years, 9 and 12

years and 6, 9 and 12 years respectively. The first four methods use standard multivariate regression analysis techniques, while the last example uses the new non-parametric method. How can the choice be made between the differing specifications? Essentially there has to be a judgement made regarding the trade-off between parsimony and the regression information as to which one best explains the data. Of the parametric scales Banks and Johnson choose the third one, but also express optimism about the way in which the non-parametric estimation is close to the simple number of children specification (#1). In interpreting any differences between the results from the different techniques it is important to be aware that each estimate has a standard error and perceived differences may or may not be statistically significant.

## Summing up

The essence of the above critique of the consumption theory approach to estimating equivalence scales is summed up in the claim of Deaton *et al* (1989) that:

Empirical evidence in and of itself is insufficient to identify the costs of children so that a variety of different theoretical structures, while observationally equivalent, can imply quite different estimates of costs. (Deaton *et al*, 1989: 180).

The mathematical sophistication of the methodology gives a 'comforting aura of precision and rigor' (Nelson, 1994: 130) but given the serious inadequacy of some of its assumptions its 'utility' for policy applications has to be very limited.

So, to quote Reuben Gronau - though giving his words a slightly different flavour by altering the context:

Now that the traditional equivalence scales have been disposed of as indices of well-being, what indices should be used as guidelines for public policy? In our haste to 'calculate numbers', we have apparently neglected to question not only the nature of the identifying assumptions but also the goals of public policy ... [All our scales] are derived from the empirical data which [already] reflect the adjustments to reduced income - rather than the consumption needs of children viewed as future members of the next adult generation of producers. (Gronau, 1988: 1204).

## Some Results

Results for two parent households with different numbers of children are presented in Table 9.3 below. The children are assumed to be 'around 6 to 12 years' or alternatively the figures are an average for all children. The scales are for families with incomes in the low to middle range or are an average for all families. Whiteford's (1985) geometric mean for scales based in consumption theory are given for comparison.

Both the geometric and the arithmetic means of the reported results for the first child are 1.18, close to Whiteford (1985) for the utility theory methods. The list in the table has three studies that are not in Whiteford and Whiteford has about fifteen that are not in this paper's table. If the critique of the full iso-welfare method given in this chapter (and earlier) is correct then the above figures are likely to underestimate the cost of children. One of the most significant features of the results in Table 9.3 is the lack of solid evidence for economies of scale as family size increases. In some cases there is the suggestion of some diseconomies.

Table 9.4 shows the quite significant variation of scale with age. In interpreting this trend it is important to bear in mind that only minimal child-care costs are reported in HES type surveys. If even modest child-care costs were included for younger children the scales would flatten out considerably.

The variation in the reported sample of results is damaging enough for the strategy, but in a more complete picture the situation is considerably worse. For example, as already discussed earlier in the chapter, when Bardsley and McCrae (1982) of the Australian Bureau of Statistics attempted to determine equivalence scales for Australia, they concluded that 'appropriate manipulation of the Theil-Goldberger centres and variances<sup>22</sup> would allow virtual control of the scales produced [and therefore, with their data] the McClements methodology did not provide an objective basis for estimating equivalence scales'. The two Muellbauer studies in the table use different functional forms for the cost functions and come up with different results. This is not a helpful state-of-affairs. There appears to be some truth in the claim that the more sophisticated the theory, the less plausible the results and/or the wider the range of results tends to be. Browning (1992) provides a reasonable summary:

[T]here is a wide range of estimates; only a very selective reading would interpret them as giving similar estimates (as some authors have claimed). Furthermore, these estimates have standard errors and almost certainly even quite tight confidence intervals would include values greater than 100 percent or less than zero ... Thus it seems that empirical attempts to pin down the costs of children using utility methods have not made much progress. (Browning, 1992: 1444).

<sup>22</sup> The Theil-Goldberger figures provide the initial estimates of the scales that the McClements method requires to avoid the identification problem and the parameters to set the iterative process in train.

**Table 9.3**

Equivalence scales using the full utility function method

Author	Date	Country	2A	2A+1C	2A+2C	2A+3C
McClements (1977)	1971-72	UK	1.00	1.23	1.48	1.71
Muellbauer (1977)	1975	UK	1.00	1.15	1.29	1.42
Muellbauer (1979)	1975	UK	1.00	1.17	1.34	1.51
Phipps (1992)	1986	Canada	1.00	1.43	1.79	2.26
Ray (1986)	1968-79	UK	1.00	1.06	1.12	1.18
Lazear and Michael (1980)	1960-61	US	1.00	1.21	1.39	1.59
Blundell & Lewbell (1990)	1970-84	UK	1.00	1.14	1.29	1.47
van der Gaag <i>et al</i> (1982)	1972-73	US	1.00	1.08	1.18	1.28
Kakwani (1977)	1967-68	Australia	1.00	1.21	1.38	1.48
Tran Nam and Whiteford (1990)	1984	Australia	1.00	1.20	1.27	1.44
<b>Geometric mean of the above</b>			<b>1.00</b>	<b>1.18</b>	<b>1.34</b>	<b>1.51</b>
<i>For comparison</i>						
Whiteford (1985)			1.00	1.17	1.31	1.47
<i>- geometric mean of utility theory results</i>						
van der Gaag (1982)			1.00	1.25	1.38	1.50
<i>- rough mean from his survey of all methods</i>						

**Table 9.4**

Equivalence scales for two-parent families by age of the child - full utility function method

Author	Data Source		Age of Child				
	Date	Country	0-2	3-5	6-10	11-13	14+
McClements (1977)	1971-72	UK	1.09	1.18	1.22	1.26	1.31
Muellbauer (1977)	1975	UK	1.08	<-----1.21----->			
Ray (1986)	1968-79	UK	1.00	1.03	<-----1.11----->		
Blundell & Lewbell (1991)	1970-84	UK	1.09	1.14	1.16	1.18	
van der Gaag <i>et al</i> (1982)	1972-73	US	0.99		1.08	1.12	
Kakwani (1977)	1967-68	Australia	no age distinction made				

# 10 The Iso-welfare Question III

## Subjective, Relative Deprivation, Budget, Modular, and Life-cycle methods

Although the full and reduced form utility function strategies dominate the literature, there are other approaches which can also deliver estimates of child costs in the iso-welfare framework. Four such methods reviewed in this chapter are:

- the subjective method;
- the relative deprivation method;
- the budget method (DV version); and
- the modular or pragmatic method.

There is then a brief review of some new work which seeks to move beyond the constraints of the single period analysis on which the above strategies and those of the previous two chapters rely so as to model child costs over the life-cycle.

The chapter finishes with a discussion of the issue of constancy of scales across the income range, drawing together theoretical and empirical evidence which gives strong support to the view that 'constant scales are not plausible and their use needs reconsidering' (Conniffe, 1992: 442).

The first two methods reviewed in this chapter belong to what could be called the 'consensual' family of methods (Walker, 1987), the distinctive characteristic of which is the establishment of 'poverty lines' or other indications of standards of living with reference to the views of society as a whole. The subjective method uses surveys which ask the public to estimate an adequate minimum income or to relate certain verbal descriptions of standard of living to income levels or *vice versa*, while the deprivation indicator method (in some of its applications) begins by asking the public to specify a list of necessary items. The role of the expert cannot be entirely done away with as they are the ones who design the questions and analyse the responses, but the commitment to the values of democracy and citizenship shown in 'asking the people' is distinctive (Mack and Lansley, 1985; Veit-Wilson, 1987).

Budget standards have traditionally been the product of years of work by panels of experts whose final judgement has been informed by evidence from a range of sources including household expenditure surveys and other experts from a variety of backgrounds - economists, social analysts, nutritionists, housing specialists, budgeting counsellors and so on. There are two ways that the budget standard approach can be 'democratised' and thus become a potential candidate for membership in the consensual family. First, the budgets as devised by the 'experts' can be exposed to scrutiny in carefully selected and managed focus groups. This is the approach being taken by the Budget Standards Unit at the University of New South Wales,

with a view to assisting in the process of 'locating the budgets in the actual experience of Australian households' while recognising that 'it cannot be claimed that the use of Focus Groups will serve to 'democratise' the budgets in the way that some writers have proposed' (Saunders, 1996: 30; cf Renwick and Bergmann, 1993: note 6). Second, the panel of experts can be completely *replaced* by 'a judicious mixture of group and depth interviews with members of the public ... [to] ...provide the basis for directly determining a socially approved budget' (Walker, 1987: 222). The use of focus groups in the New Zealand Poverty Measurement Project has taken up this option (Stephens *et al*, 1995). It is too early to draw any clear child cost or equivalence scale conclusions from this project.

## Subjective Method<sup>1</sup>

The assumption of the microeconomics based methods that households maximise a utility function subject to a budget constraint raises the possibility that observations of market behaviour can be used to compare welfare levels across households in different circumstances. Empirical work, however, need not be limited to analysing demand equations based on household expenditure data sets. The cost function that economists derive in the consumer demand theory framework answers the question, "How much income is needed by a given household to reach a given welfare level?" The same sort of question has been asked over many years by sociologists. The most well-known example is the US Gallup Poll one which asks -

What is the smallest amount of money a family of four needs to get along in your community?

The question can be understood as one way of putting a number on the cost function for the welfare level 'getting along'.

Such 'getting by' type questions and more sophisticated versions thereof form the basis of the subjective or consensual approach to estimating child costs. This method makes use of questionnaires or similar instruments to measure people's subjective evaluations of welfare levels and their relationship to incomes. It can be given an economic interpretation within the framework of the definitions of equivalence scales given in chapter seven: (9a) and (9b) are repeated for convenience below.

For any household (h) the equivalence scale (ES) can be defined as the ratio of the expenditure it needs to reach a welfare level (W) to that required by the reference household (r) for the same welfare level. Formally:

$$ES_h = \text{Spending by h to reach W} / \text{Spending by r to reach W}$$

---

<sup>1</sup> Also referred to as the consensual method, the evaluative method or the attitudinal method.

$$= E(W, p, z_h) / E(W, p, z_r) \quad (9a)$$

The equivalent 'indirect welfare function' definition is given by:

$$W = W(Y_h, p, z_h) = W(Y_r, p, z_r) \quad (9b)$$

where  $W$  = a given welfare level and  $Y_h = ES_h \cdot Y_r$

For the subjective method, there are two broad forms that the question asked of respondents can take. These two questions correspond to the two forms of the definitions of (9a) and (9b). First, respondents can be asked to give an income or spending figure which corresponds to a given welfare level. In this case they are being asked to put a number on the cost function in (9a). Alternatively they can be asked to describe (on a specified scale) the level of satisfaction (welfare) produced by their own income. In this case they are effectively putting a number on the indirect welfare function in (9b). Either sets of responses can then be worked on to produce equivalence scales.

**Table 10.1**

A classification of the various types of subjective method<sup>1</sup>.

Focus	Response type	
	Welfare	Income (MI or IEQ)
Own family	<p><b>A</b></p> <p>How do you feel about the income that you and your family have? Answered on a 7 point delighted/terrible scale.</p> <p><i>Dubnoff et al (1981)</i></p>	<p><b>B</b></p> <p>For our family in our general circumstances, I consider an income of ?? dollars 'very bad' ... and so on up a scale.</p> <p><i>Kapteyn &amp; van Praag (1976)</i></p> <p><i>Goedhart et al (1977)</i></p> <p><i>van Praag &amp; van der Sar (1988)</i></p> <p><i>Danziger et al (1984)</i></p> <p><i>Deleeck (1989)</i></p>
	<p><b>C</b></p> <p>Respondents presented with a list of families with different incomes and compositions ... asked to describe each of them on a given scale 'poor ... prosperous' or the like.</p> <p><i>Dubnoff (1985)</i></p>	<p><b>D</b></p> <p>Describe to respondents various family types. Ask what minimum income is consistent with each level of living on, say, a five point scale.</p> <p><i>Rainwater (1974)</i></p>

Source: adapted from Bradbury (1989b: 390)

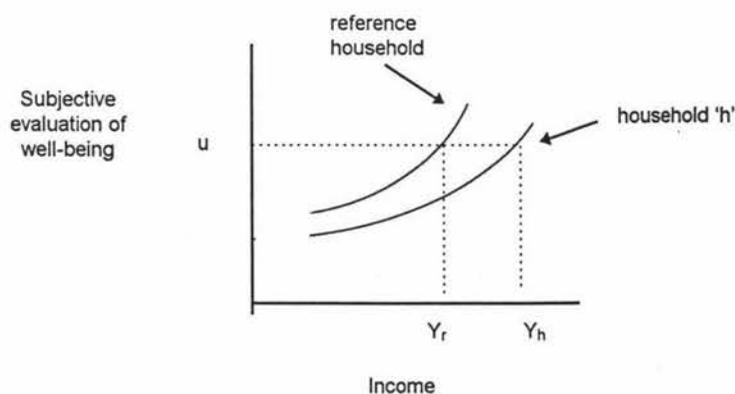
Each question can be asked in the context of the respondent's own household circumstances or those of hypothetical households, there are four subsets of approaches within the overall subjective strategy. A useful two-dimensional classification is given in Table 10.1 above. The focus of the question can be on either the respondent's own family or on a set of hypothetical families. The response can be in terms of welfare level (what welfare level does such-and-such an income produce for this family?), or in terms of income (what minimum income (MI) is needed by a given family to maintain a certain welfare level?). Some studies refer to the MI questions as IEQs (Income Evaluation Questions).

The approach built around the question in quadrant B is the most well known of the four. It has its origins in Bernard van Praag's 1968 dissertation while studying at Leyden University in the Netherlands and was developed further by that of Arie Kapteyn which was written under van Praag's supervision at the University in 1977. A substantial literature has built up over the late two decades (see Table 10.1) with useful summaries provided by Hartog (1988) and Bradbury (1989b). The remainder of this review of the subjective method will focus primarily on the 'Leyden method'.

The Leyden approach can be summarised as follows. The respondents are given an Income Evaluation Question (IEQ) of the form, 'What income would you, in your circumstances, consider to be 'very bad', 'bad', 'insufficient', 'sufficient', 'good', 'very good' (income is after tax household income)?' It is assumed that the responses correspond to the midpoints of six equal intervals on  $[0,1]$  - the 'equal quantile' assumption. Each person is assumed to have a Welfare Function of Income (WFI) which summarises their evaluation of different income levels on the bounded numerical scale. The WFI is interpreted as a cardinal utility function with a lognormal functional form. Interpreted graphically (see Figure 10.1) the next step is to select a particular welfare level ( $u$ ), find the money incomes that make the two household types as well off using the estimated functions, and hence calculate the equivalence ratio,  $Y_h/Y_r$ .

**Figure 10.1**

Simple graphical interpretation of the Leyden method

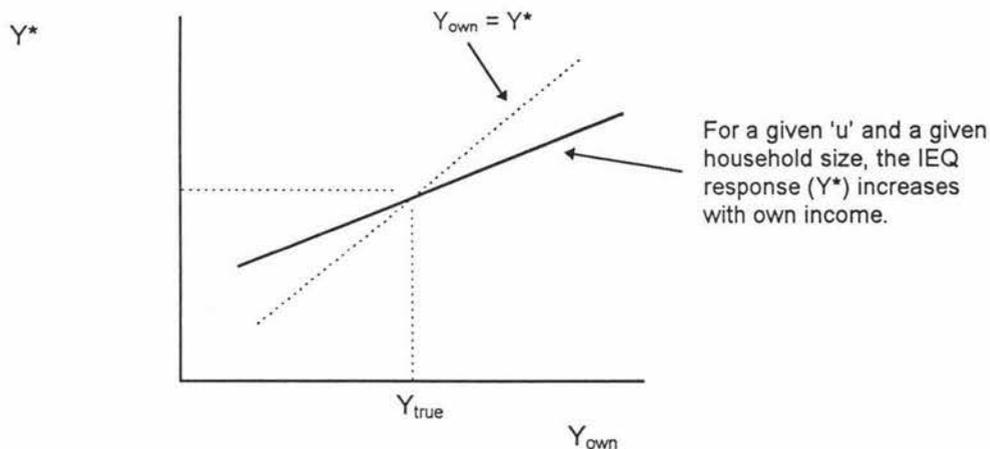


Unfortunately the implementation of the strategy is not as simple as that because it is found that the evaluations vary systematically with the respondent's own current income. There is good evidence to show that those on higher incomes typically have higher income evaluations for a given welfare level and family size, a phenomenon described as 'preference drift' (Kapteyn and van Praag, 1976: 319)<sup>2</sup>. The effect of this is that (contrary to the impression given by Figure 10.1) the WFIs are not neatly determined as there will be many estimates of the income generating 'u' for each family size.

The Leyden method for getting around this problem can be explained graphically (Figure 10.2). Empirical evidence shows that for a given welfare level and given household size,  $Y^*$  (the stated required income) will be an increasing function of  $Y_{own}$ . Where  $Y^* = Y_{own}$ , the person will be evaluating their own income as being at the given welfare level. This is the only point ( $Y_{own} = Y_{true}$ ) where the estimates are not contaminated by the preference drift.

**Figure 10.2**

Stylised graphical interpretation of the Leyden method's response to the problem of preference drift (for a particular family size and welfare level)



The method can be illustrated using the log-log functional form adopted by Danziger *et al* (1984). The observed relationship between the stated income required ( $Y^*$ ), the respondent's own household's income ( $Y_{own}$ ) and family size (HS) is assumed to be of the form:

$$\ln Y^* = a_0 + a_1 \ln Y_{own} + a_2 \ln HS \quad (1)$$

<sup>2</sup> 'Preference drift is a specific instance of a general phenomenon, studied in psycho-physical adaptation theory ... [which] states that people relate their judgments on the brightness of light, loudness of sounds, etc., to an "anchor point", a level to which they are accustomed. In this case, where *income* levels are judged, the prominent anchor point is *own current income*' (Van Praag and van der Saar, 1988: 203). cf Clark and Oswald (1996).

When  $Y^* = Y_{own} (= Y_{true})$ ,  $Y_{true} = \exp \{(a_0 + a_2 \ln HS)/(1-a_1)\}$ . As the coefficients are all estimable from the regression,  $Y_{true}$  for the given family size is able to be calculated<sup>3</sup>. This procedure can be repeated for various household sizes and the equivalence scales calculated.

## Results

Van Praag and van der Saar (1988) have recently refined the Leyden approach<sup>4</sup> and applied it to data from several European countries and to a data set from Boston in the United States. Their approach is similar to that of Danziger *et al* (1984) outlined above. They acknowledge that '[t]here is no theoretical justification for the choice of the double-log relation, only the strong empirical evidence that it fits rather well' (p202). Table 10.2 summarises their results at welfare level 3 (insufficient). They do not place a great deal of reliance on the US figures as the sample was small and unrepresentative and note that the Irish results could have been affected by rural households having extended families in which children are of some economic value, thus reducing their net costs (and lowering the resulting scales). The possible effects of differing 'family allowances' are noted but not quantified. The results were given for each of six welfare levels. Table 10.3 shows the UK results for each of the six welfare levels.

**Table 10.2**

van Praag and van der Sar (1988) for welfare at level 3.

Country	Number of children <sup>a</sup>			
	1	2	3	4
Denmark	1.21	1.39	1.54	1.63
West Germany	1.17	1.30	1.42	1.51
Belgium	1.17	1.30	1.40	1.51
UK	1.14	1.23	1.32	1.40
Netherlands	1.12	1.22	1.30	1.37
Italy	1.12	1.20	1.30	1.37
France	1.11	1.19	1.26	1.32
Ireland	1.09	1.16	1.22	1.28
US (Boston area)	1.19	1.33	1.45	1.57

a The study uses family size rather than number of children as the household characteristic variable, but assume that the predominant households were nuclear family ones headed by an adult couple.

<sup>3</sup> The method breaks down if  $a_1 = 1$ , but 'empirical evidence demonstrates that [it] is practically always smaller than one' (Van Praag and van der Saar, 1988: 203).

<sup>4</sup> In particular, they drop the three assumptions of: cardinality of the WFI, the lognormal functional form, and equal quantiles.

**Table 10.3**

van Praag and van der Sar (1988) for the UK at the six levels of welfare

Level of welfare	Number of children			
	1	2	3	4
1 very bad	1.14	1.25	1.34	1.43
2 bad	1.14	1.25	1.34	1.43
3 insufficient	1.14	1.23	1.32	1.40
4 sufficient	1.12	1.20	1.28	1.34
5 good	1.11	1.19	1.26	1.31
6 very good	1.08	1.15	1.21	1.24

The results of several studies using this approach are summarised in Table 10.4 below. The most significant feature of this selection is the relative *flatness of the scales* in comparison with those generated by other methods. The impression is given that the levels of needs of the different family types are closer to each other than other studies would indicate. In terms of the one parameter power law summary developed in chapter three [scale value = (household size) <sup>$\theta$</sup> ], the subjective scales tend to have a  $\theta$  value of around 0.20 to 0.30 compared with other methods which have a  $\theta$  value around 0.45 to 0.60 (Atkinson *et al*, 1995 - see Appendix C).

**Table 10.4**

Equivalence scales produced using the subjective method

Study	Country	Data Year	Number of children <sup>a</sup>			
			1	2	3	4
Kapteyn & van Praag (1976) <sup>b</sup>	Netherlands	1971	1.19	1.28	1.36	1.39
Rainwater (1974)	US	1974	1.12	1.27	1.30	-
Goedhart <i>et al</i> (1977)	Netherlands	1975	1.13	1.24	1.32	1.40
van Praag & van der Sar (1988) <sup>c</sup>	UK	1979	1.14	1.23	1.32	1.40
Danziger <i>et al</i> (1984)	US	c 1977	1.12	1.23	1.32	1.40
Dubnoff (1985) <sup>d</sup>	US	c 1983	1.15	1.26	1.37	1.46
de Vos and Garner (1989) <sup>e</sup>	US	-	1.18	1.34	1.44	-
Deleeck (1989) <sup>f</sup>	Belgium	1985	1.16	1.26	1.31	-
<i>Geometric mean of the listed scales</i>			<b>1.15</b>	<b>1.26</b>	<b>1.34</b>	<b>(1.41)</b>

a Several of the studies use family size rather than number of children as the household characteristic variable, but in these cases the predominant households were nuclear family ones headed by an adult couple.

b For younger children (parents in mid to late twenties).

c A mid-range example from the extensive study reported on above (see Table 10.1 and associated text)

d Source: Bradbury (1989), Table 2.

e Source: Calculated from Ruggles (1990), Table 4.4.

f Calculated from Deleeck (1991), Table 4

### Commentary and Evaluation

It is instructive to compare and contrast the subjective and utility function approaches. Both use the same broad definition of equivalence scale and both are based on certain fundamental behavioural assumptions which are to a considerable degree untestable. Both are driven by the desire to use widely-based empirical evidence directly rather than as mediated by the minds and experience of a few experts as in the modular, budget and political approaches. The contrasts between the two are set out in Table 10.5 (cf van Praag and van der Sar, 1988: 197).

**Table 10.5**

Contrasts between the utility function and subjective methods.

	Utility Function Method	Subjective Method
what behaviour is observed?	choice behaviour (actions)	verbal behaviour (opinions)
what is assumed as common between individuals?	common demand behaviour (same preferences)	common response behaviour (same understanding of 'adequate', etc)
how can welfare be 'captured'?	demand captures the unobservable 'welfare' concept	verbal labels describe welfare levels

There are several favourable points about the subjective method. It offers a way of measuring material welfare directly, rather than using a proxy. It is relatively easy to understand the basic idea and the strategy can be given a 'conventional economic interpretation' (Danziger *et al*, 1984: 504). In contrast to the full utility function approach, the data requirements are not demanding. The researcher does not have to make allocation decisions regarding shared goods. Instead, the method implicitly assumes that the respondents take account of the possibilities of sharing such goods in giving their answers. The method also seems to produce very consistent results and given the core philosophy of 'asking the consumers' it is not as vulnerable as some other methods to the criticism of not being in touch with 'real life'.

There are, however, some grounds for concern. The method clearly depends on the MI and IEQ questions being understood in the same way by all respondents (see Ruggles, 1990: 20-23 for a discussion of this issue). It assumes that 'a specific verbal label has the same welfare connotation for all respondents' (van Praag and van der Saar, 1988: 198), yet 'for a method so reliant upon the behaviour of people in answering questionnaires ... [it is surprising that] so little has been done to validate and improve the measurement instruments used' (Bradbury, 1989: 406). In support of his warning that '[t]he use of techniques of attitude measurement in relation to economic well-being has hazards', Jensen (1989) notes that:

A broad review of research to date would suggest that the results are sensitive to the specific wording of questions, and possibly to the context in which they are asked. Furthermore, the results in part reflect psychological processes relating to maintenance of positive self image, habituation to stable circumstances, and adaptation to adversity. Results need to be interpreted with an understanding of such processes. (Jensen, 1989: 22)

A related issue is whether it matters which household member answers the questionnaire (Walker, 1987). It appears that the method assumes that it does not matter, just as the economic methods avoid dealing with intra-household allocation issues by assuming equitable allocation.

Both the 'own family' and the 'hypothetical family' variants have their respective advantages and limitations. For example, the latter avoids many of the distortions brought about by the preference drift issue, in that while the average level of the responses for the various family types is likely to be influenced by the respondent's own income, the relativities are less likely to be affected. However, respondents may have only limited knowledge of the needs and living conditions of families different from their own and may also have their responses significantly affected by common views of merit which form along the lines of the deserving/undeserving poor concept (cf Walker, 1987: 218).

Beyond these general considerations, an evaluation of the strategy should seek to understand why it is that the scales produced by it are consistently lower and flatter than those obtained by using other methods<sup>5</sup>. Various explanations have been offered for this tendency, and not surprisingly the discussion revolves around the central problem that exists for all iso-welfare methods, namely the nature of the welfare function involved. It has been suggested, for example, that the respondents may include the utility derived from the presence of children in their thinking, thus flattening out the resulting equivalence scales and lowering the reported cost of children. This is the view, for example, of Mayer and Jencks (1989) who consider that the relative inelasticity of the scales with respect to family size suggests that 'adults expect to make tradeoffs between extra children and material comfort' (p102). Others (eg Goedhart *et al*, 1977) have argued that preferences may change with the addition of children to the family thus allowing the same adult satisfaction for less expenditure, with the savings being used for the additional spending due to family size.

These sorts of issues have been met in earlier chapters when examining the issues of identification and separability, but there is another dimension to the analysis that could be significant. The point can be illustrated in relation to the MI (own family) type of question but is equally applicable to all four types. A simple model would have the indicated welfare level ( $W$ ) dependent on the income level specified ( $Y$ ), the respondent's own income ( $Y_{own}$ ) and the household characteristics ( $z$ ).

$$W = f(Y, Y_{own}, z) \quad (1)$$

The preference drift effect associated with the influence of the respondent's own income is explicitly recognised in the Leyden method and is controlled for as indicated earlier. However in making a welfare evaluation of income, respondents are also likely to be influenced by factors other than  $Y_{own}$ . If all of these are gathered within the ambit of another variable, 'expectations' (EXPECT) then a more complete model would be ...

$$W = f(Y, EXPECT, z) \quad (2)$$

---

<sup>5</sup> Danziger *et al* (1984) are not troubled by the issue, noting to the contrary that their results 'resemble those obtained using the much more cumbersome (and more expensive) indirect approach based on market behaviour' (p504). Their point of comparison was only with van der Gaag and Smolensky (1982) which cannot (now) be claimed to be typical of the economic strategy's results.

and the question becomes one of deciding what else, other than  $Y_{own}$ , to include as the independent variables in the EXPECT function. There are many possibilities (education, previous standard of living, and so on) but a major one is likely to be the *social reference group* of the respondent (Bradbury, 1989b). The living standards of such groups of friends, relatives, neighbours, fellow-workers and so on form a reference level against which respondents evaluate their own situation. For example, those whose reference group has a relatively high standard of living are likely to indicate the need for a higher income to achieve a given level of well-being, even when own income effects are controlled for. Similarly, if larger families have lower standards of living on average they may have 'depressed aspiration levels' (Kohl, 1996: 264). If families tend to use families of the same composition as their own as their reference group (rather than 'all families') then reference group effects will be systematically related to family type and there will be a tendency for the resulting scale to move towards unity as some responses will be above and some below average in a random sample. This may help explain the flatter scales.

If it could be shown that reference group effects are independent of family composition, or if the two could be statistically separated, then these sorts of problems would not arise. In some limited circumstances this may be so. The most obvious example would be families with one and two younger children. They could be expected to have similar reference groups and if other factors liable to influence 'expectations' could be controlled for then this roadblock to validity would be removed in relation to these households.

In comparison with some of the other approaches, the subjective method is still in its early days of development and there remains the hope that further refinement may overcome some of the limitations identified above. Unfortunately, the strategy (even in its sophisticated Leyden clothing) remains relatively isolated from mainstream economic analysis. Hartog (1988) could find only one minor exception to his claim that 'neither the research program, nor elements thereof, have been adopted by any economist who was not, at one time or another, a direct associate or staff member of van Praag or Kapteyn'. He suggests that the Leyden methodology may not have been included in the economist's toolkit because of issues relating to 'the cardinality axiom, theoretical isolation, the lack of behavioural predictions, and data accessibility' (pp263f). Although progress is possible on some aspects of these issues (eg the first has been resolved in that an ordinal approach has now been developed (Danziger *et al*, 1984; van Praag and van der Saar, 1988)), it is likely that the economist's 'methodological suspicion regarding introspective concepts' (Sen, 1982: 9) will make the wider acceptance of the strategy difficult.

## Relative Deprivation

Townsend's (1979) seminal work builds on the idea that 'as resources for any individual or family are diminished, there is a point at which there occurs a sudden withdrawal from

participation in the customs and activities sanctioned by the culture' (p57). A summary deprivation index can be constructed from a range of indicators of 'style of living' and equivalence scales can be produced from the incomes at which various household types become 'disproportionately deprived'. In terms of the discussion at the beginning of this chapter, this research has elements which do not fit well with the characteristics of a consensual approach. For instance, the respondents did not have any say in the components of his 12-item deprivation index.

Townsend's approach has the attraction of seeking to take account of the multi-dimensional nature of the standard of living concept, but it has been extensively criticised for a variety of reasons (Ringen, 1987; Piachaud, 1981, 1987; Donnison, 1988). One of its main weaknesses is its failure to distinguish between the effects of choice as opposed to constraints as determinants of observed standards of living.

Table 10.6 below summarises the weekly income levels for families of different compositions which were found to be consistent with participation in the prescribed lifestyle. Three observations are of interest from his results. First, the estimates are very close to those of Piachaud. Second, there is little if any evidence of economies of scale as family size increases. Third, older children cost more than younger children (assuming 'free' child-care provided by the parents, mainly the mother). In terms of the purposes of this study, it should be noted that the Townsend scales are applicable to the very low end of the income range and as such may not be useful for analysis at other income levels.

The original estimates used 1968-69 UK data. In the process of conversion to 1992 New Zealand dollars the significant assumption is made that over those twenty-five years and across the two countries there is reasonable similarity in what is considered a normal or typical style of living.

**Table 10.6**  
Townsend's child costs using relative deprivation method

Family composition	Younger family <sup>1</sup>			Older family <sup>2</sup>		
	Total income required	Cost of child(ren)	Equivalence scale	Total income required	Cost of child(ren)	Equivalence scale
Two adults	262	-	1.00	262	-	1.00
with one child	305	43	1.16	327	65	1.25
with two children	348	86	1.33	392	130	1.50
with three children	392	130	1.50	432	170	1.65
with four children	436	174	1.66	523	261	2.00

Notes 1 A younger family has children with an average age of around 5 or 6

2 An older family has children with an average age around 12 or 13

The subsequent work of Mack and Lansley (1985) sought to avoid some of the problems of Townsend's approach. They defined poverty as 'an enforced lack of socially perceived necessities' (p30) and followed this through in the survey questionnaire by getting respondents who indicated that they lacked certain of the socially determined necessities to say whether this was the result of choice or shortage of money. In so doing they sought to allow for the diversity that arises from differing tastes. No equivalence scales are produced and none can be derived from this source.

In the United States, Mayer and Jencks (1989) surveyed non-Hispanic blacks and whites in Chicago in 1983 and 1985 to measure whether families could afford food, medical care and housing. Their final sample contained 1617 complete responses. When they weighted the data to make it more representative of Chicago as a whole, there was no significant change to their central findings. Using reasonably straightforward regression analysis they conclude that for measured hardship to remain constant across households an elasticity ( $\theta$ ) of 0.91 is required. This is at the very high end of the range of results reported in the literature.

## Budget Method

When using a budget approach, there are two ways of deriving child costs. On the one hand, a basket of goods and services judged to be adequate for the needs of a child living at a certain standard of living in a particular family type can be defined and costed. On the other, a budget for a two parent household with children can be compared with one for a childless couple household at the same or similar standard of living. The difference is taken as a measure of the costs of the children. Oldfield (1992:177f) refers to these as the Itemised Variant (IV) and the Deductive Variant (DV) respectively and it has already been argued that they belong to different concepts of the cost of a child. The IV attempts to answer the needs question, whereas the DV seeks to answer the iso-welfare question. Oldfield (1992) is one of the few studies that observes the distinction and reports on the difference in results produced. She found that the DV method gives results for households about ten per cent lower than the IV.

## Results

In chapter five the results of studies by Piachaud, Lovering, Middleton *et al*, the New York Community Council, the Social Planning Council of Toronto and Oldfield were reported on in the context of the needs question (whether rigorously adhering to the IV approach or not). Only Oldfield can easily be given in equivalence scale format. To convert Piachaud and Lovering, an assumption along the lines of that made by Whiteford (1985: 14, 16) is necessary. In both cases he assumes that the United Kingdom's equivalent of the current New Zealand married couple unemployment benefit was appropriate for use as the two adult reference level,

and the budget based dollar child cost is the extra required to maintain the standard of living. The figures in Table 10.7 for these studies are taken from Whiteford (1985). Middleton *et al* is unconvertible unless the same sort of assumption is made. There appears to be little value in doing that for this study.

**Table 10.7**

Budget estimates of child cost in equivalence scale format

	2A	2A+1	2A+2	2A+3	2A+4
German	1.00	1.36	1.72	2.08	2.44
US	1.00	1.23	1.57	1.86	2.09
Beveridge <sup>1</sup>	1.00	1.24	1.48	1.72	1.96
Piachaud	1.00	1.23	1.50	1.82	-
Oldfield <sup>2</sup>	1.00	1.26	1.44	-	-
Henderson <sup>3</sup>	1.00	1.15	1.37	1.68	-

1 At subsistence level (Source: McClements, 1978 , Table 5.10)

2 Excluding childcare

3 For the 'head working' scenario. The 'head not working' option has a very slightly higher scale.

The German scale 'is based on a basket of goods approach to determine a minimum of subsistence by experts' (Burkhauser *et al*, 1990: 321). The figures are for children aged 7 to 10 years. The United States ratios are those embodied in the official poverty thresholds which are 'modified versions of the relative food consumption standards that happened to be available to Mollie Orshansky 25 years ago' (Ruggles, 1990: 64). Orshansky (1965) set the thresholds for families of three or more at three times the US Department of Agriculture's 'economy' food budget on the grounds that low income families spent about one third of their income on food. For families of two, she increased the multiplier to 3.7 to allow for their relatively larger fixed costs such as for housing and utilities. A person living alone was rated at 80 per cent of the family of two. As can be seen from Table 10.7 the scale has some strange features such as strong diseconomies of scale and elasticities with respect to family size that vary from 0.36 to 0.85 (Ruggles, 1990: 66)<sup>6</sup>. The Orshansky strategy probably has more substantial conceptual links with the iso-prop methods than with budget standards methodology. However, although it could never reasonably be claimed to be a true budget standards approach it does have a 'budget' link and therefore is included here for completeness. The particular version reported on is from Ruggles, 1990: 66. The Henderson figures are those implicit in the poverty line that was first used in Australia in 1966 by Professor Ronald Henderson and later updated and used by the Commission of Inquiry into Poverty which Henderson chaired and which reported in

<sup>6</sup> The basis for the scales has understandably been severely criticised over the years and it appears that all that is saving them are the arguments of data producers and the like that significant changes to them would have serious ramifications for providing valid comparisons over time.

1975. The basis of Henderson's relativities were the family budget standards of the Greater New York City Council of 1954. The figures in Table 10.7 are drawn from Whiteford (1985).

## Evaluation

Some of the advantages and limitations of the budget approach have been canvassed in chapter five. A further advantage can be seen in Table 10.8 where the relativities are laid out for different budget options for different child ages and numbers with and without child-care and housing. The ability to obtain that sort of detail is valuable and the basis for it is transparent.

**Table 10.8**

Oldfield's Child Equivalence Scales for various circumstances

	Total Budget	Excluding Housing	Excluding Childcare	Excluding H & C
One Child Family				
aged 4	0.30	0.23	0.22	0.16
aged 10	0.28	0.22	0.26	0.20
aged 16	0.31	0.24	0.30	0.24
Two Child Family				
aged 4	0.26	0.22	0.18	0.15
aged 10	0.24	0.21	0.22	0.19
aged 16	0.27	0.24	0.27	0.24

There are however some challenges that are endemic in the iso-welfare strategy in general that therefore affect the DV option of the budget standards estimation strategy - namely, the now familiar intertwined issues of the budget constraint, changing adult tastes and the separability assumption.

The budget constraint is not a direct issue for the IV version of the budget method as its prime focus is a budget for a child for a certain standard of living. Where the income is to come from is not an issue. The separability assumption is therefore not an issue for the IV method but it is for the DV one which consistently gives lower estimates of costs when applied to individual budget categories. For example, Oldfield reports that for a young child in a two child family child food costs appear to be 23 per cent less using the DV method compared with those using the IV one. This discrepancy can no doubt be explained along the lines of that discussed earlier in relation to Browning's examination of FAMEX data. Here, as there,

this result is not that surprising if one accepts that adult preferences are likely to change on the arrival of children.

For the budget developer the issue is one example of the catch-22 dilemma referred to in chapter five. If the budget standards are not tested against and related to consumer behaviour and community opinion then they are vulnerable to the criticism that to too great a degree they reflect the personal judgements of the researchers or other experts and not the values and patterns of the wider community. On the other hand, if the standards are modified to reflect actual behaviour, there is a weakening of the claim that they represent an independent assessment of what is required to satisfy a given level of needs. For example, if social norms are the principal guide and there is a social expectation that larger families will tend to have lower living standards, then this social expectation is likely to be incorporated into the common-sense notion of what, say, 'modest but adequate' means in relation to living standards. The same words come to mean different things for different households with 'modest but adequate' meaning a lower standard for large families than for small. The more the developers lean towards the 'social norms' pole, the more downward bias is reflected in relative costs between households and the 'flatter' are the resulting equivalence scales. (cf Bradbury, 1996).

It is therefore important that in the documentation associated with budget standards based scales that there is a clear indication of the degree to which the published relativities might reflect the extent to which people's expectations adjust to their limited resources.

### **Time and Home Production**

In common with other strategies the budget standards approach tends to ignore the time and home production components of welfare relevant resources, although they can be incorporated relatively easily if desired because of the flexibility of the method.

## Modular or arbitrary scales

It is possible to generate a 'reasonable' set of ratios without any direct reference to household consumption data, budgets, public opinion or indeed to any other comprehensive empirical work at all. On the basis of informed judgement and/or intelligent guesses, household members can be assigned weightings in terms of adult equivalents and the necessary calculations done to make a complete scale. The resulting scales are variously described as arbitrary, pragmatic and *ad hoc*. This study calls them 'modular scales'.

As an example of the modular or building block approach, assume that second and subsequent adults may be given a 60 percent weighting and that children under 16 may be counted on average as being equivalent to 40 percent of the first adult. Naturally the first adult counts as 100 percent. The resulting scale for selected household types is shown in the first line of Table 10.9 below. The second line in the table gives the scale converted to the alternative of the childless couple as reference.

**Table 10.9**

An illustrative scale generated from arbitrary but 'sensible' adult equivalent building blocks

	A	2A	2A+1	2A+2	2A+3	2A+4
Single adult as reference	1.00	1.60	2.00	2.40	2.80	3.20
Childless couple as reference	0.63	1.00	1.25	1.50	1.75	2.00

The modular approach has the twin advantages of costing nothing to produce and of being transparent as regards the implicit judgements about the relative weightings of different household members. Many such scales are in use throughout the world, the most well-known being the one the OECD recommends to those countries that do not yet have their own (OECD, 1982). It is derived by setting the value for a single adult as 1.00, a second or subsequent adult as 0.70 and each child as 0.50. In Table 10.10 includes a range of arbitrary scales all converted to the base of 1.00 for an adult couple. Except for Jensen (1989) there are no economies of scale as family size increases. None have an allowance for the special costs of sole parents. The marginal increase for each child is typically at the higher end of the spectrum of estimated costs using other methods.

**Table 10.10**

Examples of modular based scales

	Original specification		Recalculated for couple household as reference						Average <sup>a</sup> elasticity
	Adults 1 & 2	Children	A	2A	2A+1	2A+2	2A+3	2A+4	$\theta$
German <sup>a</sup>	1.0 0.80	0.65	0.56	1.00	1.36	1.72	2.08	2.44	0.80
O'Higgins <i>et al</i> (1989)	1.0 0.50	0.50	0.67	1.00	1.33	1.67	2.00	2.33	0.75
OECD <sup>b</sup>	1.0 0.70	0.50	0.59	1.00	1.29	1.59	1.88	2.18	0.70
RCDIW <sup>c</sup>	1.0 0.65	0.45	0.61	1.00	1.27	1.55	1.82	2.09	0.65
LIS <sup>d</sup>	1.0 0.40	0.30	0.71	1.00	1.21	1.43	1.64	1.86	0.55
CCSD, Callan <sup>e</sup>	1.0 0.67	0.33	0.60	1.00	1.20	1.40	1.61	1.81	0.50
Jensen (1989) <sup>f</sup>	1.0 0.55	#1 0.35 #2 0.30 #3 0.25	0.65	1.00	1.23	1.42	1.58	1.74	0.50

- Notes
- a Based on a budget standards approach (Burkhauser *et al*, 1990)
  - b Recommended by the OECD for countries that do not have their own scale, (OECD, 1982). Ringen and Halpin (1995: 20) refer to this scale as a 'middle-of-the-range' one. This is a strange comment - the OECD scale is at the top of the range of scales that are considered 'plausible'. Perhaps they meant that it is mid-way between the two extremes of per capita scale and 'no scale'.
  - c Used by the Royal Commission on the Distribution of Income and Wealth (1978) [Source: Coulter *et al* (1992: 102f)]
  - d See Smeeding *et al* (1993) - not all LIS works use this scale however.
  - e Used by the Canadian Council on Social Development (Phipps, 1993) and in Callan *et al* (1993)
  - f Designed to fit well with the Revised Jensen Scale (Jensen, 1988)
  - g These are approximate only and focus on the scales for household size 2 and above. The O'Higgins *et al* scale is particularly difficult to model as all additional family members after the first are allocated the same weighting.

## Life-cycle methods

It is widely acknowledged that spending decisions are made with more than just one time period involved, yet virtually all the estimates of child costs that are based on expenditure surveys work within that restricted time-frame. Child costs may be funded by spreading the costs over the life-cycle rather than simply by decreasing current adult consumption. Conceptually, this can be seen either as a means of easing the budget constraint or as relaxing the assumption that income equals expenditure to take account of savings, dissavings or borrowing.

The costs of children may be spread over the life-cycle by various means. As already noted, parents may 'over-purchase' relevant goods before there are children. Thus, what is being compared in the iso-welfare process of estimating child costs is the spending pattern of a household with children with that that is childless but anticipates the presence of children. Most childless couples do not intend to remain that way. The effect of this is that the gap in spending patterns between the two households is likely to be diminished and the resulting analysis will underestimate child costs. Another way to spread the cost is to reduce the rate of savings, dissave or borrow while the children are being raised. Each of these actions effectively reduces the amount available for consumption spending in the future. This again has the effect of making single-period analysis underestimate the costs as some of them are transferred to times when there are no children in the household (Pashardes, 1991). 'The difference between the within-period expenditure of two such households would seem of limited interest in the study of households other than those suffering extreme liquidity constraint' (Banks *et al*, 1994: 193).

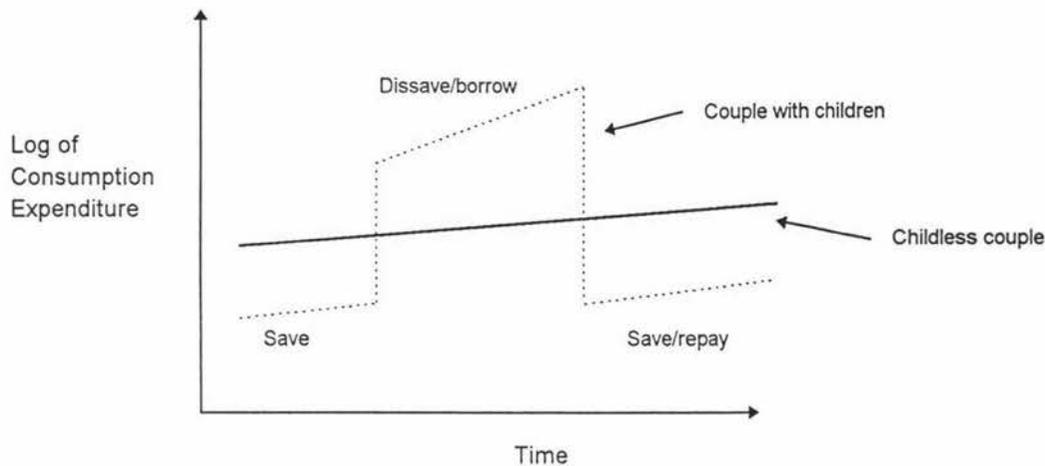
Pashardes (1991), Browning (1991a, 1991b), Banks, Blundell and Preston (1991, 1994) and Attanasio and Browning (1995) are representative of an emerging school of thought which broadly accepts the tenor of the critique of traditional 'economic' equivalence scale estimation strategies that is given in this study, and argues that a better way to seek to estimate child costs (and equivalence scales) would be to move beyond the usual one year within-period analysis of expenditure reallocations to look at life time patterns. Such a strategy provides no panacea for the central problem of the traditional approach (namely, that knowledge is required not only of preferences over goods but of joint preferences over goods and demographic attributes themselves (Pollak and Wales, 1979; Blundell and Lewbell, 1991; Coulter *et al*, 1992a)), but:

... [the placing of welfare measurement in an intertemporal context] does, nonetheless, seem to capture an important aspect of child costs and can be shown to widen the set of parameters which the economist can identify in comparison with conventional procedures. In so doing it also clarifies the precise nature of what lies beyond econometric identification with expenditure data. (Banks *et al*, 1994: 194).

The highly stylised graph below illustrates the basic idea (Figure 10.3). The two households each have the same life time expenditure (say, for forty years from couple formation). One couple remains childless - their expenditure path is represented by the solid horizontal line which slopes slightly upwards to represent age effects. To keep the analysis as uncluttered as possible, it is assumed that the other couple intend to have just one child. In anticipation they save. As the child ages, costs increase. The child then leaves home and becomes economically independent at, say, age eighteen years. To cover the extra expenditure while the child is in their direct care they first use up their savings (dissave) then borrow and finally when the child leaves home pay back what was borrowed. In their case consumption expenditure is sometimes less and sometimes more than current income. The real-life graph will not be that simple, but the basic idea will be captured.

**Figure 10.3**

Stylised life time consumption expenditure paths (same total expenditure)



The life-cycle strategy seeks to estimate child costs by following the same household through its various life-cycle phases, with and without children. Given that such panel data is hard to find, some alternative has to be developed and the easiest way is to use the data from year-on-year cross-sectional surveys to construct synthetic panels. More sophisticated versions use five-year wide cohorts based on the birth-year of the 'head' of the household and then take averages to get the estimates of expenditure (eg Banks *et al*, 1991).

Because the approach has the time horizon expanded to include the whole life-cycle of the family (or at least the adults) from childless couple to old age there is a superficial link to the work of Seebom Rowntree, who in his well-known poverty study conducted at the turn of the century observed that poverty among workers in York varied over the life-cycle of the family and the individual. For families, 'need' was greater than 'resources' in the child-bearing years and in old-age. However, the intellectual origins of key aspects of the life-cycle method of estimating equivalence scales and child costs are more likely to be found in the United States in

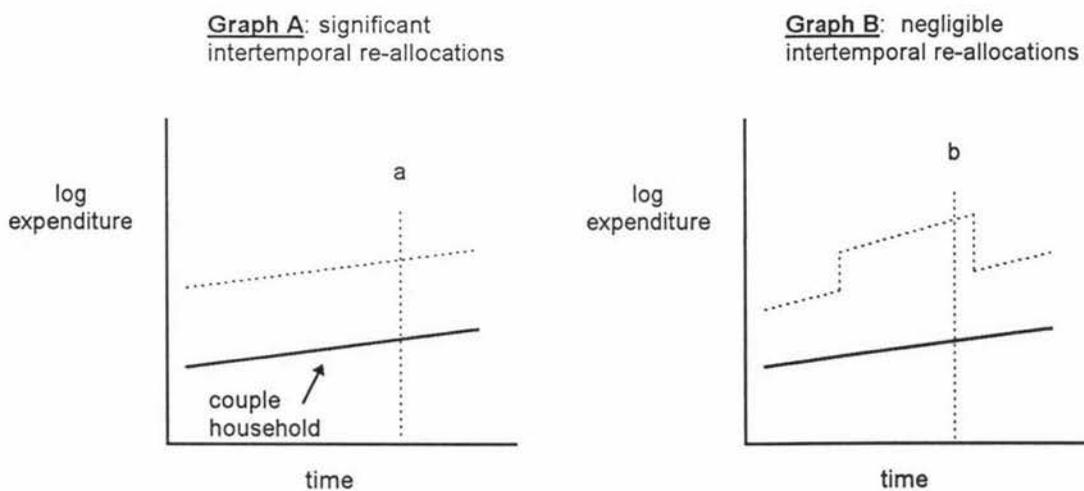
the 1950s at which time there emerged the concept of the life-cycle income hypothesis (Modigliani and Brumberg, 1954) and the permanent income hypothesis (Friedman, 1957). In contrast to the standard Keynesian view that household consumption depends on disposable current income, both the new theories emphasised that consumption depends more on wealth than on current income. A fundamental proposition in this school of thought is that households smooth consumption over the life-cycle in the face of an uneven income profile. A more realistic version allows for the effects of household composition and uses equivalised consumption instead of unadjusted consumption (Attanasio and Browning, 1995). A further key assumption for the theory is that households are free to transfer spending between periods by borrowing or saving - in economic terms, there are no significant liquidity constraints.

*Banks et al (1991, 1994)* seek to build a model which allows the two family types to have the same life time standard of living and they estimate two types of equivalence scales based on that. One is simply the ratio of total life time expenditures for the two households (the 'life time scale') while the latter is the ratio at some point in time along the life-cycle path (the 'life-cycle scale')<sup>7</sup>. Both are sensitive to the assumptions regarding the willingness or ability of households to make inter-temporal reallocations of expenditure and neither are likely to have the same values as traditional scales as the focus for both is on life time (rather than within period) equivalent material well-being.

In contrast to Figure 10.3 which shows comparative expenditure pathways when the total life time expenditures of each household are the same, Figure 10.4 compares the life time pathways when total life time utility ('material well-being') is the same for both. Graph A illustrates the

**Figure 10.4**

Stylised consumption expenditure paths (same life time utility for each household)



<sup>7</sup> These are the terms used in the 1994 paper. In 1991 they were called the 'life-cycle' and 'life-cycle consistent' scales respectively. The 'life-cycle' label has been swapped between papers. This report will follow the 1994 terminology.

situation when the household with the child has sufficient intertemporal re-allocation of spending to allow a full smoothing of spending over the life time. Graph B describes the situation for this same household when they are unable or unwilling to spread the costs very much. By inspection of the graphs (see lines 'a' and 'b') it is clear that the life cycle scale at 'b' (the within period scale) will be much greater than that at 'a'.

The empirical work of Banks and Johnson confirms this and also shows that the life-cycle scales are dependent (but much less so) on the amount of intertemporal substitution. To reproduce the specific numerical values for the various scales is not appropriate as the authors are very clear that their prime purpose was not to estimate a set of scales but to explore the issues raised by measurement of child costs in an intertemporal framework with households able and willing to transfer spending between periods by various means. Of much greater importance is their general conclusion which potentially has significant policy implications:

Any form of equivalence scale that recognised the intertemporal aspects of household decision making would depend on the shape of [the] life time expenditure profiles [cf Figure 10.4]. We believe that these intertemporal processes are important and therefore for policy purposes (given the need for some monetary level of compensation) we need to look outside simple current period models and acknowledge the intertemporal factors that influence the household decision making process.

The main reason why households do not substitute expenditures over time may well not be because they are unwilling, but because they are unable ... In particular this may be true at the lower end of the income distribution. (Banks and Johnson, 1994: 210).

One of the most important applications of both the cost of children and equivalence scale literatures relates to the compensation of poorer households. The evidence from Banks and Johnson's research would strongly suggest that the 'true' equivalence scales for those households are likely to be higher than those applying generally as the latter are diluted by the effect of intertemporal transfers by those without severe liquidity constraints.

*Pashardes (1991)* also draws attention to the limitation of the static demand analysis approaches to estimating child costs in that they use 'contemporaneous analysis alone to draw conclusions about the cost of a household characteristic with an obvious intertemporal dimension' (p191). In line with the general model illustrated in Figure 10.3 he argues that a household may provide for the cost of children partly by reducing current (adult) consumption and partly by drawing on savings (in this case interpreted widely to include non-current expenditure, including the depletion of stocks and borrowing capacity), which means that a portion of total child costs are met by reduced consumption when the children are not in the family. As a result, 'equivalence scales estimates obtained from contemporaneous demand analysis would differ between households with and without borrowing constraints' (p192).

To facilitate the analysis he distinguishes between expenditure scales (the traditional contemporaneous or within period ones) and income scales (which take account of the intertemporal aspects). He also estimates what he calls a 'savings' scale which enables him to capture intertemporal aspects by estimating the savings costs of children and comparing them to the expenditure costs for households facing different liquidity constraints.

His empirical work produces two noteworthy results. First it appears that parents meet the current cost of children by a relatively fixed reduction in current expenditure and top up to what is required through variable intertemporal transfers. These transfers increase with the age of the child and Pashardes suggests that this may occur as 'parents find it easier and/or necessary to meet the cost of older children, anticipated to leave home soon, by borrowing or reducing their savings and stocks' (p208).

The second significant empirical result produces supporting evidence for the claim that households with more severe liquidity constraints face relatively higher child costs when the children are in the family. Pashardes' data set (the UK Family Expenditure Survey, 1970 - 1984) did not allow him to clearly identify such households so to make progress he assumed that households in rented accommodation would in general find it more difficult to borrow. His analysis shows that such households have higher expenditure scales and lower savings scales than those in owner-occupier accommodation which is consistent with the opening claim. Arising from this, his policy conclusion echoes that of Banks and Johnson (1994) noted above:

[Poor households] are likely to be facing severe liquidity constraints so that the cost of children is borne out of consumption in the period when the children are in the family. In this case an adequate compensation should also cover the cost that other households are able to meet through reductions in savings. (Pashardes, 1991: 198).

It is early days for this approach and the proponents are very aware of the problems but are convinced that it is worth pursuing. There are several significant difficulties to overcome. First, the data requirements are demanding, although in the absence of adequate panel data the use of cohort groups is thought to be of some help. Second, the underlying theory may simply be wrong! At best it may apply only to a subset of the population. Banks *et al* (1991) have gone some way to tackling this by introducing a parameter into their model to allow for varying degrees of inter-period reallocation. Third, the method cannot yet accommodate housing and durable goods expenditure. Fourth, in both Pashardes and Banks *et al* a functional form has to be imposed for the life time utility function and this requires an arbitrary identifying assumption regarding preferences for children. Once again the value-judgements get hidden in the mathematics, although no more so for these methods than for the single period utility function approaches.

## Political Scales

The different amounts that society is prepared to pay as minimum incomes or as 'social assistance' could possibly be interpreted as the equivalence scale for society or at least its elected representatives and advisors (Coulter *et al*, 1992a). Whatever the merits of such a view it appears that there is a lack of conceptual coherence associated with such scales, which are often based on 'rule of thumb, historical precedent and hunch' (Bradshaw, 1993: 2), emerging 'by the haphazard interaction of pressure group politics, voting, administrative conventions, etc' (Muellbauer, 1980: 153). Furthermore, as it is just these scales that often need to be tested against the results of other information, it is hardly useful to use them as part of the benchmark.

Table 10.11 allows comparison of the current New Zealand administrative or 'political' scale against Jensen (1988). To keep the comparison with Jensen valid the children are assumed to be aged 8 to 10 on average. The married couple unemployment benefit is taken as the reference point. The comparison highlights two features of the benefit relativities. First, households of size two and three have similar ratios, irrespective of composition. Second, for two parent households, the benefit relativities fall below those of the Jensen scale for larger families.

**Table 10.11**

New Zealand benefit payment ratios (April, 1995) compared with Jensen (1988).  
(Children aged 8 to 10 on average)

	2A	2A+1	2A+2	2A+3	2A+4	A+1	A+2
UB plus Family Support (\$)	230.74	287.20	314.20	341.20	368.20	240.31	285.34
NZ benefit ratios	1.00	1.24	1.36	1.48	1.60	1.04	1.24
Jensen (1988)	1.00	1.21	1.41	1.58	1.75	0.91	1.14

## Do scales vary with the income of the reference household?

Applied work in comparative and policy related welfare studies almost always assume scales to be constant across the income range. This section presents the evidence and argument that support the view that 'constant scales are not plausible and their use needs reconsidering' (Conniffe, 1992: 442), and concludes with a brief consideration of a policy implication of the conclusion.

## Evidence against constancy of scales and in favour of decreasing scales

The strands of evidence are:

- theoretical and empirical evidence against the Independence of Base (IB) assumption which is often used to deal with under-identification;
- empirical evidence from the lifecycle literature that those with greater liquidity constraints (likely to be the 'poorer' households) have higher within-period scales;
- high household size elasticity of equivalence scales for the multiply-deprived (Mayer and Jencks, 1989); and
- theoretical evidence that directly supports the conclusion without having to use a utility function framework (cf Conniffe, 1992).

The first three above have been discussed earlier in this chapter or in the previous one, so will be mentioned only briefly here.

### The failure of the Independence of Base (IB) assumption

The IB assumption places some rejectable implications on demand behaviour. There is good evidence against the assumption that scales can be estimated as if they are independent of the utility level (level of well-being) at which the ratios are calculated.<sup>8</sup>

### High elasticity for the multiply deprived

Mayer and Jencks (1989) found in a Chicago study that for measured hardship (ability to purchase food, medical care, housing) to remain constant across household types a scale elasticity relative to household size of 0.91 was needed. This is well above typical average scales and implies that the poor need higher scales - in other words scales decline with increasing income. Townsend's (1979) results do not support the argument as they have an average elasticity of around 0.50 to 0.55, which is mid-range for estimated scales.

### Higher scales for the liquidity constrained

In applying a life-cycle model both Pashardes(1991) and Banks and Johnson (1994) produce evidence that the 'true' equivalence scales for poorer households are likely to be higher than

<sup>8</sup> Since many estimates are based on a model in which the IB assumption is imposed, there will be no results from this set which examine variations of scale values with income. Among the small number that do report scales at different income or welfare levels, there is a range of results, with some showing no variation (Kakwani, 1980; van Praag and van der Sar, 1988; Tran Nam and Whiteford, 1990) and others showing modest to significant scale decreases with income increases (Muellbauer, 1977; Cass, 1983; Espenshade, 1984; Lee, 1989; Bradbury, 1992a). There is no evidence that scale values increase with income.

those applying generally as the latter are diluted by the effect of intertemporal transfers by those without severe liquidity constraints.

### A theoretical confirmation

This sub-section draws on, but is somewhat different in detail from, Conniffe (1992)<sup>9</sup>. It amounts to a formal presentation of the intuitive view that there are likely to be fixed costs for families with children and therefore scales 'should fall with income as these fixed costs represent a smaller proportion of income for high income families' (Browning, 1991: 48). The essence of the argument is not so much that the model is a good representation of how households behave (although it may be), but that for welfare comparisons the model is useful when it comes to considering fairness across the income range.

Consider a household consisting of a single adult ( $A_1$ ) whose spending on broad commodities can be described by a linear expenditure system. For commodity  $i$  the quantity purchased (and consumed),  $q_i$ , is taken to equal some socially acceptable minimum (SAM) quantity,  $\gamma_i$ , plus an amount that is inversely related to price  $p_i$ , and directly related to 'discretionary' income, which is income,  $y$ , minus the expenditure required to purchase the SAM quantities of all commodities. Only after the SAM quantities have been purchased do preferences (represented by the  $b_i$ ) come into operation. The equations are:

$$q_i = \gamma_i + \frac{b_i}{p_i} \left( y - \sum_j \gamma_j p_j \right) \quad (1a)$$

If  $x_i$  ( $= p_i q_i$ ) is the total expenditure on the  $i$ th commodity group and  $n_i$  ( $= p_i \gamma_i$ ) is the SAM spending for it, then (1a) can also be written as:

$$x_i = n_i + b_i \left( y - \sum_j n_j \right) \quad (1b)$$

If income is all used in the period, so that income = expenditure, then:

$$y = \sum_i x_i = \sum_i p_i q_i \quad (2)$$

$$\text{and} \quad \sum_i b_i = 1 \quad (3)$$

<sup>9</sup> Conniffe (1992) has errors at two points: the second expression on p433 is incorrect and on p434 equation (9) omits a term and the text beneath refers to (2) instead of (1). These errors have been confirmed in correspondence with the author. The text in this section reflects the corrections.

Suppose now that a second person is added to the household. As far as  $A_1$  is concerned, the prices of all commodities whether below or above SAM levels are now  $\theta_i p_i$  with the size of  $\theta_i$  depending on both the nature of the goods and the type of relationship with the second person. If the second person is an adult who pays his or her way for both SAM levels and the discretionary components, then the price of commodities that are shared or show other economies of scale will fall for  $A_1$ , so that  $0.5 \leq \theta_i \leq 1$ . For example, if the same accommodation can be used,  $\theta_{\text{housing}} = 0.5$ . On the other hand,  $\theta_{\text{food}}$  will be closer to 1.0.

If the second person is a dependent (ie someone with an income ( $y_{\text{dep}}$ ) that is too low to purchase all the required SAM quantities), the situation is a little different. Assume that the SAM quantities for the dependent are  $\gamma_{\text{dep}} \leq \gamma$ <sup>10</sup> and that  $A_1$  makes up the difference between  $y_{\text{dep}}$  and the dependent's SAM expenditure. After the SAM expenditure on the dependent and on him/herself,  $A_1$  spends the discretionary income as in (1a) above. For  $A_1$ , the prices of SAM quantities up to the  $\gamma_{\text{dep}}$  level are  $\theta_i p_i$ , and  $p_i$  thereafter. In this case  $1 \leq \theta_i \leq 2$ . The total spending required from  $A_1$  on the SAM quantity for the  $i$ th commodity group is:

$$\begin{aligned} & p_i (\gamma_i - \gamma_{i \text{ dep}}) + 2\theta_i p_i \gamma_{i \text{ dep}} \\ & = p_i \gamma_i + (2\theta_i - 1)p_i \gamma_{i \text{ dep}} \end{aligned} \quad (4)$$

$A_1$ 's discretionary income is:

$$y + y_{\text{dep}} - \sum p_i \gamma_i - \sum (2\theta_i - 1)p_i \gamma_{i \text{ dep}} \quad (5)$$

In the case of a child, the income contribution can be taken to be zero ( $y_{\text{dep}} = 0$ ). By comparing (5) with 1(a), it can be seen that the quantities of all goods consumed by  $A_1$  are identical in both household circumstances provided income in the second household (with one dependent child) is increased by  $\sum (2\theta_i - 1)p_i \gamma_{i \text{ dep}}$ . If the incomes in the two circumstances are  $y_r$  and  $y_h$  respectively, then:

$$y_h = y_r + \sum (2\theta_i - 1)p_i \gamma_{i \text{ dep}} \quad (6)$$

and the equivalence scale (ES) is given by:

$$ES = \frac{y_h}{y_r} = 1 + \frac{\sum (2\theta_i - 1)p_i \gamma_{i \text{ dep}}}{y_r} \quad (7)$$

As  $y_r$  increases, ES declines to unity.

<sup>10</sup> The result is the same if there are some  $\gamma_{\text{dep}} > \gamma$ . The assumption in the text is simply to allow a less cumbersome exposition.

The same result (7) can be obtained in the case of a household comprising an adult couple and a child. In this case the couple are treated as a single decision making unit, where the  $b$ 's and  $\gamma$ 's in equation (1a) and the  $\theta_i$ 's now refer to this unit.

It is important to be clear about what is being assumed in this model. The above analysis does not assume that the child does not benefit from the discretionary expenditure of the adult(s); the child does to the extent that commodities are jointly consumable and so on. They do assume, however that, once parents have provided the child with commodities to the levels society considers the norm, their own preferences for commodities (and hence the  $b_i$  values) remain the same as in the household before the child was added.

This is equivalent to adopting the separability assumption which was discussed earlier. There are two possible lines the argument can take at this point. The first is to accept the separability assumption (no changes in preferences as a child is added), in which case (7) is the scale and the point would be that comparisons ought to be made as if preferences are the same. The core result is obviously not changed on this line of argument. Alternatively, a change of preferences could be accepted, in which case the households with the child would be better off than the (reference) ones without a child if they received the income increment (6). In this case (6) and (7) are upper bounds. However the conclusion is preserved since if an upper bound decreases towards unity so must the true value, given that it can never be below unity if child costs are positive.

The above analysis has been conducted without the use of utility functions. It is not difficult, however, to show that the core result (scales decreasing to a constant value as income increases) can be obtained by using a utility function to combine the quantities to make an overall comparison. Conniffe (1992) chooses the one associated with (1a), namely:

$$\prod (q_i - \gamma_i)^{b_i}, \quad (8)$$

and establishes the result for the two adult household first mentioned above. He does so without any assumptions about a *household* utility function and without the possibility of interpersonal welfare comparisons. It is not difficult to extend the approach to include the households with children so that their consumption is able to be treated similarly to that of the adult(s).

Conniffe tests the sensitivity of the findings to the choice of model by looking briefly at how the arguments might be affected by a change from the linear expenditure system (1a) to its only close rival as regards frequency of application, the 'almost ideal demand system' introduced by Deaton and Muellbauer (1980). His conclusion is that 'constant scales have little ... support with this model either' (p440).

### **Possible policy implication**

The result of this analysis (that scales decline to a constant with increasing income) has potentially significant effects. For policy application purposes in relation to the cost of children, the implication is that the common use of average scales from across all incomes is likely to underestimate the scale values that 'ought' to be used for poorer households. In New Zealand, for larger two parent families, the implied benefit scales drop away too quickly relative even to the Jensen (1988) scale, which is itself not at the 'generous' end of the plausible range. If the scale values for the poor should be higher than the average estimated value across the income range, then this discrepancy is further exacerbated. This is a benefit relativity issue, not a benefit adequacy issue across the board. If this analysis is well-founded, standard of living studies would be expected to show that when these larger families receive approximately the same low equivalent income (using Jensen, 1988) as the smaller ones, they will be noticeably worse off.

# 11 Indirect Costs

The indirect costs of children are generally understood as the opportunity costs of having children and refer primarily to the loss of income that a household experiences when one or both parents spend time out of paid employment to look after the children. The wider conceptual framework was laid in the early parts of chapter two and especially in Figure 2.1 which gives a stylised analysis of the way in which total parental resources are allocated within the family.

The literature reports two principal ways in which the size of the indirect costs of raising children have been conceptualised and estimated: either as the *opportunity cost* of having children (the income the parent could expect to earn if he or she devoted that time and labour to work in the market economy), or as the *replacement cost* of the services provided (the amount which parents would have to pay someone else to perform the equivalent services). Whichever strategy is used, the estimation of indirect costs focuses one way or another on the time costs involved in child care. These costs are considerable and though it is true that they are costs to the family, it is the mother who is most likely to be the one most directly affected.

In contrast to the wealth of material produced on the direct costs of children, there is very little on the indirect costs. Piachaud (1984) suggests two main reasons for this. In the first place, it is sometimes considered that having a child is a matter of private choice and thus the decision to spend time on child-care activities is a private matter. Secondly, the study of time spent on child care is not easy. Definitions and measurement present problems. For example, when are child care tasks burdensome and more like a job<sup>1</sup> and when are they more pleasurable and more like leisure activities? What is the researcher to do with those child care tasks that are carried out simultaneously with other tasks? From the opportunity costs perspective, is the child in a family where the mother was/is a highly paid surgeon to be considered more costly than the child in a family where the mother was a lower-paid assembly-line worker? The study of the time-costs of child-care is a minefield in relation to definition and measurement, not to mention political fallout. Whether or not one agrees with the particular political ideology behind the first reason (the emphasis on children as private consumption goods and the downplaying of their public good aspect) or the capitulation in the second, they probably do go some way in explaining the dearth of material on the indirect costs of children. However, it may be that a more complete explanation would need to take into account the way in which such research goes to the heart of one of the core structures of our society, namely the division of labour along gender lines, which finds its most complete expression in the traditional male breadwinner/female childcare model of the nuclear family. Whatever view one has of the appropriateness of this state-of-affairs, there can be no doubt that any study of the indirect costs of children impinges on the question even if no explicit mention is made of it.

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<sup>1</sup> And are all jobs burdensome anyway? Many employees enjoy their work and derive satisfaction from it over and above the financial rewards.

In the decade or so after the end of World War II the male breadwinner/dependent female childcarer model of family life was dominant and generally accepted and the question of the indirect costs of children was not likely to be raised. Virtually all families were in the same situation<sup>2</sup>. All this has changed now. Motherhood is no longer idealised and the traditional model is no longer dominant. Two alternatives have arisen, each with a strong market-share. Families headed by sole parents do not fit the model at all, and many couple headed families pursue a heavily modified version of the traditional model with many mothers now employed outside the home in part- or full-time capacity even when the children are of school age. In short it is no longer the case that 'everyone's doing it'.

This chapter first reports on three studies of the indirect costs in two parent families, then looks at the question of the special costs of children in sole parent households.

## Mitchell and Cooke (1988)

The book in which their chapter on 'The Costs of Childrearing' appears was published in association with the Social Policy Research Unit (SPRU) of the University of York. In their analysis they recognise that there are the two ways of estimating indirect child costs as noted in the introduction above.

### Opportunity Costs

They begin with the reminder that 'in considering the income-effect of a young child it is principally the earnings of women that are lost' and note that of all the factors that could be and are involved in determining whether or not married women are in paid work, the presence of a young child is the most important. The loss of earnings clearly depends on the time out of the workforce, but it does so in three different ways. Firstly, there is the direct loss of full-time earnings in the time of full-time childcare and some portion of these if part-time employment is taken up when the children are somewhat older. Secondly, when working part-time, the hourly wage is likely to be less than for full-time employment. Thirdly, there is the loss of earnings that arise because the re-entry employment is often into a job of lower status and lower pay because of the lost experience and seniority due to time out of the paid work-force. In seeking to quantify the impact of child-care on incomes they report the findings of a British study undertaken by Joshi (1987). Based on the assumption of having two children and thus an eight year period out of employment followed by twelve years of part-time work, Joshi arrived at the figure of 130 pounds per week for twenty years. Using the UK CPI figure to update to 1992 then the PPP conversion, in 1992 NZ dollars the cost is \$440 per week. The methodology is unpacked a little in Table 11.1 below where the three components of lost earnings are

<sup>2</sup> eg Kedgley's (1996) account of the story of motherhood in New Zealand has testimony from those who were mothers in the late 1940s and 1950s that 'it was incomprehensible that anything other than marriage and motherhood could lie ahead for any normal young woman' (p150) and 'our friends were in the same situation' (p153), and so on.

identified. A better estimate in New Zealand dollar terms would be arrived at by following the Joshi methodology using New Zealand wage rates, rather than the conversion process specified above. The full details of the method were not available in the report, but some approximation to it is attempted in the final two columns of Table 11.1. The following assumptions are made; 8 years employment at the average female wage rate in 1992 of \$13.13 per hour and a full-time week being 36 hours (Statistics New Zealand, 1994b); part-time rate of \$9.00 per hour for a 10 hour week for 12 years; the losses due to the lower wage rate were calculated over 12 years for a 36 hour week. On these assumptions the figure arrived at is \$420 per week, which is very close to the \$440 obtained using the PPP conversion. To enable a comparison with the figures for direct costs some allowance for taxes should be made. Assuming an average tax rate of 30 per cent (all taxes, direct and indirect) the gross figures drop to a net weekly amount of around \$300. It is evident that on the basis of the above assumptions the indirect costs are considerably higher than even the most generous estimate of direct costs.<sup>3</sup>

**Table 11.1**

Indirect costs of children - Joshi (UK) and New Zealand comparison

Source of lost earnings	Years	Joshi - converted		Using NZ wage rates	
		per annum (1987 UK pounds)	Total (1992 NZ dollars)	per annum (1992 NZ dollars)	Total (1992 NZ dollars)
Away from full-time work	8	6800	183 300	24 700	197 600
Working part-time, not full-time	12	4067	164 500	12 200	146 000
Lower pay rates	12	2690	108 900	7 730	92 780
All factors over the 20 years	20	6 800	457 000	21 700	434 000
Summary figure (\$NZ pw)			<b>\$440</b>		<b>\$420</b>

## Replacement Costs

The great majority of childcare is undertaken by parents themselves, especially the mother. Mitchell and Cooke note that while surveys have been carried out to provide data on the division of labour in child-care tasks, there is a dearth of hard evidence on the actual time involved. They settle for the 'fifty hours' estimate from the study by Piachaud (1984) and

<sup>3</sup> There is a flaw in the opportunity costs argument as described here. When the parent is at home, various goods and services are produced and the value of these should be subtracted from the lost income (cf Gronau, 1980). However, on the other side of the ledger, the value of leisure time lost (relative to those without children or child care responsibilities) is not taken into account.

using 1984 average earnings arrive at a figure of 200 pounds sterling. This converts to \$770 in New Zealand in 1992. Using the average female rate of \$13 per hour for New Zealand in 1992 the comparable figure is \$650. Allowing for tax at around 30 per cent again, the final figure for comparison purposes is around \$500 per week.

## Piachaud (1984)

This study ('About Fifty Hours a Week') was carried out under the auspices of the London-based Child Poverty Action Group (CPAG) and includes a useful review of past studies in the general field of 'time spent on non-marketed production'. The conceptual framework begins by noting that child-care time may be provided by one or both parents, relatives, friends, private agencies or public institutions. Piachaud divides the time into that spent in three areas: basic tasks, educational and entertaining tasks and indirect supervisory/on-call activity as indicated in Table 11.2. The empirical side of the study looks only at the 'basic tasks' component.

**Table 11.2**

Categories of child-care time

Category	Description	Comment
Basic Tasks (life-support activities)	Activities directly involving the child such as feeding, washing, transporting ...  Servicing activities that can be done without the child present such as shopping, washing, cleaning ...	This category is this study's prime focus. Piachaud is aware that the dividing line between the first two categories is not sharp and that emotional/mental development is no less important than the physical
Educational and Entertaining Tasks	Reading to, playing with, talking to the child	For those over 5 yrs, a large part is provided collectively. The study makes no attempt to estimate time spent in this area
Indirect Supervisory/on-call activity	In one form or other, required 24 hrs a day for very young children	No attempt to make estimates in this category

Information about the time taken on basic child-care tasks does not of itself give an indication of the 'burden' of the work involved so the study also asked mothers about their perceptions of the work-load.

## The fieldwork

Interviews were carried out in York and in a nearby town by three women, two of whom were mothers. Although the sample selection process was not up to the ideal of a random selection from a predetermined sampling frame, the 55 respondents were reasonably representative. All of those approached agreed to participate. A key criterion was that the women to be interviewed had to have at least one child under six years. In the sample, 62 per cent of the households had two children, the remainder being either one or three child families in roughly equal proportions. In 89 per cent of the sample the household consisted of the child(ren), mother and husband/male partner (called 'father' for the sake of simplicity).

## Child-care and employment

92 per cent of the fathers and 40 per cent of the mothers were employed, the mothers' employment being mostly part-time work. Nearly four out of five of the mothers did not have a relative or friend, apart from the father, who looked after the children on a regular basis. Table 13.3 summarises the responses of those not in a paid job to questions about the effect of the availability of suitable child-care on their employment prospects. The results indicate that both the preference not to have a paid job and a lack of available jobs were significant reasons for not being employed. However, the primary consideration was the lack of suitable child-care, with only 14 per cent of those who would want a job, circumstances permitting, saying they thought they could arrange child-care if a job were available.

**Table 13.3**

Employment prospects, personal preferences and child-care

	All those not in a paid job	All those not in a paid job who would want a job
Thought they could find a job if suitable child-care were available	65%	63%
Thought they could arrange suitable child-care if a job were available	24%	14%
Would want to take a job if both a job and suitable child-care were available	59%	100%

## Time on child-care tasks

The questionnaire specified nine basic child-care tasks and the respondent had to estimate either the total time per day (eg on getting the child dressed) or the extra time on the task, given the presence of a child (eg for washing and ironing). In total the nine tasks took just on seven hours a day or 'about fifty hours a week', hence the title of the report. 87 per cent of this time input was provided by the mothers in the households where there was a father present 89 per cent overall. Piachaud used three methods to assess the mothers' perception of the intensity of the workload. The main findings were that 83 per cent felt that their total workload of child-care plus paid job (if they had one) was more than when they had previously been in a full-time job, 45 per cent found the child-care very tiring and 86 per cent of those with the youngest child under 2 years had no spell free of child-care of longer than one hour<sup>4</sup>. The most surprising result was that mothers without paid jobs had fewer free spells, felt they had a greater workload and found it more tiring than did the mothers with the 'two jobs'. It is possible that the experience of being with other adults at the place of paid employment was sufficiently energising to alter the perspective positively. It could be that the respondents' subjective responses were shaped by social pressures which led them to under- or over-estimate the 'burden' factor according to whether they were in paid work or not. The report itself offers no explanation for this finding.

## Opportunity costs

Piachaud puts a value on the loss of paid work associated with the presence of children by asking how many more women would be economically active (in the traditional narrow sense) if the participation rate was the same as for childless married women of the same age. He estimates that in 1981 there would potentially<sup>5</sup> have been about two million more economically active women which would have added 8 per cent to the total workforce. He goes on to assume women's productivity to be on average three-quarters that of men, and arrives at an estimate of 6 per cent of GDP. In 1992 NZ dollars this comes to just under \$60 billion or about \$550 per mother per week.

## Replacement costs

The second rough estimation method is to ask what would be the cost of replacing the child care now provided by parents. The dollar figure clearly depends on the rates of pay assumed. Piachaud uses the average rates for full-time work and apportions the fifty hours between the parents in the ratio of 87 : 13 on the basis of the findings noted above. This leads him to a

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<sup>4</sup> For those with jobs outside the home, the free-time in question excludes the time when in paid employment.

<sup>5</sup> He is aware that given the unemployment rates of the 1980s the actual addition to output would be much lower. All that is being estimated is the potential output.

replacement costs estimate of \$600 per week (before tax) which is close to the Mitchell and Cooke figure. This is not that surprising seeing they used his time estimate of fifty hours as a starting point. Piachaud notes that his figure takes no account of any on-call supervisory time.

### **Other effects of time costs**

Piachaud identifies two matters that the time costs of child-care significantly affect: poverty and gender inequalities in pay. While poverty is associated with many factors he offers evidence that in the UK in the 1980s the presence of very young children is one of the most important. On the question of the explanation of pay inequality he briefly summarises the human capital theory argument that women tend to have less training, less experience and more interruptions to their employment, all of which reduces their output relative men and therefore they are paid less. He puts the case for going beyond this to see that the division along gender lines of child care is a self-perpetuating cycle in that when a family is faced with the issue of who should reduce their paid work hours to provide child care it makes financial sense for the mother to stay at home as she is on a lower hourly rate. He concludes that 'equality of pay and equal opportunities in the labour market are unattainable given the asymmetrical family and the existing inequalities of child care and parenting' (p 22).

The spirit of his research is well captured by the final paragraph:

A fair deal for families requires insight into the invisible world of child care and the burdens of the endless day. We tolerate present hardship and we imperil the future if we ignore the personal and financial stress that results from the time costs of children.

## **Beggs and Chapman (1988a, 1988b)**

In 1987 the Australian Institute of Family Studies commissioned Beggs and Chapman, research economists at the Centre for Economic Policy Research at the Australian National University (ANU), to undertake a study of the earnings foregone through the process of child-rearing in Australia. The researchers had access to the 1986 Family Formation Survey, collected by the ANU Research School of Social Sciences. The sample consists of 2358 women aged 20 to 64, half of whom were in paid employment and half not. The sample characteristics are broadly consistent with data from the 1981 Australian census.

### **Conceptual framework and method**

The basic model used by Beggs and Chapman has three determinants of labour market income: labour force participation, hours worked if employed and the hourly wage rate. It is assumed

that each of these variables is affected by the presence, age and number of children together with various other factors such as the marital status, education, labour market experience and age of the women, and in the case of the first two variables the wage rate offered. Human capital theory is used as the explanatory link between having children and experiencing a lower relative hourly wage rate, the expectation being that decreases in labour market experience due to parenting lead to lower relative wages.

Because the independent effect of children cannot be ascertained without controlling for the influence of other variables, regression analysis must be employed. The study takes each major variable one at a time, specifies two or three possible functional forms for the relationship then estimates the coefficients in the usual way. The best model is chosen for each case and the resulting model is used to simulate the effect of children on foregone earnings. To enable an estimate of foregone earnings to be calculated a typical scenario is chosen: a woman chooses to marry at 23 and has a first child two years later. At 28 she may choose to have a second child or just have the one, with a similar decision occurring at 31 for a third child. These situations can be compared with that of a woman who remained childless.

The researchers were aware of the potential for selectivity bias to make the interpretation of some of the results difficult - that is, there is the possibility that working women differ systematically, in some unobserved way, from non-working women. They use an econometric technique to minimise the effect of this potential problem.

## Results

While education and the like had an effect on *labour market participation*, the presence of a child, particularly a young child dominated the work decision. For the average woman (in the statistical sense) the presence of an under 5 year old child reduced the likelihood of labour force participation by 50 per cent, the effect reducing to 25 per cent for an older child. *Hours worked* were also found to be affected overwhelmingly by the presence of children compared to the influence of any other factor. For those women in the labour force, the time spent in paid work was reduced by about 10 hours when the child was younger and by 7 hours for the over fives. In contrast to these large effects, the presence of children was found to have only a small negative effect on *wage rates*.

Applying these results to the typical scenario described above, the study estimates the consequences for foregone earnings over the 'lifetime' up to age 60. Beggs and Chapman add the extra refinement of calculating the further effect of investing the lost earnings at 5 and 7 per cent real rate of interest. Table 11.4 summarises the findings for a woman with average education.

**Table 11.4**

Foregone total earnings at age 60 (1992 NZ dollars)

Number of children	Real rate of interest		
	0%	5%	7%
0	0	0	0
1	\$550,000	1,510,000	2,370,000
2	\$625,000	1,730,000	2,700,000
3	\$680,000	1,870,000	2,900,000

## Summary

To attempt a comparison of weekly figures across all three studies is not easy as Beggs and Chapman assume the effect of children on lost earnings continues across 37 years whereas Joshi uses only 20 years. As the effect in later life is probably somewhat less severe, the Beggs and Chapman weekly figure could be expected to be less than Joshi's. Taking the two child figure of \$625,000 in the table above, the estimate of weekly lost earnings is \$340 which as expected is a little less than the first two studies' figure of around \$400 to \$500. It would seem reasonable to conclude that over the 20 years from the birth of the first child, a conservative estimate of the indirect costs of children for a two child family is of the order of \$400 to \$500 per week. These costs are considerably greater than those typically estimated for direct costs per child (excluding all childcare). Over a lifetime the indirect costs to a family having two children is of the order of at least \$500,000 (excluding the effects of investing at a positive real interest rate).

## The special costs of sole parenthood?

Compared with the vast amount that has been produced in relation child costs (direct and indirect) for two parent families, the equivalence scale literature and indeed the wider cost of children literature has very little to say on the cost of children in sole parent families *per se*.

There are two reasons that go some way towards explaining such a gap in the literature. First, there were relatively few sole parent families when many of the studies that are included in this and similar surveys were carried out. Second, even for the more recent works, the limitations in the usual sorts of data sets used by the more popular iso-welfare methods mean that there are often too few sole parent households in the sample to allow the costs of children in such

households to be reliably estimated. When analysis is attempted the resulting equivalence scale figure is sometimes limited to the 'average' such family with no analysis by number of children possible (eg Royal Commission on Social Policy, 1988: 559ff)<sup>6</sup>.

In the developed nations, families headed by a sole parent now make up a significant proportion of families with dependent children<sup>7</sup> and are in the main found in the lower quintile of household income distributions. The questions of child costs and income adequacy are therefore likely to be of great importance but the irony is that at this very point the scope for analysis is limited because of data and methodological challenges.

Two strategies have been used when the problem of limited data is the hindering factor. First, the direct cost of children in sole parent families is sometimes taken to be the same as in two parent families. To produce a scale for sole parent families, this cost (in equivalence scale format) is added to that for a single person. Secondly, some build scales around household size without any allowance for differing composition, so that a sole parent one child family is considered equivalent to a couple family and so on.

**Table 11.5**

Methods used to estimate equivalence scales for sole parent families in the research surveyed in Whiteford (1985).

Basis of the estimates	Number
Study makes own estimates	11
No estimates given	16
Single person plus cost of children in two parent families	18
Household size and (1,1) = (2,0); (1,2) = (2,1) and so on	9
Jensen (1978) uses a smoothing formula to fit with the average of other studies' estimates	1
Total number of sets of scales reported	55

In Whiteford's summary of previous equivalence scale research fifty-five sets of scales from about thirty studies are listed (Whiteford, 1985: 106ff). Of these sets of scales, only eleven have a direct estimate of sole parent scales, and six of these are budget standard or deprivation studies (see Table 11.5 above). Almost one third do not give any sole parent family estimates and the remainder simply use either the cost of children in two parent families plus the cost of a single adult or the household size option as the basis for their estimates. Whiteford includes the

<sup>6</sup> There are studies using budget-based approaches which focus on sole-parent families (eg Renwick and Bergmann, 1993), but they investigate poverty levels and are often not set up to estimate child-costs.

<sup>7</sup> In New Zealand in 1991 26% of families with dependent children and 33% of all one child families were headed by a sole parent (Statistics New Zealand, 1994a).

Jensen (1978) scales in his summary table even though they do not depend on a particular data set either directly or indirectly but are produced by a smoothing formula with selected anchor points determined by the results from other studies.

As first order approximations the two indirect strategies are probably quite reasonable. Although using household size as the basis for scale generation makes no distinction between a second adult and a first or subsequent child, it could be argued that (at least at low to modest incomes) adults after the first are not that much more 'expensive' than children especially when even modest child care costs are included. Similarly, the use of child costs from two parent studies seems a reasonable assumption when there is no other way to get an estimate.

The latter approach has been criticised, however, on the basis that it ignores the fact that compared with two parent households, sole parent households are 'time-poor' (Vickery, 1977) when it comes to adult hours available for either the generation of market income or for household production. Whiteford (1985) summarises the issue thus:

The costs faced by single-parent families cannot simply be regarded as the costs of a single adult plus the costs of a child, nor as the costs of a couple and children minus the costs of one adult. This is because sole parent families face many of the same fixed costs as do two-parent families, but they lack the human resources of two-parent families<sup>8</sup>. One adult has both less earnings capacity and less time to spend on non-market activities that contribute to a standard of living than do two adults (Whiteford, 1985: 96).

The issue is an important one and clearly forms a part of the discussion on the indirect costs of children - which is the rationale for including this section on the special costs for sole parents in this chapter. If sole parents are to be free to 'participate and belong' at a 'modest-but-adequate' standard of living then apart from the usual direct child costs, then they clearly do have extra costs that non-parent single adults do not have - especially in the childcare and possibly the housing categories. However, from the perspective of this report it is not clear to what degree and in what way these special costs should be included. In particular, it is unclear as to why the indirect costs of child care (to facilitate employment) should be treated any differently for sole parent families than for two parent families. The scales that Whiteford criticises regarding their methodology for sole parent households do not take account of time resources in two parent households either. The argument in favour of special treatment could be based on the needs concept of child costs in which maintaining the child at a given standard of living is the focus, or on the notion that the indirect costs represent a much larger proportion of available 'welfare-relevant resources' (cf Figure 2.1) than for two parent households and therefore have a greater undesirable impact. Whether or not such a conclusion is fleshed out in

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<sup>8</sup> Whiteford's view would probably need some qualification along the lines of acknowledging an assumption that the two-parent family was reasonably functional. The human situation behind a good number of sole parent households is the breakdown of a two-parent situation in which an unacceptably large amount of resources was being used in dealing with conflict, distrust and worse. In formal terms, we are back to the question of what to include in the concept of 'utility', or wider still 'standard of living'.

policy is yet another matter, depending on various factors including value judgements about the importance of maintaining the standard of living of the child(ren) at an acceptable level and, more controversially, about the desirability of sole parent households *vis-à-vis* two parent households in relation to the sort of society envisaged as 'optimal'. The interface between social policy and moral values/political philosophy is 'awkward' (Morgan, 1995), but may increasingly need to be made more explicit.

Whiteford and Hicks (1993) provide some limited enlightenment on the question through the use of the budget standards of the Family Budget Unit at the University of York. Their fairly extensive discussion is built on the assumptions that the sole parent works full time and that total cost for a sole parent household consists of the cost of the children, the cost of an adult plus 'the special costs of sole parenthood'. These extra costs have to be viewed simultaneously in relation to single-adult households and two parent households and relate primarily to housing and childminding/babysitting. If the equivalence ratios for the various families are represented by ordered pairs such as (1,2) (the scale for a sole parent family with two children), then the special costs of sole parenthood are given by

$$\text{special costs of sole parenthood} = [(1,1) - (1,0)] - [(2,1) - (2,0)]$$

The logic of the argument can be seen with the help of Table 11.6 which presents four of the six FBU modest-but-adequate budgets in equivalence scale format for the rental housing option and for housing and child care excluded separately and severally.

**Table 11.6**

FBU equivalence scales for various household types

	A	C	D	F
Full Budget (tenants)	0.68	1.00	1.51	1.39
No childcare (tenants)	0.68	1.00	1.38	1.09

A: Single adult

C: Two adults

D: Two adults, two children (4 and 10)

F: One adult, two children (4 and 10)

Source: Bradshaw (1993), Table 14.2.

NB. Tables 14.2 and 14.3 do not appear to be 100% consistent with Tables 11.1 and 11.3.

An examination of the first line indicates a 0.51 cost for the two children (1.51-1.00) in a two parent family and a total for the sole parent household of 1.39. When the child costs are deducted, 0.88 is left, which can be interpreted as 0.68 for the single adult and 0.20 for 'the special costs of sole parenthood'. This represents about a 30 percent extra cost relative to a non-parent single adult. As a rule of thumb, these extra costs are roughly equivalent to those of one extra child. The second line shows the relativities when child care costs are deducted. In this case, using the same formula as above, the residual special costs come to only 0.03.

This is not at all surprising given that in the FBU budgets the major extra cost for sole parent households is child care.

Whiteford and Hicks (1993) apply the above analysis to various sets of scales and conclude that:

Broadly speaking, there are two polar extremes - a number of studies find that the extra costs of lone parenthood are quite substantial, between 15 and 25 percent of the costs of a couple without children. The FBU results fall into this group. The other studies find that extra costs are less 10 percent of the costs of a couple without children. When childminding and babysitting costs are deducted, the FBU estimate is in this range. (Whiteford and Hicks, 1993: 231).

## Recent estimates of the costs of children in sole parent households

The FBU budget standards research program (Bradshaw, 1993) has already been mentioned above<sup>9</sup>. These results can be compared with those from Tran Nam and Whiteford (1990) who gained access to a large enough sample in the 1984 Australian HES to allow the estimates of equivalence ratios for various sole parent household sizes without resorting to either of the two indirect methods discussed above (namely, single adult plus two parent child costs and the simple household size approach). They used three estimation strategies - Engel, extended Engel and full utility function. The three sets of results are reported in Table 11.7 below. The expected pattern of a descending order of average value from Engel to full utility is not evident. The Engel scales are somewhat similar to the utility ones with the Extended Engel the highest. It is not easy to explain that relative result - none is offered in the text either.

A feature of the ratios in Table 11.7 that is significant for the theme of this chapter is the way that judgements regarding housing and childcare costing influence the results. When childcare costs are excluded, the ratios from the FBU methodology have reasonable fit with the Tran Nam and Whiteford results based on 'behavioural' data. The fit with Jensen (1988) becomes particularly good.

The research of the Family Economics Research Group (FERG) of the US Department of Agriculture (1993) is based on the expenditure concept of child costs estimates. The most significant result for this chapter is that they found no real difference in child costs between two parent and sole parent families when the total costs up to age seventeen were calculated. What

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<sup>9</sup> Renwick and Bergmann (1993) have developed some Basic Needs Budgets for two child sole parent families but there is, unfortunately, no straightforward way to go from these budgets to equivalence scales or to the dollar costs of the children as only the one family composition is considered. The work does furnish further evidence, however, of the resurgence of interest in the budget standards approach in general.

is different for the two household types is income. For example, within the low income band, the sole parent households had on average only two thirds the pre-tax income of two parent households, so the child costs are considerably higher proportionately for sole parent families (pp8f). Without a more comprehensive knowledge of the non-cash benefits and taxation regime a more detailed comparison is not possible.

New Zealand research is discussed in the next chapter.

**Table 11.7**

Equivalence scales for sole parent families with up to three children - various methods

Author	Date	Country	A	A+1C 4 yrs	A+2C 4 & 10	A+3C 4, 10 & 12
<i>Tran Nam et al</i> Engel	1984	Australia	0.59	0.75	0.95	1.20
Extended Engel	1984	Australia	0.70	0.89	1.12	1.42
Full Utility (ELES)	1984	Australia	0.53	0.80	0.95	1.27
<i>FBU budgets</i> No child care	1992	UK	0.67	0.89	1.09	1.30
Full	1992	UK	0.71	1.15	1.39	1.64
<i>Jensen (1988)</i>	1988	-	0.65	0.91	1.14	1.34

## 12 New Zealand Studies

The New Zealand literature on the cost of children is not extensive. The main contributors have been John Jensen and Brian Easton with some exploratory work also done by Barry Smith at the (then) Department of Statistics. Using Jensen's 1988 work as the guide, the Royal Commission on Social Policy (RCSP) produced some dollar estimates of direct costs per child. In 1994 Jeremy Robertson from the Office of the Commissioner for Children produced a short review paper. The only other source is the work of David Fergusson and others involved in the Christchurch Child Development Study - the focus here is limited to relativities among differently sized sole parent households<sup>1</sup>.

The order of treatment in this chapter has been determined by expositional convenience .

### Jensen (1978, 1988, 1989)

Jensen's first two papers were produced at the Department of Social Welfare. The 1978 work seeks to address three issues that relate to the overall theme of minimum living standards: the establishment of a minimum living standard, the establishment of minimum income levels that correspond to that standard and the establishment of a means of determining income equivalences between households of various types. Clearly each of these matters has relevance to the question of the costs of children - particularly the latter one.

Jensen identifies six methods for determining equivalence scales. As the comparison summarised in Table 12.1 indicates, there is no simple correspondence with the analysis based on this study's conceptual framework as developed in chapters three and seven, in particular.

His first is based on the notion of having on hand 'a technically adequate, quantitative measure of standard of living' (pp26, 39). Although such a measure was not and is not yet available there can be no argument with the claim that if it were it would 'probably [be] the best method for determining equivalence scales'. The search continues!

His second approach ('finding minimum incomes for a given standard of living') is really a general coverall for several methods ( eg budget, Engel, deprivation indices such Townsend (1979)). The next three are well-known approaches - the budget, Engel and Prais-Houthakker methods.

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<sup>1</sup> It is possible that the data from the focus group component of the New Zealand Poverty Measurement Project may deliver some estimates of child costs. At this stage the range of family types for which budgets have been drawn up is too limited to allow conclusions to be drawn. On the basis that the implied scales are likely to be relatively flat ( $\theta = 0.25$  to  $0.30$ ), the estimated child costs are likely to be 'low'.

The sixth method that he notes is that of Rainwater (1974) who essentially adopts the subjective or attitudinal approach in his Boston survey. Respondents were asked to nominate the minimum income (Y) that various family types would require to achieve various levels of living (LL) as described by the five categories of 'poverty', 'get along', 'comfortable', 'prosperous/substantial' and 'rich'.

**Table 12.1**

Methods identified in Jensen(1978) for deriving equivalence scales.

Jensen	This study
quantitative measure of SoL	-
minimum incomes for a given SoL	?
estimates of various household costs	budget/proportional
Engel's Law - food proportions	Engel/extended Engel
McClements' method	sophisticated Engel (PH)
theoretical functional relationship between income, SoL and household composition	-
-	Rothbarth (adult goods)
-	consumption theory
-	subjective

Jensen's interest in this approach was not however in the subjective method itself, but rather in the functional form that Rainwater found fitted his data best, namely:

$$Y = c.FS^a.LL^b \quad (18)$$

where FS = family size and a, b and c are constants. LL takes on the values 1 to 5. Jensen takes the formula and develops an income equivalence scale formula by some simple division. The general form of the Jensen equivalence formula for household 'h' compared with reference household 'r' is given by -

$$\begin{aligned} ES_{Jensen} &= \text{Income for h to reach a given LL} / \text{Income for r to reach same LL} \\ &= (c.FS^a.LL^b \text{ for h}) / (c.FS^a.LL^b \text{ for r}) \\ &= (FS_h / FS_r)^a \end{aligned} \quad (19)$$

as  $b$  and  $c$  are constants and the same LL applies to both households. Jensen developed his formula further by replacing FS with notional household size (NHS) which allowed children and adults to have different weightings and children of different ages to have different weightings. In its simplest form, we can write  $NHS = NA + w.NC$

NA = number of adults  
 NC = number of children (assumed to be on average 9.5 years old)  
 w = weighting for the children

$$\begin{aligned} \text{Thus, } ES_{\text{Jensen}} &= (NHS_h / NHS_r)^a \\ &= (NA + w.NC)^a / 2^a \end{aligned} \quad (20)$$

as for a childless couple reference household  $NHS_r = 2$ .

It has already been shown in chapter seven that a summarising formula like (19) has a good fit with many existing equivalence scales, although Rainwater himself had a more mixed result. Jensen showed (1978: 59) that (20)<sup>2</sup> can be made to fit the McClements (1977) scale by a judicious choice of 'w' and 'a'. Encouraged by that success, he set about determining his own values of 'w' and 'a' by inspection of some other scales, deciding that 0.60 was about right for a single adult and 2.00 for a married couple with four children. None of the reference scales were New Zealand based although one was available at the time - namely that of Easton (1973) which was a budget-based one derived from the Community Council of New York family budget standard but costed in New Zealand (see below).

Jensen's formula is very useful for generating ratios - more useful in some circumstances (eg SAS modelling) than simply having a table of values for all household types, and at least as useful as the modular or building block format in which the McClements scales and others are often presented. However, it has no significant theoretical basis despite the apparent linkage with Rainwater. This link is hardly more than fortuitous - the inspiration could just as well have come from elsewhere. This point is given substance by reference to the earlier analysis in this study referred to at the beginning of the previous paragraph. The section in question includes a Jensen-like generating formula (see (7) on page 76) which itself required no theoretical base at all beyond the simple observation that power functions like (7), (19) and (20) are modestly concave when viewed from the horizontal axis ( $a < 1$ ). This is the graphical equivalent of saying that there are some economies of scale as family size increases. The upshot of all of this is that Jensen's formula is simply a device, albeit a very useful one, for generating plausible scales once three anchor points<sup>3</sup> are decided on. It cannot claim to have any strong theoretical basis and requires two crucial value-judgements to be made before it can be applied.

<sup>2</sup> In fact, for this comparison, he uses the enhanced version of (20) that includes dependence on the age of the children.

<sup>3</sup> The third being 1.00 for a two adult couple.

These observations do not imply that the Jensen (1978) scales are 'wrong'. Rather, they are simply identifying the formula for what it is, a mathematical smoothing device<sup>4</sup> to enable the non-predetermined values to be generated. At another level this discussion further establishes the strength of a central claim of this paper that 'all equivalence scales ... rest on potentially controversial normative judgements' (Coulter *et al*, 1992a: 79).

**In 1988, Jensen revisited his anchor point decisions** in the light of Whiteford's (1985) extensive survey of published equivalence scales and produced the Revised Jensen Scale (RJS). As shown in Table 12.2 below, the single adult ratio was revised upwards while the four child family one was revised downwards.

**Table 12.2**

Anchor points and parameter values (equation (20)) for Jensen (1978, 1988)

	1 A	2 A + 4 C	Conforming to	a	w
1978	0.60	2.00	The rough average of 7 other scales	0.737	0.781
1988	0.65	1.75	Whiteford (1985)	0.621	0.730

**Table 12.3**

The Jensen (1978) and Revised Jensen (1988) scales

	A	A+1	A+2	2A	2A+1	2A+2	2A+3	2A+4
1978	0.60	0.92	1.20	1.00	1.27	1.53	1.77	2.00
1988	0.65	0.91	1.14	1.00	1.21	1.41	1.58	1.75

In terms of the theme of this part of the study, both Jensen scales are determined by considerations of 'plausibility and reasonableness', rather than some more rigorous criteria. Jensen is very aware of this and freely acknowledges that 'the assignment of anchor values has an unavoidable element of arbitrariness, depending as it does on an informed judgement' (1988: 14). Furthermore, in contrast to the scientism of some who may use such scales as if they were as definitive as, say, a physicist's determination of the resistivity of copper, he described his earlier version as simply 'a useful rough-and-ready indication of equivalences in New Zealand' (1978: 65).

<sup>4</sup> Whiteford (1985: 60) has it that Jensen 'simply smooths and interpolates McClements results'. The discussion in the main text above shows that this is incorrect - McClements was only one step on the way to a final decision re the values assigned 'a' and 'w'.

The question that has to be asked, though, is this: is the 1988 judgement about plausibility 'better' than the 1978 one? This issue has been thoroughly discussed at the end of chapter seven under the theme of 'a case study in the application of the plausibility rule', the conclusion being that Whiteford's Geometric Mean Scale may not be the best guide in the seeking of an informed judgement.

Jensen (1988) also provides a formula for converting from equivalences to dollar expenditure on children when total annual household spending is known. This also has been discussed in chapter seven. The conclusion reached there was that the formula was useful but that Jensen's derivation of it was unnecessarily complex and possibly suspect. The same result can be derived on the basis of much simpler assumptions.

In 1989, while in the UK on secondment to the DSS, Jensen put together a comprehensive piece of work on the conceptual basis of income equivalence and the applications of the tool in social policy analysis. Apart from the helpful background material the section of most interest for this study is the one containing his suggestion of using a modular or building block approach for the generation of scales. Naturally enough the illustration he constructs fits well with his 1988 revision (see Table 12.4 below), but the major point is that the suggestion itself coincides with that promoted in this study, namely that in the end a modular method is probably the most useful approach for generating summary equivalence scales.

**Table 12.4**

Jensen (1989) compared with other modular scales and the 1988 Revised Jensen Scale

	Original Specification		Recalculated for couple household as reference				
	Adults 1& 2	Ch 1,2, 3 ...	2A	2A+1	2A+2	2A+3	2A+4
German <sup>1</sup>	1.0 0.80	0.65	1.00	1.36	1.72	2.08	2.44
OECD <sup>2</sup>	1.0 0.70	0.50	1.00	1.29	1.59	1.88	2.18
CCSD <sup>3</sup>	1.0 0.67	0.33	1.00	1.20	1.40	1.61	1.81
LIS <sup>4</sup>	1.0 0.40	0.30	1.00	1.21	1.43	1.64	1.86
Jensen (1989) <sup>5</sup>	1.0 0.55	0.35 0.30 0.25	1.00	1.23	1.42	1.58	1.74
Jensen (1988)	-	-	1.00	1.21	1.41	1.58	1.75

- Notes
- 1 Based on a budget standards approach (Burkhauser *et al*, 1990)
  - 2 Recommended by the OECD for countries that do not have their own scale (OECD, 1982)
  - 3 Used by the Canadian Council on Social Development (Phipps, 1993)
  - 4 Used in some LIS work - see Smeeding *et al* (1993).
  - 5 Designed to fit well with the Revised Jensen Scale (Jensen, 1988)

There is no special treatment of sole parent households in Jensen's three studies mentioned above. The main feature to note is that both the 1978 and 1988 scales have the sole parent

household ratio consistently below that of a two parent household of the same size. This is shown clearly in Table 12.5 below in which the data is presented in household size format.

**Table 12.5**

Jensen Equivalence Scales (1978, 1988)

	Household size			
	2	3	4	5
Two parent (1978)	1.00	1.27	1.53	1.77
Sole parent (1978)	0.92	1.20	1.46	1.70
Two parent (1988)	1.00	1.21	1.41	1.58
Sole parent (1988)	0.91	1.14	1.34	1.52

## Smith (1989)

Smith's report describes preliminary work that was undertaken by the Department of Statistics in an attempt to derive equivalence scales based on New Zealand expenditure patterns. The final data set consisted of detailed income, expenditure and demographic data for 3439 private households as found in the 1985/86 Household Expenditure and Income Survey (HEIS).

In his introductory comments, Smith notes that some have used a budget standards approach in deriving scales but dismisses the option on the basis that '[i]t is usually considered more desirable ... to base scales on how households actually *do* behave ... [rather than] ... on prescribed views of what a household *ought* to spend its money on' (p2). In the context of the stance of this report, both sides of his comparison appear to be inadequately understood. His choice is to proceed with the Canadian method and the Extended Linear Expenditure System (ELES) version of the utility function approach. He considers that the latter provides a sounder theoretical base for the calculation of scales as it is grounded in the theory of consumer behaviour, uses real data and avoids 'many of the biases, assumptions, and subjective views of how households ought to behave that are inherent in some of the other methods' (p 14). For the Canadian method he used as his necessities either food at home, housing, heating, lighting and children's clothing or all those plus adult clothing. He used a log-log functional form for his regression procedure and compared the required incomes for the situation where the necessities proportion was 45% of total income.

Smith found that the utility method produced disappointing and inconsistent results (p14) and though the Canadian method was a little better even this approach did not seem very promising (p 15). Overall he considered that the results were not good enough to be of much practical use and concluded by asking the question that this study also asks, namely, whether any scales produced by these methods 'would be any better than the simple intuitive notions of what the

values should be, [values] which the scales are being judged against in the first place' (p 17). In a word, we are back to the issue of resorting to 'plausibility' as the final arbiter.

The Canadian method results are reported in Table 12.6 below, not because they have great authority, but to illustrate how they change with choice of necessities, to show their lumpiness in places and to facilitate the discussion of Easton's contribution to the equivalence scale literature.

**Table 12.6**

An attempt to derive NZ Equivalence Scales using the Canadian method (Smith, 1989)

	A	A+1	A+2	2A	2A+1	2A+2	2A+3	2A+4
adult clothes excluded	0.61	1.53	1.74	1.00	1.74	1.92	2.16	2.16
adult clothed included	0.58	1.49	1.72	1.00	1.68	1.82	2.03	1.95
Jensen (1988) for comparison	0.65	0.91	1.14	1.00	1.21	1.41	1.58	1.75

## Easton (1973, 1980, 1995)

Easton's 1973 'Needs Index' is the earliest recorded comprehensive set of scales produced in New Zealand and was developed while he was in the Economics Department of the University of Canterbury. It is based on the family budget standards set in 1970 by the Community Council of New York who defined a fairly comprehensive basket of goods which included food, clothing, housing, personal care, medical care, transport and a general category of 'other goods and services'. Easton priced each family's basket in New Zealand and thus calculated his needs index (see Table 12.6 below).

In 1980, he proposed a new scale based on expenditure (as per the HEIS) that he hoped would get out of part of the problem of the *ad hoc* nature of both his 1973 needs index and Jensen's 1978 estimates. Instead of taking the percentage share of expenditure on necessities as the proxy for standard of living (as in the Canadian approach adopted by Smith (1989)), he uses the savings ratio - that is, savings/after tax income<sup>5</sup>.

There are at least three significant features in the results which are shown in the second line of Table 12.7. First, the allowance for children is on the generous side, the pattern being similar to that of scales based on Engel food-share and budget standards (with some child-care) methods. Second, there is a very low result for a single adult household and for sole parent families. Third, and most significantly, there are no economies of scale evident as family size

<sup>5</sup> This assumption is also used by Jensen (1988) in the development of his 'Jensen Child Expenditure Formula' (see chapter seven).

increases. This stands in marked contrast to Jensen (1988, 1989) where significant economies are reflected (see Table 12.3 above).

**Table 12.7**

New Zealand Scales (Easton, 1973 and 1980)

	Method	A	A+1	A+2	2A	2A+1	2A+2	2A+3	2A+4
1973 <sup>1</sup>	NYCC budget	0.64	-	-	1.00	1.22	1.43	1.63	1.83
1980	'Engel' with savings ratio as the indicator of standard of living	0.53	0.81	1.09	1.00	1.28	1.54	1.81	2.07

Notes 1 For a married couple household with only the husband employed.

In the discussion of his 1980 approach he notes that it is an open question as to whether the savings ratio is the 'best calibration measure' (ie proxy for standard of living)<sup>6</sup>. He suggests that it could be wise to investigate several possibilities for calibration purposes, including the food share one, using deprivation indices from other studies as well as social judgement to make the final selection. In the language of this report, the latter can be understood as Easton's version of the resort to plausibility as the final arbiter.

It is clear that Easton considers that scales derived from some sort of HES type data are likely to be superior to both a budget standards approach (as in his needs index of 1973) and what he calls 'indigenous a priori reasonings'(p30) which is an oblique reference to Jensen (1978). While he recognises that there still remains an element of judgement in his recommended approach he does not seem to apply that description to either the choice of welfare proxy used (food share, savings share and so on) or to the deeper issues embedded in the data set, in particular the fact that HES type data captures only market transactions.

This optimistic evaluation of what he calls 'empirical studies' is even more explicitly spelt out in a more recent paper (Easton, 1995) the main theme of which is a critique of the work done for the New Zealand Treasury by Brashares and Aynsley (1990) on assessing income adequacy. That work and its more succinct offspring (Brashares, 1993) use the Jensen scales in their analysis. The section of interest in Easton's article (pp93f) opens with a criticism of the Jensen approach as being 'pseudo-scientific ... [based on] introspection ... ad hoc' and having 'unstated and obscure assumptions, many of which are not value free'. This allegedly flawed set of scales is then contrasted with 'a number of New Zealand Household Equivalence Scales which have a firmer empirical underpinning'.

<sup>6</sup> The question arises as to whether there is any value in the method at all given the variety of factors that influence the savings behaviour of a household and the empirical evidence that the savings ratio is a family lifecycle phenomenon as much as anything (Pashardes, 1991).

Unfortunately, both sides of his contrast are overdone and the key point missed. In the first place, there is unambiguous evidence in Jensen's work that he is aware of the place that value judgements play in his assumptions. Furthermore, it is very wide of the mark to suggest that his assumptions are unstated and obscure. While this study has itself raised questions about the basis of Jensen's decisions about what is plausible, the assumptions made and the basis for them are clear.

Secondly, the more empirically based studies that Easton refers to in the contrast are his own (1973, 1980) and the Extended Engel one from Smith (1989). To refer to Smith's results so favourably when the researcher himself is dubious about them is optimistic to say the least. Easton's own efforts are worthy contributions to the ongoing research project but there are problems with the methodology they use, too, as discussed above.

The point that is missed is the one often repeated in this paper, namely that 'all equivalence scales ... rest on potentially controversial normative judgements' (Coulter *et al*, 1992a: 79). The core issue is how best to decide on what is plausible. There is no escape from making judgements, there are no value-free scales, there are no 'scientific' scales in the sense that there are 'scientific' estimates of the refractive indices of various transparent substances, for instance. The seeds of such a view are present in Easton's earlier paper (1980), but there is little or no evidence of it in the later one.

## Royal Commission on Social Policy Vol III/2 (1988)

In its chapter on Families with Children (within the Income Maintenance and Taxation section) the April Report of the RCSP has an annex on "The 'Cost' of Children" (pp559ff). The material in the annex draws on the 1988 DSW paper 'State Financial Support for Children' which includes an appendix which has come to have a status of its own as Jensen (1988) - see above.

After making the usual distinction between direct and indirect costs, the Jensen formula for converting from income equivalences to dollar expenditure per child is applied to the 1985/86 HEIS data for four different sets of equivalences - Townsend, Henderson, Whiteford and the revised Jensen. The estimates in Table 12.8 below are those of the Royal Commission updated by the CPI to 1992 dollars.

From this analysis the conclusion is reached that 'the estimated weekly expenditure per child is about \$80 in March 1986 dollars'. This corresponds to around \$120 in 1992 terms. While the size of the RCSP estimate is within the range of other dollar estimates reported on in this study (see chapter five and six, for example), there are some matters in the methodology and discussion that call for comment.

**Table 12.8**

Estimated weekly cost per child from RCSP(1992 dollars)

Household type	Equivalence scale used			
	Townsend	Henderson	Whiteford	Jensen (1988)
A+2C	95	86	107	110
2A+C	115	104	132	138
2A+2C	120	110	111	117
2A+3C	98	107	99	98

### 1 Equivalence scales

The authors begin by noting that a fundamental difficulty in estimating equivalence scales is knowing when households of different types have achieved the same level of material well-being and that dealing with this issue usually involves various mathematical assumptions. The different approaches have produced different results and the annex goes on to illustrate this point by the use of the four scales as in Table 12.8.

The choice of scales is unfortunate in the context of their introductory comments. None of them involve any mathematical assumptions in their attempt to deal with the difficulty of identifying the conditions for households experiencing the same level of well-being. Townsend is based on a deprivation index, Henderson on the NYCC budget standard and Whiteford has no theoretical base whatsoever, his scale simply being an average of those produced by previous research. Jensen's mathematical assumptions are very limited and have nothing at all to do with determining when two households are at equivalent standards of living. Any number of scales based on sophisticated mathematical techniques were available in 1988 but were not used by the authors of this section. Such scales may not be any 'better' than the four used but it would have helped with the internal coherence of the text.

Second, in support of the view that there economies of scale as family size increases the annex argues that such a scenario is not only to be expected *a priori*, but is also supported by the revised Jensen scale. Further confirmation is found in the fact that the Jensen scale is reasonably consistent with the Whiteford average which shows the same trend. This is a misleading logic. As explained above, the revised Jensen scale requires three anchor points and these were chosen to ensure a good overall fit with the Whiteford one. This is why the two right hand columns of Table 12.8 are so similar. Jensen is dependent on Whiteford, so one would expect them to be similar. In the same paragraph it is claimed that the Whiteford scale is based on more recent data than the Townsend scale and the implication is that the former is therefore to be preferred. Townsend is based on 1968-69 data from the UK. Well under half

of the sources for Whiteford are from more recent studies. This does not sit well with the claim that Whiteford is based on more recent studies!

Third, the use of the Henderson scale is understandable in the light of its use and status in Australia. However it does seem strange that no reference is made to the Easton (1973) needs index which was based on precisely the same NYCC budget standard as was Henderson's work and not surprisingly produced a virtually identical scale.

Even though the result (\$120 per week) is not being questioned at this point, it is important that the underlying conceptual framework is sound and deals accurately with the evidence.

## 2 Conversion formula

The Jensen conversion formula is used to produce weekly dollar estimates from the HEIS data and the Revised Jensen Scales. As has been argued elsewhere (chapter seven) the derivation of the formula appears to involve some problematic assumptions although the formula itself can be shown to be reasonable on other grounds.

## 3 Treatment of sole-parent households

There are no figures for one child sole parent households in the table in the annex (see Table 12.8 above). The reason given was that there were too few sole-parent households in the data, so all such households were put together and labelled 'adult plus two children'. The average per child estimate is around \$105 in 1992 values.

## Fergusson *et al* (1990)

This paper is a product of the Christchurch Child Development Study<sup>7</sup> and reports on a twelve year longitudinal survey and analysis of the relationships between family income, family size and reports of family income inadequacy for single parents of a birth cohort of Christchurch children. The study produces relativities among sole parent families.

Given that the results are reported in the format of a one child family being used as the reference (scale = 1.00), there is no way of moving to equivalence scales with either one adult or a childless couple as reference. Comparisons therefore have to be limited to relativities among sole parent households where there are dependent children.

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<sup>7</sup> The project is based in the Department of Pediatrics at the Christchurch School of Medicine and is funded by grants from the Medical Research Council and the National Children's Health Research Foundation.

The researchers compared their results for relativities between larger sole parent families and single child sole parent families with those implied by the Easton (1979)<sup>8</sup>, Whiteford (1985) and Jensen (1988) scales and found a close fit with the latter two (Table 12.9).

**Table 12.9**

Relativities among sole parent households with children. Comparison of Fergusson *et al* (1990) with other equivalence scales.

(NB - one child household taken as reference)

	number of children			
	1	2	3	4
1989 DPB rate (including Family Support)	1.00	1.12	1.20	1.29
1995 DPB rate (including Family Support)	1.00	1.19	1.30	1.41
Fergusson <i>et al</i> (1990)	1.00	1.19	1.39	1.58
Whiteford (1985)	1.00	1.22	1.45	1.65
Jensen (1988)	1.00	1.25	1.47	1.67
Easton (1979)	1.00	1.35	1.68	2.01

Source: adapted from Fergusson *et al* (1990), Table 6

On the basis of their view that the Jensen and Whiteford estimates were devised by different methods but produced similar estimates, they set Easton's results aside as perhaps having 'specification errors in the construction of [the] scale' (p14), taking comfort in Easton's own *caveat* in the original work. This allowed them to conclude that their estimates are plausible as they are about the same as the other two. Unfortunately, it is not the case that Whiteford and Jensen are independent. As previously explained, Jensen explicitly conformed his scales to those of Whiteford so one would hardly expect them to be different.<sup>9</sup> Perhaps Easton is nearer the truth? As it turns out, making that assumption would only strengthen the main conclusion of their project, but the point remains that their argument for confirmation is built on sand. The central dilemma emerges again - which scale is best and how do we/can we know?

As well as producing scale relativities, the study also concluded that a flat rate of \$56 per child per week would be adequate to ensure that single parent families with differing numbers of children were provided with equivalent incomes. To produce this estimate the study assumes that households have equivalent incomes when they have the same probability of reporting income inadequacy. A logistic model is fitted to their data and the increase in net income (X) required by an 'm' child household compared to an 'n' child one is given by

<sup>8</sup> Easton (1979) in Fergusson *et al* is Easton (1980) in this report.

<sup>9</sup> Fergusson *et al* do not appear to have used the primary sources but have simply relied on the summaries and commentary in the April Report of the RCSP.

$$X_m - X_n = r(n-m) \quad r < 0 \text{ and } m > n$$

where  $r$  is a ratio determined by key coefficients from the regression.

The authors are careful to qualify their conclusion with various caveats, but unfortunately seem to miss one of the most important considerations. As their data does not include any single adult households ( $m = 0$ ) the study by its very nature cannot give any indication of the cost of the first child in a sole parent household. The \$56 figure is therefore the incremental amount required for each child after the first.

This restriction on the application of their \$56 result is crucial and needs to be made explicit as the failure to do so can easily lead to the figure being quoted as if it applies to a flat rate for all children in sole-parent households (eg Robertson, 1994: 10).

## Rutherford *et al* (1990)

This research was carried out in the Research Section of the Department of Social Welfare with the primary goal of testing the sensitivity of the distribution of equivalent income to choice of scale. The project was also to investigate whether one scale could be selected as somehow being 'representative' and appropriate for use in New Zealand.

The report gives a helpful and clear summary of the main methods of producing scales and of New Zealand work on the topic up to some time in 1988. The Revised Jensen Scale (1988) is mentioned but hardly discussed as it appears it was not available until late in the piece. There is nothing here of great direct relevance to the matter of the cost of children except to note their conclusion that the goal of selecting a representative scale was not considered possible and their subsequent observation that in practical terms the final answer might simply have to be some sort of policy/research community consensus as to what is acceptable.

## Robertson (1994)

Jeremy Robertson (Office of the Commissioner for Children) compiled a brief review of some of the literature on the cost of children. He reported the estimates of Lee (1989), Jensen (1988), Fergusson *et al* (1990), Lovering (1983) and Oldfield (1992). In an associated publication, he also produced his own estimates based on the principle of a food costs multiplier of '4' and using various food plans developed by the School of Consumer and Applied Sciences at the University of Otago.

His conclusion that the 'New Zealand research on the costs of children is sparse' is a fair summary of the current state of affairs.

## The New Zealand works and this study's conceptual framework for direct child costs

In terms of the conceptual framework developed in chapter four, the studies carried out by Easton, Smith and Fergusson are easy to place (Table 12.10). When it comes to Jensen's work (and the derivative in RCSP) there are difficulties. As has been shown above, Jensen's equivalence scales are generated by a mathematical smoothing formula once three anchor points are decided upon. These anchor points are chosen on the basis of informed judgement with the guidance coming from other studies which sit within the first and third concepts. Using a simple conversion formula, dollar costs are then produced on the basis of the scales and HEIS/HES data. This approach does not belong clearly in any one category. Even though equivalence scales are used in the calculations, this is not an iso-welfare procedure in terms of this report. In concept it is closest to the 'expenditure question' and the equivalence scales are simply used as a quick (and reasonable) allocation mechanism. It is therefore not surprising to find that children in sole parent households have about six per cent less spent on them than do children in the corresponding two parent family. This simply means that there was a smaller income to share out in the first place, not the children in sole parent households are less expensive to raise.

**Table 12.10**

New Zealand studies and concepts of the cost of children

<b>The Needs Question</b> (prescriptive)	<b>The Expenditure Question</b> (descriptive)	<b>The Iso-welfare Question</b> (descriptive)
What are the incremental costs incurred with the addition of a child to a household, with the child maintained at a nominated standard of living?	At a given income level (standard of living), how much do parents spend on their children?	How much extra income is needed by a family with children to be as well off as a family with no children?
Easton (1973)		Easton (1979) Smith (1989) Fergusson <i>et al</i> (1990)

# 13 Summary and Conclusions

The efforts of researchers to answer the apparently simple and innocuous ‘cost of children’ question are reported in a literature that is vast and often complex. At times it becomes very abstract (academic in the pejorative sense), far removed from such practical realities as carefully budgeting the household income so that a growing twelve year old can have a much needed new pair of shoes for winter. Yet, far from being a matter of mere academic interest, the economic cost of children is a matter of great practical significance in the modern state, especially, but not only, in the development of public policy for income support for families. The reality of the costs of children and the need for reasonable estimates of these costs is well accepted. However, the situation is not as tidy when the question is asked as to how these costs should be measured or even conceptualised.

The objectives of this research were:

- to identify and examine the concepts underlying the notion of ‘the costs of children’ in both the New Zealand and the international literatures on the subject; and
- to provide a critical account of how these costs have been estimated and an indication of the sorts of values that have been produced as a result.

The structure of this final chapter is guided by the three substantive themes in the objectives: the underlying concepts, the critical account of estimation strategies, and an indication of estimated costs.

## Concepts underlying the notion of ‘the costs of children’

Some of the literature suggests a fairly straightforward conceptual framework for the notion of child costs. Direct and indirect costs are distinguished, and for direct costs a further distinction is made between child costs as ‘what parents should spend’ (budget standards method) and child costs as ‘what parents actually do spend’ (direct methods, utility function methods) with the former described as ‘prescriptive’ and the latter as ‘descriptive’. The report has argued that the latter analysis for direct costs is both misleading (the dichotomy is nowhere near as clearcut as suggested) and incomplete (the conceptual framework in which the notion of the costs of children sits is multi-layered and multi-dimensional). Key elements in the conceptual framework are identified below, but there are several others that are discussed in the next major section on the critique of the estimation strategies which for expositional purposes is treated separately.

## Who are the children?

The literature almost invariably assumes that the children are dependents (aged under 18 years) without any special healthcare needs or disabilities living in a nuclear family headed by an adult couple in a city or town in an OECD type country. The adoption of this understanding has several implications: it does not recognise that (in New Zealand) around one-half of eighteen to twenty-four year olds are living with their parents and many of them are in part or in full economically dependent on their parents; for a subset of these families costs relating to tertiary education are incurred and these are not factored in except insofar as they affect the savings pattern of parents anticipating these costs; and, some other household types receive either limited treatment or none at all (eg sole parent households and 'extended' family households respectively).

## What costs (and what benefits) to whom?

Two types of costs are distinguished in the literature. The *direct costs* include both the explicitly child-induced outgoings on items such as food, clothing, school related expenses and toys, as well as the child(ren)'s portion of the shared costs of housing, heating, transport and the like. The *indirect costs* are the opportunity costs of having children and refer primarily to the loss of income that a household experiences when one or both parents spend time out of paid employment to look after the children. Some parents choose to purchase a significant amount of child care to avoid loss of time and opportunity in paid employment. In such cases the indirect costs are better conceived of as 'replacement costs' rather than 'opportunity costs'.

Although the concepts of direct and indirect costs are distinct and reasonably well-defined, they are interrelated. For instance, in the situation where a couple has a first child and one parent leaves paid employment, the interrelationship shows itself in two ways: first, the loss of income as a result of child care responsibilities tightens the budget constraint and limits the amount that is available for direct spending; and, second, the presence of the principal caregiver in the home reduces the need to spend on some items because they are 'home-produced'.

The bulk of the costs of raising children are undoubtedly borne by their parents with most of the remainder coming from the rest of society making a modest economic contribution mainly (in New Zealand) through the public health and education systems<sup>1</sup>. Although the total contribution from the wider family (eg time, money, meals) and the wider community (eg sports clubs, organisations for children and youth) is negligible as a proportion of the total resources 'invested' in children, they can be crucial at the margins. So also can changes in the

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<sup>1</sup> In New Zealand, the public expenditure in 1994 for primary schooling was around \$3200 per student pa, for intermediate \$3800 pa and for secondary \$5000 pa. Public expenditure on health care is estimated at around \$600 per child (under 15) pa. The total public spending per child for health and education is of the same order of magnitude as the direct costs to parents. When indirect costs are added the total costs borne by parents far exceeds that borne by the rest of society through the state. See chapter two for sources.

philosophy and practice of provision of services by the state. Assuming a given total cost for a child for a given time period, the cost to the parents is determined by the portion of the total cost borne by each party. For example, if the state's contribution to education costs decreases, then, other things being equal, the cost to the parents must increase.

In pre-industrial western economies (and currently in some so-called 'less developed' societies), children were, in economic terms, a crucial private investment for parents. They provided labour for home production and were an important resource for the elderly, the sick, the disabled and the unemployed in kin-based welfare systems. By contrast, children in advanced industrial democracies do not generally bring any significant economic benefits to their parents. The benefits that do accrue to parents come under the general banner of 'the joys of parenthood' and consist of less tangible contributions such as providing companionship and being a source of pride through their achievements. On the other hand, child-rearing brings considerable social and economic benefits to society as a whole, particularly but not only through the production of the next generation of the labour force. Table 13.1 below summarises the relative sizes of the allocation of the costs and benefits of raising children in a modern industrial economy.

**Table 13.1**

Allocation of costs and benefits in the raising of children

type of benefit or cost	size of benefit	size of cost
social/economic (for society 'as a whole')	considerable	low to modest
economic (for parents)	zero or negligible	considerable
social/psychological (for parents)	The overwhelming majority of 'cost of children' studies ignore or deliberately set aside the issue of 'the joys and trials of parenthood'. See chapter nine for a discussion of the matter.	

### Concepts of the direct costs of children

The cost of children literature appears to address three distinct questions about direct child costs: the needs question, the expenditure question and the iso-welfare question (see Table 13.2 below). Each concept of child costs has a distinct bundle of estimation strategies associated with it. The needs question focusses on what is required to maintain a child at a given standard of living and can be construed as an indication of what parents ought to spend to achieve that goal. A budget standards approach is the main strategy used for answering this question. Although in the pre-ordinalist literature it was the needs question that was predominant, over the last forty or so years the expenditure and iso-welfare questions have proved much more popular mainly because of the greater value placed on behavioural data than on introspection

and the judgements of panels of experts. It is important not to confuse the expenditure and iso-welfare concepts. The expenditure question seeks to describe what is, given all the constraints on the budget and the influence of social expectations and so on. The iso-welfare question on the other hand seeks to have those constraints removed so that estimates can be made of what compensation parents would require to return them to the same level of economic well-being they had before the addition of a(nother) child. The success of the iso-welfare approach depends crucially on finding a valid and robust measure of well-being.

**Table 13.2**

Concepts of the direct costs of children

	The Needs Question	The Expenditure Question	The Iso-welfare Question
Formal	What are the incremental costs incurred with the addition of a child to a household, with the child maintained at a nominated standard of living? **	At a given income level, how much do parents spend on their children?	How much extra income is needed by a family with children to be as well off as a family with no children?
One-liner	What parents should spend	What parents do spend	Compensation required to maintain the same welfare
Associated methods	eg <i>Budget</i> - a basket of goods and services is defined and costed (IV option).	eg <i>Direct</i> - the spending on sets of goods by families with children is compared with that by childless couples. Regression analysis used to control for and tease out the effect of various factors.  <i>Survey</i> - work closely with a sample of households using diaries, etc and thus get detailed child-only costs. Allocate cost of shared goods or exclude them.	General idea:  Compare the expenditures (or incomes) of different family types deemed to be 'equally well off' using various measures of well-being or standard of living, which are themselves based on data from surveys of household expenditure or from public opinion surveys relating household income and well-being ..... or .....  ... use the judgement of experts to define and cost a set of budgets or to build a modular scale:

\*\* Note that this question can be split into two subquestions, the one assuming that the existing accommodation and most other consumer durables are adequate for the larger family, the other assuming that a slightly larger dwelling and some more durables are needed as family size increases. The former assumption implies that a more limited and simpler budget estimate is adequate.

## Critical account of the estimation strategies

It is quite natural as a first thought to see the task of estimating child costs as that of identifying the various child components of the family budget - food, clothing, housing, heating, toys and personal effects, healthcare and so on - then adding them up. Child costs in this direct approach are an answer to the expenditure question - 'what do parents spend on children?'. A promising start can be made with clothing and footwear as many national data sets and other smaller surveys give such information based on the diaries kept by survey participants. Unfortunately there are very few other budget categories that allow such an easy analysis, as the great bulk of a family budget is made up of shared goods and co-mingled private goods.

Shared goods raise the question of how to allocate costs between the various household members. Even for most privately consumed goods (eg food, toothpaste), the allocation of costs to individual consumers is not possible without the use of rules of thumb or extreme data collection measures involving a generally unacceptable invasion of privacy. Even if the latter were done, there still remains the challenge of shared goods.

More sophisticated versions of a direct approach use multivariate regression analysis to estimate expenditure equations from the data sets, with dummy variables judiciously chosen to control for and take account of major differences between the households (eg income, employment status of the parents, geographical location, number and ages of the children and so on). From this analysis it is possible to draw up budgets for households that are similar in all important aspects except that some have children and some do not. The budget can be broken down into as many commodity groupings as the data will allow so that spending by a household with, say, one child can be compared in detail with that of a similar childless one.

The chief difficulty with this approach is this: if a household's income remains steady then, other things being equal, the budget constraint requires that when the amount spent on some goods increases, the amount spent on others must decrease. A second problem is that inter-temporal transfers (saving and dissaving) open up the possibility that some of the consumption spending on a child may effectively occur in periods when that child is not present. The implication of this is that single period data sources will lead to an underestimation of child costs.

Because of the budget constraint and the presence of shared and co-mingled private goods, we cannot directly observe what is spent on children. The options are to abandon the attempt to produce estimates based on data which reflects consumer behaviour (and use a budget approach) or to develop an indirect approach to analysing the data. The IV version of the budget strategy has been used, but apart from any other limitations it may be seen to have (eg

dependence on the judgements of the researcher or research team), it, too, has to face allocation issues for shared goods.

The indirect approach to using household expenditure data uses the iso-welfare concept of child costs and in this way seeks to side-step the difficulties by defining the costs of a child as the extra resources needed to bring the parents (or the household<sup>2</sup>) back to the same level of economic well-being they (it) had while childless. This is an intuitively attractive idea and has a long history in cost of children studies. Unfortunately, a household's level of well-being cannot be observed directly, so assumptions have to be made about the determinants of well-being. By devising a means of getting around the difficulties caused by shared goods, co-mingled private goods and the budget constraint, a new challenge is created - namely, how to compare welfare levels across households. This is by no means a simple exercise and several fundamental questions are raised in the process of seeking to carry it out: what concept of welfare should (can) be used? what measure of or proxy for welfare is most appropriate? whose welfare is being compared - that of the household, the adults or the child(ren)? is it reasonable to even attempt to compare welfare across households, especially when their composition varies? Table 13.3 summarises the means used in the literature to identify when households are at the same or similar standards of living.

**Table 13.3**

The means used to identify when households are at the same or similar standards of living

Iso-welfare Method	Means of identifying 'equivalent welfare'
Engel	equal food-share
Extended Engel	equal 'necessities'-share
Sophisticated Engel (PH)	weighted average of all commodity scales
Rothbarth	same absolute amount on 'adult goods'
Consumption Theory	same 'utility'
Subjective	perception of sampled citizens
Savings Ratio	same savings ratio <sup>1</sup>
Budget (DV)	informed judgement of experts
Relative deprivation	index of relative deprivation
Modular/arbitrary	informed judgement/intelligent guess

Notes 1 The savings ratio = savings / total after-tax spending

<sup>2</sup> Given the assumption of equitable intra-household allocation of goods and services, all household members are assumed to be experiencing the same level of material well-being. This means that it is of no consequence whether it is adult or household welfare that is discussed. If, however, the concept of 'welfare' is broadened beyond that of material or economic welfare, then the situation is more complicated. This issue is discussed in chapter nine.

The utility function approach, especially in its 'full-form' version, has proved popular in the last twenty-five years or so. Its strength is that it provides an explicit and systematic theoretical link between household choices, well-being and household characteristics. In contrast to the situation for many of the other methods it appears that the scope for arbitrary decision and value judgements is quite limited. This claim of 'objectivity' is one of the reasons for this approach proving to be heavily favoured by economists and others.

There are two general sets of considerations that provide grounds for questioning this positive assessment. The first is the wide range of results that have been produced using the technique. Secondly, it is fairly clear that the budget standards method and the welfare proxy techniques (isoprop, Rothbarth) make assumptions about how to measure household well-being. The problem is that the more sophisticated full utility function approaches do so too, but they have some of their assumptions hidden in the mathematics. Many of the value-judgements thus enter by the back door, as it were, and can catch unawares those not sufficiently economically or mathematically inclined. Some of the underlying value judgements, assumptions and conceptual difficulties of the method are briefly identified below.

The definition of child costs used by the strategy can be expressed in equivalence scale (ES) format thus:

$$ES_h = E(U, p, z_h) / E(U, p, z_r)$$

where  $E(.)$  are the cost functions for the two households and give the respective minimum costs required for the reference household (r) and the other household (h) to reach a given utility level (U) at the same prices (p). The fundamental problem for the method arises in the process of going from the data to the estimation of the cost function. It can easily be shown that there are many utility functions and cost functions that are consistent with the same data set. This has the unfortunate consequence of making the resulting estimates dependent on the chosen form of the utility function - there is an identification problem.

The source of the problem can be expressed in non-technical terms thus: when a child is added to a household and the consumption pattern changes, it is not possible to tell from demand data alone whether the changes are due to the composition changes or to the adults 'losing the taste' for certain goods and services with the arrival of the child or to a mixture of both factors.

There have been several responses to this problem. One is to invoke the separability assumption which solves the dilemma expressed above by assuming that adults tastes are not affected by the presence of children. This assumption is counter-intuitive and there is also empirical evidence which calls it into question.

If the separability assumption is rejected, then it has to be accepted that the estimated scales are composed of the product of two elements:

$$ES = (\text{factor determined by the data}) \times (\text{factor determined by choice of utility function})$$

The factor determined by the data is a relative scale which shows by how much the cost of living has changed for a particular household since a reference price regime. The factor defined by the choice of the functional form of the utility function is an arbitrary constant that the researcher has implicitly selected when deciding how to model the effect of household composition on the cost function (or the utility function).

If the researcher wishes to go beyond reporting only what can be unambiguously deduced from empirical demand analysis (ie relative changes for each scale over time), then there are a limited number of possible strategies for attempting to cope with this problem of under-identification. All these involve the adoption, either explicitly or implicitly of some assumption or value-judgement from outside the original data. Several have been proposed:

- \* take some set of scales as 'correct' then update them over the years from the data;
- \* estimate the cost functions 'directly' by using psychometric data (as per the subjective method); or
- \* choose a specific form for the utility function and declare it. There are several variations on this option, including using the Engel or Rothbarth methods. One that has proved fairly popular is to use the IB (Independence of Base utility) assumption which implies that child costs are proportional to income. As for the separability assumption the IB assumption can be rejected on intuitive and empirical grounds.

As well as this core (identification) problem, the consumption theory strategy has several other major hurdles to overcome. First, the data sets that it draws from include only market transactions and therefore 'household production' and other non-market aspects of family life are excluded from consideration. Second, there are significant tensions between the conceptual frameworks of the underlying consumer demand theory and the applications of the results in a policy context. The latter assumes a cardinal view of utility, a household concept of welfare and has no great problem with the idea of inter-household welfare comparisons. On the other hand, consumption theory (in its pure form) assumes ordinal utility, focuses on individual welfare and rejects inter-personal (let alone inter-household) welfare comparisons.

These considerations (and the wide range of results the consumption theory methods produce) constitute fairly compelling evidence that it would be unwise to assume that the economic approach is superior to others. It, too, cannot escape the challenge of having to import normative judgements if welfare comparisons are to be made. This conclusion opens the way for a more realistic evaluation of the relative worth of alternative strategies such as the budget standards (DV) and subjective method.

Finally, given the considerable range of estimates of the direct costs of children that is reported in the literature, it is tempting to hypothesise that matters could be reasonably tidied up by the development and use of a comprehensive and robust conceptual framework as in the previous section. If different studies were asking different questions and estimating different variables then these differences could perhaps explain a significant proportion of the variation in results.

There is certainly a need for a clear conceptual framework and there can be little doubt that conceptual differences have contributed to the variation in estimates of child costs. However, it is too optimistic to expect conceptual refinement in itself to satisfactorily resolve much of the problem of the wide spread of results. None of the currently available methods have completely overcome the fundamental issues posed by the existence of shared goods, the budget constraint, preference modification, the charge of subjectivity and the limitations of the survey data. Thus, the indecisive results of the empirical work could be as much due to these endemic difficulties as to anything else.

## An indication of direct costs

Given the conceptual and technical complications discussed in the previous chapters and the wide range of surveyed results, it may seem that the implied goal of this section is unrealistic. There is no doubt that the precision associated with the physical sciences is not possible in this endeavour, but that does not mean that nothing can be said. In what follows, a 'reasonable' set of equivalence ratios is established, then two strategies are used to produce some estimates of weekly dollar costs. As in the main text, two parent families are treated first, then there is a special section on sole parent households.

### Summarising the scales surveyed in the literature

One option for producing a summary scale is to take an average of the surveyed scales. This was Whiteford's (1985) approach. A similar approach will initially be adopted here, except that whereas Whiteford simply took the geometric mean of all his surveyed material, this report first establishes the geometric mean of the results of each method, then takes the mean of these means for each household type. This has the advantage of allowing the idiosyncrasies of each method (eg their respective under- and over-estimating tendencies) to have an equally weighted effect. Simply taking the overall geometric mean in one step means that the methodology which has the most studies surveyed is likely to have an 'unfair' influence on the final result.

In Table 13.4 below the geometric means for the various methods have been extracted from the tables in Appendix B and the overall means calculated. The ratios reported in the summary tables below are derived from results for children aged around 8 to 10 years, or from average scales for children of varying ages.

- 1 It would be misleading to interpret line 7 of Table 13.4 as being the average of a some sort of random sample of scales. Two selection or censoring mechanisms are at work, both dependent on the tendency for researchers to have pre-formed ideas as to what is a plausible set of ratios or at least an idea of a plausible band for the scale(s) to lie within. First, the available pool of studies is likely to have already had the extreme results filtered out. What researcher would (now) seek to publish results that lie significantly outside the plausible range? What publisher would accept material in which there were results outside the accepted limits? Secondly, in preparing the report, some scales were not included in any summary tables or calculations on the grounds that they were 'unusually high or low', or because of some unusual discontinuities between economies and diseconomies of scale. These observations are not meant to imply that the results are meaningless or simply the expression of preconceptions. It is simply an acknowledgement of one place that judgement has entered the process.

**Table 13.4**

Summary of the geometric means of the results from the different estimation strategies

	Method of Estimation	2A	2A+1C	2A+2C	2A+3C
1	Engel	1.00	1.32	1.62	1.97
2	Extended Engel	1.00	1.27	1.53	1.77
3	Budget <sup>1</sup> (excl childcare)	1.00	1.22	1.44	1.67
4	Full Utility	1.00	1.18	1.34	1.51
5	Rothbarth	1.00	1.14	1.28	1.40
6	Attitudinal	1.00	1.15	1.26	1.34
7	<i>Geometric mean of the above</i>	<i>1.00</i>	<i>1.21</i>	<i>1.41</i>	<i>1.60</i>
	<i>Jensen (1988)</i>	<i>1.00</i>	<i>1.21</i>	<i>1.41</i>	<i>1.58</i>
8	<i>Geometric mean of lines 2 &amp; 3</i>	<i>1.00</i>	<i>1.24</i>	<i>1.49</i>	<i>1.72</i>
	<i>Jensen (1978)</i>	<i>1.00</i>	<i>1.27</i>	<i>1.53</i>	<i>1.77</i>
9	NZ benefit ratios <sup>2</sup>	1.00	1.24	1.36	1.48

Notes 1 This budget-based equivalence scale is for a 4 year old in the one child family and for children 'averaging around 10' otherwise, from Oldfield (1992), excluding child-care.

2 Using the Unemployment Benefit rates and Family Support (April, 1995). If support for housing were added, the implied ratios are unlikely to move closer to the estimated ones in lines 7 and 8.

2 It is tempting to argue that because it can be shown that some scales tend to overestimate and some to underestimate the costs of children in scale format, then the average figure will be about right. This is unhelpfully simplistic as it assumes that the 'overs and unders' are equally balanced, an assumption for which we have no good grounds at all. There is however value in pursuing this line of thought a little further. It is widely accepted that there are sound reasons for concluding that the Rothbarth method underestimates the costs of children. The report has also argued that the full utility function method will also underestimate because of the effect of the budget constraint, changing adult preferences as children are added to the household and inter-temporal transfers. There are thus good grounds for setting aside lines 4 to 6 (utility, Rothbarth, attitudinal). It is also widely accepted that the Engel method overestimates, especially as the household size increases. There would therefore seem to be a case for taking the FBU budget standard and the extended Engel approaches as giving results 'closer to the truth'. The geometric means of these two are given in line 8 and indicate a 'steeper' or 'more elastic' scale (which is close to Townsend's (1979) ratios based on his deprivation index strategy which were reported in the main text but not used in the calculations in Table 13.4). Note that lines 7 and 8

correspond reasonably closely to Jensen (1988) and Jensen (1978) respectively. The evidence and arguments produced in this paper suggest that Jensen's earlier judgement may have been closer to the mark.

- 3 The relativities implied by the New Zealand benefit rates for a household headed by an unemployed couple are given in line 9. For families with two or more children these ratios are significantly below those of both lines 7 and 8.
- 4 The summaries in both lines 7 and 8 can be generated using the modular approach (see Table 13.5 below). The CCSD modular scale fits well with the overall geometrical mean scale reported in line 7 above. It rates the children as close to 40% of the per capita rate for the adults in the couple. Jensen (1989) has greater economies of scale for the second adult and for the children as the number of children increases. If such economies were considered closer to the mark then his modular-based ratios are to be preferred, giving 1.90 for the five child family as against 2.01 using the CCSD base. If the argument in 2 above is seen to have some validity, then the Budget Standard Consistent (BSC)<sup>3</sup> scale would be more appropriate. In this case, the second adult has a 0.6 allocation and the children 0.4 each (ie 50% of the per capita rate for the adults in the couple). It produces a reasonable figure for a one adult household (0.63).

**Table 13.5**

Modular scales

	Original Specification			Recalculated for 2 adult household as reference				
	Adults 1 & 2		Ch 1,2, 3 ...	2A	2A+1	2A+2	2A+3	2A+4
<i>This report (geometric mean of all methods)</i>				1.00	1.21	1.41	1.60	(1.80)
CCSD <sup>1</sup>	1.0	0.67	0.33	1.00	1.20	1.40	1.61	1.81
Jensen (1989) <sup>2</sup>	1.0	0.55	0.35 0.30 0.25	1.00	1.23	1.42	1.58	1.74
<i>This report (ext Engel, Deprivation Index, Budget)</i>				1.00	1.24	1.49	1.72	(1.96)
BSC <sup>3</sup>	1.0	0.60	0.40	1.00	1.25	1.50	1.75	2.00

- Notes
- 1 Used by the Canadian Council on Social Development (Phipps, 1993)
  - 2 Designed to fit well with the Revised Jensen Scale (Jensen, 1988)
  - 3 BSC = Budget Standard Consistent (see text)

- 5 Table 13.6 records the scales from the New Zealand literature as discussed in chapter eleven. As argued in that chapter, Jensen's scales are simply the result of applying a mathematical smoothing formula once certain anchor points are decided on. Although very

<sup>3</sup> This term has been coined for this report. It is not used elsewhere in the literature.

useful as a means of generating a full set of ratios, they cannot be seen as independently derived scales. Smith's extended Engel results are on the high side and are considered 'not promising' by the researcher himself. Easton's savings ratio approach gives results that are similar to Engel or extended Engel ones, while his budget-based one is consistent with that of the FBU. In summary, there is very limited scope for comparison of New Zealand based empirical work with that from other countries.

**Table 13.6**

Summary of 'New Zealand scales'.

Study	Method of Estimation	2A	2A+1C	2A+2C	2A+3C
Jensen (1978)	Smoothing formula	1.00	1.27	1.53	1.77
Jensen (1988)	Smoothing formula	1.00	1.21	1.41	1.58
Smith (1989)	Extended Engel	1.00	1.68	1.82	2.03
Easton (1973)	Savings Ratio	1.00	1.28	1.54	1.81
Easton (1979)	Budget	1.00	1.22	1.43	1.63

### Weekly dollar costs using equivalence ratios

There are two main sorts of approach to producing an estimate of the weekly dollar costs of children. The first is to use equivalence ratios and various base income or expenditure figures and the second is to use a budget standard (or food budget with multiplier). The analysis that follows is for two-parent households. For sole parent households, the same figures can be used or 'the extra child' can be added as per the argument in chapter eleven.

As the cost of a child is in the main dependent on three factors - family income, age of the child and child's rank order - a four dimensional table is required. To simplify the presentation, estimates are provided in Tables 13.7 and 13.8 of the average cost per child at various after-tax reference household income levels, using a range of plausible child-portion ratios.

The two tables have slightly different starting points but are not to be seen as two different sets of estimates. The income used in Table 13.7 is that for the household before the child is added. In this case, the child portion is simply  $r-1$ , where  $r$  is the scale ratio for the household with the child(ren). The weekly dollar figure is the extra income/spending required to maintain the household at the same standard of living. The top left hand cell (\$69), for example, is the result of  $(0.18 \times 20000 / 52)$ .

**Table 13.7**

Summary estimates of weekly dollar child costs based on low to modest after-tax incomes (expenditures) for childless two adult couples.

Childless couple after-tax income	Child portion of the household equivalence ratio						
	0.18	0.20	0.22	0.24	0.26	0.28	0.30
\$20,000	\$69	77	85	92	100	108	115
\$24,000	\$83	92	102	111	120	129	138
\$28,000	\$97	108	118	129	140	151	162
\$32,000	\$111	123	135	148	160	172	185

Alternatively, and possibly more usefully, the household income can be taken to be that of the household with the child(ren) already there. In this case the child portion is  $(r-1)/r$ , where  $r$  is the household equivalence ratio. This is the option followed in Table 13.8. Provided that within-period income and expenditure are close (which usually means that there is a very low savings ratio) the same formula can be applied to total spending. Jensen (1988) uses this formula for converting from total household expenditure to weekly dollar costs although, as the main text suggests, his line of argument for arriving at it is probably unnecessarily complex. The top left hand cell (\$59) is the result of  $(0.18/1.18) \times (20000/52)$ .

**Table 13.8**

Summary estimates of weekly dollar child costs based on after-tax incomes (expenditures) for households with a child.

After-tax income for households with a child	Child portion of the household equivalence ratio						
	0.18	0.20	0.22	0.24	0.26	0.28	0.30
\$20,000	\$59	64	69	74	79	84	89
\$24,000	\$70	77	83	89	95	101	107
\$28,000	\$82	90	97	104	111	118	124
\$32,000	\$94	103	110	119	127	135	142

To apply Tables 13.7 and 13.8 an appropriate ratio has to be selected from within the plausible range. In making that decision there are several key factors to take into account:

- \* is housing included and if so, how are these costs apportioned?
- \* is childcare included and to what degree? (in the limit, the issue shifts to that of indirect costs);
- \* are there any significant economies of scale with increasing numbers of children?

\* for sole parents, are there any special costs that argue against estimating the scales on the basis of 'single adult costs plus two-parent child costs'?

On the basis of this report's equivalence scale survey and analysis, the shaded column would be a 'plausible' focus. In New Zealand, households with two parents and one or two children have after-tax household incomes of around \$35, 000 to \$40, 000 on average which means that the after-tax incomes used in the table are all at the lower end of the distribution. A weekly child cost of the order of \$110 to \$120 could never be said to be an overly generous estimate. If it is accepted that poorer households require 'higher ratios' than those produced on average across the income range, then this conclusion is even more strongly reinforced.

### Weekly dollar costs using the budget standard method

The figures in the first and third lines in Table 13.9 below are derived from the budget studies in chapter four and can be seen as an average cost per child figure for two parent families. Given that the decisions on how to treat *housing and child-care* have a considerable effect on the figures, these two categories are *excluded from the estimates*. The use of the average cost

**Table 13.9**

Summary estimates of weekly child costs (1992 dollars<sup>4</sup>) using budget methods (*housing and child-care costs excluded*).

Standard of living	Age of child		
	0 - 5 yrs	6 - 12 yrs	13 - 16/18 yrs
No shared goods	\$45	55	70 - 100
Low-cost food plan x 4	\$47	70	115
Modest but adequate	\$85 - 90	90 - 110	130 - 140
RCSP average figure	-	118	-

per child is reasonable since the variation in cost per child with changes in family size is not great once housing costs are excluded as there is limited scope for economies of scale in other expenditure areas. The Otago low-cost food plan multiplied by four (Robertson, 1994) and the average figure for all incomes for all ages from the Royal Commission (1988) are also given for comparison. The question of how to include child-care costs in cost of children estimates is a difficult one and when the issue is allowed to go to the limit, we find ourselves discussing indirect costs. Child-care costs are not included in the summaries above. The effect of the budget constraint is not relevant as the core concept is that of the maintenance of the child at a given standard of living. Note that no allowance is made for shared goods in the first line. To

<sup>4</sup> Add 10% to update to 1996 dollars in line with the change in CPI over the four years.

recognise the variation in cost due to age, three age-bands are used. Again, the conclusion is that around \$110 to \$120 per week would not be excessive for a modest standard of living.

### **An indication of costs: some general results**

- 1 *Family expenditure on children increases with the number of children, but, according to most studies, with only modest economies of scale.*

Contrary to the common perception that there are good economies of scale as household size increases when children are added to it, the bulk of the studies surveyed in this research found for two parent families the second and third children were almost as costly as the first (see Table 13.4). The economies are evident when an adult couple is formed, but not as children are added. When there *is* a lack of proportionality as children are added, there are several potential explanations:

- \* economies of scale - although this applies primarily to housing and some household durables;
- \* it may be that there is a fixed cost associated with the presence of children that shows up with the first child only - a variation on the economies of scale theme; or
- \* given the reality of the budget constraint, when a(nother) child is added to the family some parts of the budget get trimmed back so that the increased child costs can be met. When the usual econometric and microeconomics-based methods are used to estimate child costs, the effect of this factor is that such methods underestimate child costs.

- 2 *Family expenditure on children increases as family income increases, but not proportionately*

The other way of expressing this result is to say that scale values decrease with increasing income. The major implication of this finding is that in applied analysis and policy applications the scales used with poorer households should be higher than those used for households at modest and higher standards of living.

- 3 *Spending on a child increases with the age of the child (if child-care costs are excluded).*

The qualification is very important. If reasonable child-care costs are included the age factor virtually disappears as older children need less supervision. In national HES type surveys (on which equivalence scales are based in the main) child-care costs are invariably reported as being very low, even where the adult or adults work outside the home - friends and family must give 'free' help. This particular instance illustrates a more general feature of expenditure data sets commonly used in estimating child costs. They capture only market transactions and therefore by definition exclude non-market interactions which are of considerable significance in any comprehensive view of the cost of children

4 *The indirect costs of children are considerably greater than the direct costs.*

On the basis of the evidence from this study, the indirect costs of a child are some three to five times greater than the general estimate of direct costs.

### Sole parent households

In chapter ten it was argued that the answer to a fundamental question would significantly influence the set of scales developed for sole parent households: apart from the usual child costs, do sole parents have any extra costs that non-parent single adults do not have? The modular approach can be applied to sole-parent households for both 'Yes' and 'No' responses to the key question. Table 13.10 shows that both the Jensen (1989) and BSC models fit the 'No' option reasonably well, although their different assumptions about economies of scale mean that they begin to diverge for 'larger' families. For the 'Yes' option as in the FBU estimates, the BSC model fits very well if an extra 0.4 (ie equivalent to another child) is added in recognition of the extra costs of lone-parenting vis-à-vis single non-parent adults and couples with children. In policy applications - equity issues vis two parent households. Is the focus on the child? Then parents may have to be over compensated. If focus on parents ... probably go for the 'no' option??

**Table 13.10**

Sole-parent households and the modular approach

	Original Specification		Recalculated for 2 adult household as reference			
	Adults 1& 2	Ch 1,2, 3 ...	A	A+1	A+2	A+3
CCSD	1.0 0.67	0.33	0.60	0.80	1.00	1.20
Jensen (1989)	1.0 0.55	0.35 0.30 0.25	0.65	0.86	1.06	1.23
BSC	1.0 0.60	0.40	0.63	0.88	1.13	1.38
<i>Geometric mean (all methods) - Whiteford</i>			<i>0.64</i>	<i>0.90</i>	<i>1.10</i>	<i>1.31</i>
<i>This report's geometric mean (excluding FBU)</i>			<i>0.59</i>	<i>0.82</i>	<i>1.06</i>	<i>1.33</i>
BSC (adjusted)	1.0 (+0.4) 0.60	0.40	0.88	1.13	1.38	1.63
<i>FBU (Whiteford and Hicks)</i>			<i>0.89</i>	<i>1.15</i>	<i>1.39</i>	<i>1.64</i>

## An indication of indirect costs

The indirect costs of rearing children are considerably greater than the direct costs. For a two or three child family the literature indicates a figure of \$400 to \$500 per week over a twenty year period from the birth of the first child as being a reasonable estimate. This represents \$400,000 to \$500,000 assuming a zero investment rate. If opportunity costs for investment were included the estimates are considerably higher.

The estimates are sensitive to the assumptions made regarding the length of time that the second parent is not in paid employment or not in full-time paid employment. The above estimates assume that the mother is out of the paid workforce for around ten years and is only part-time for around another ten years. Should typical current behaviour deviate greatly from these patterns then the estimates may change. If, for example, mothers spend less time out of the paid work-force then the cost of childcare becomes an increasingly important factor in determining indirect child costs.

# Appendices

## Appendix A - Converting to 1992 New Zealand Dollars

In order to make meaningful international comparisons of child costs in money terms, a clear and reliable method of converting to a particular currency base has to be adopted. In this study the base used is 1992 New Zealand dollars. There appear to be three options available for converting child costs given in other currencies: the relative approach of the proportion of the average wage and two absolute dollar level methods using exchange rates (ERs) and purchasing power parities (PPPs) or ERs and Comparative Price Levels (CPLs). For the latter two approaches a CPI adjustment is also needed in one of the countries.

Most of the literature does not discuss the issue as the costs are either given in equivalence scale format in which case there is no need for conversion or when given in money terms they are left in the currency of the original data. Those that do convert use one or other of the options listed above, usually without any discussion or explicit justification. Lovering (1984) uses the 'ER followed by CPI' option and briefly looks at the average wage approach. Mitchell and Cooke (1988) adopt the 'PPP followed by CPI' option. The (Australian) Department of Social Security (1995) uses the ER followed by CPI option. One work that does discuss the issue is that commissioned by the United Kingdom Department of Social Security and carried out at the University of York (Bradshaw *et al*, 1993). Its purpose was to analyse and evaluate the different arrangements for support for children internationally. Their view is that the best approach is to do a CPI update followed by the PPP conversion.

The Purchasing Power (PP) of a currency is determined by the amount of goods and services that may be purchased with a unit of that currency - a given sum of nominal earnings, when converted at PPP rates, will purchase the same basket of goods and services in all countries. It is argued that PPPs are to be preferred to ERs which may be volatile and may not reflect relative price levels in different countries. PPPs are a method of comparing the actual value of a currency in terms of purchasing power and the OECD publishes updated tables each year. In Graph A.1 below the relation between PPP and ER conversion over time is shown for the New Zealand - United Kingdom comparison. Note that there are only four PPP points plotted. A continuous series was not available in the source (OECD, 1994) and a continuous one cannot be constructed by simply looking up previous tables to fill in the gaps. The PPP methodology requires that the scale is recalculated each year in the light of more up-to-date data and this revision usually alters the year on year relativities of the previous few years.

Although the situation is complex (Rogoff, 1996), it appears that the PPP figure is often below the ER figure not only over time between the two countries above, but also at any time between

any two countries. Thus, child costs (and poverty levels) come out lower using PPP than using the ER.

### Graph A.1

PPP and ER comparisons for the UK to NZ conversion

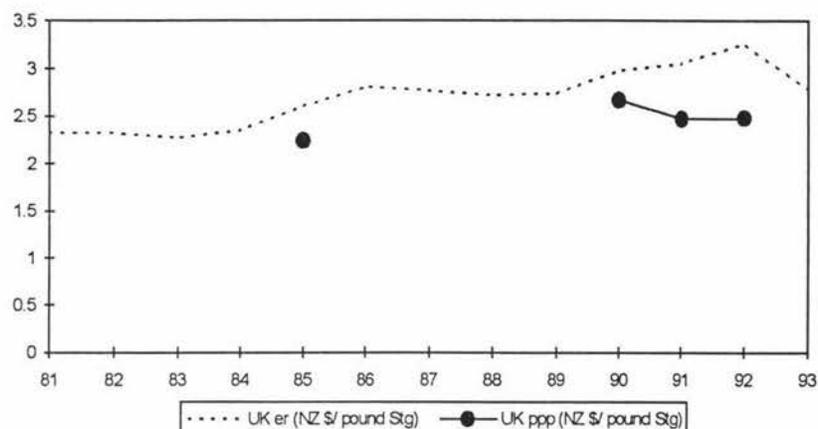


Table A.1 below further illustrates this and also gives an indication of the variation in average wage rates across countries. This variation exists even where countries have similar GDP per capita figures when adjusted for PPP (eg UK and France). As an illustration of the dependence of results on the choice of method, Table A.2 shows how Piachaud's UK study converts to New Zealand dollars.

All inter-country conversions in this report will use the 'CPI followed by PPP' methodology for conversion to 1992 New Zealand dollars.

### Table A.1

Three methods of comparison compared (1992 figures)

(PPP and ER in national currency units per NZ dollar average male wage in NZ dollars adjusted for PPP)

Country	PPP	ER	Avg Male Wage	Wage index (NZ = 1)
New Zealand	1.00	1.00	33 000	1.00
Australia	0.87	0.73	38 500	1.17
France	4.20	2.85	27 500	0.83
United Kingdom	0.40	0.31	36 250	1.10
United States	0.64	0.54	42 000	1.27

**Table A.2**

Piachaud (1981) cost of children results in 1992 NZ dollars

Method	2 yrs	5 yrs	8 yrs	11 yrs	14/15 yrs
(1981 UK pounds)	8.32	9.45	11.42	12.10	21.90
CPI then PPP	38	43	52	56	101
CPI then ER	54	61	74	78	141
% avg male wage	35	40	48	51	92

## Appendix B - scales reported in this study

The scales are for children aged around 10 or are average figures.

**Table B.1**

Equivalence scales using the Engel and extended Engel (Canadian) methods

Author	Data	Country	2A	2A+1C	2A+2C	2A+3C
<b>Engel</b>						
Banks and Johnson (1993, 1994)	1989-90	UK	1.00	1.37	1.70	1.99
Phipps and Garner (1994) <sup>a</sup>	1986	Canada	1.00	1.36	1.73	2.06
Tran Nam and Whiteford (1990)	1984	Australia	1.00	1.27	1.61	2.03
Bradbury (1992) <sup>b</sup>	1988-89	Australia	1.00	1.37	1.56	1.82
Tsakloglou (1991) <sup>c</sup>	1981-82	Greece	1.00	1.33	1.76	-
Espenshade (1984)	1972-73	US	1.00	1.24	1.41	-
<i>Geometric mean of the above</i>			<b>1.00</b>	<b>1.32</b>	<b>1.62</b>	<b>(1.97)</b>
<b>Extended Engel</b>						
Phipps and Garner (1994) <sup>a</sup>	1986	Canada	1.00	1.27	1.53	1.73
Tran Nam and Whiteford (1990)	1984	Australia	1.00	1.26	1.59	2.01
Canadian LICOs (Ruggles, 1990)	1986	Canada	1.00	1.27	1.46	1.60
<i>Geometric mean of the above</i>			<b>1.00</b>	<b>1.27</b>	<b>1.53</b>	<b>1.77</b>

Notes (a) This study controls for household size only. To derive child costs, it has to be assumed that n-person households consisting of 2 adults and n-2 children dominate the respective categories to such a degree that the approximation is warranted or that households of the same size have approximately the same 'needs' regardless of composition.

(b) From Table 4.3

(c) Tsakloglou reports some diseconomies of scale

**Table B.2**

Results using the Rothbarth (adult goods) technique

Study	Composite Adult Good	Country	Year	One child <sup>1</sup>		Two child
				0-5 yrs	6-13 yrs	
Deaton & Muellbauer (1986)	adult clothing, alcohol, tobacco	Sri Lanka	1969-70	1.10 (1.20)	1.12 (1.22)	1.21 (1.34)
	<i>(adjusted ratios - see text)</i>	Indonesia	1978		1.12 (1.22)	1.20 (1.33)
Fedyk (1991)	adult clothing, gifts to charity, miscellaneous spending	Canada	1986			
			low inc	1.18	1.20	1.35
			high inc	1.12	1.14	1.23
Lazear & Michael (1988)	adult clothing, alcohol and tobacco	US	1972-73		1.20	
Nelson (1990)	adult clothing, alcohol and tobacco	US	1972-73		1.13	
Bradbury (1989)	adult clothing or alcohol	Australia	1984		1.20	1.40
Bradbury (1994)	adult clothing	Australia	1988-89		1.16	1.28
Tsakoglou (1991)	meals out, alcohol, tobacco, adult clothing & footwear, entertainment	Greece	1981-82	1.09	1.13	1.29
Deaton et al (1989)	adult clothing, adult education, alcohol, entertainment, health, meals out, personal care, transport	Spain	1980-81	1.11	1.15	
<i>Geometric mean of the above (excluding D&amp;M's adjusted figures)</i>				<b>1.12</b>	<b>1.15</b>	<b>2.28</b>

<sup>1</sup> For those studies that do not provide an age analysis, the child is assumed to be ten years

**Table B.3**

Equivalence scales using the full utility function method

Author	Date	Country	2A	2A+1C	2A+2C	2A+3C
McClements (1977)	1971-72	UK	1.00	1.23	1.48	1.71
Muellbauer (1977)	1975	UK	1.00	1.15	1.29	1.42
Muellbauer (1979)	1975	UK	1.00	1.17	1.34	1.51
Phipps (1992)	1986	Canada	1.00	1.43	1.79	2.26
Ray (1986)	1968-79	UK	1.00	1.06	1.12	1.18
Lazear and Michael (1980)	1960-61	US	1.00	1.21	1.39	1.59
Blundell & Lewbell (1990)	1970-84	UK	1.00	1.14	1.29	1.47
van der Gaag <i>et al</i> (1982)	1972-73	US	1.00	1.08	1.18	1.28
Kakwani (1977)	1967-68	Australia	1.00	1.21	1.38	1.48
Tran Nam and Whiteford (1990)	1984	Australia	1.00	1.20	1.27	1.44
<i>Geometric mean of the above</i>			<b>1.00</b>	<b>1.18</b>	<b>1.34</b>	<b>1.51</b>
<i>For comparison</i>						
Whiteford (1985)			1.00	1.17	1.31	1.47
- <i>geometric mean of utility theory results</i>						
van der Gaag (1982)			1.00	1.25	1.38	1.50
- <i>rough mean from his survey of all methods</i>						

**Table B.4**

Results of some studies using the subjective method

Study	Country	Data Year	Number of children <sup>a</sup>			
			1	2	3	4
Kapteyn & van Praag (1976) <sup>b</sup>	Netherlands	1971	1.19	1.28	1.36	1.39
Rainwater (1974)	US	1974	1.12	1.27	1.30	-
Goedhart <i>et al</i> (1977)	Netherlands	1975	1.13	1.24	1.32	1.40
van Praag & van der Sar (1988) <sup>c</sup>	UK	1979	1.14	1.23	1.32	1.40
Danziger <i>et al</i> (1984)	US	c 1977	1.12	1.23	1.32	1.40
Dubnoff (1985) <sup>d</sup>	US	c 1983	1.15	1.26	1.37	1.46
de Vos and Garner (1989) <sup>e</sup>	US	-	1.18	1.34	1.44	-
Deleek (1989)	Belgium		1.16	1.26	1.31	-
<i>Geometric mean of the listed scales</i>			<b>1.15</b>	<b>1.26</b>	<b>1.34</b>	<b>(1.41)</b>

a Several of the studies use family size rather than number of children as the household characteristic variable, but in these cases the predominant households were nuclear family ones headed by an adult couple.

b For younger children (parents in mid to late twenties).

c A mid-range example from the extensive study reported on above (see Table 10.1 and associated text)

d Source: Bradbury (1989), Table 2.

e Source: Calculated from Ruggles (1990), Table 4.4.

**Table B.5**

Results using the deprivation index method

Study	Country	Data Year	Number of children			
			1	2	3	4
Townsend (1979) <sup>a</sup>	UK	1971	1.21	1.41	1.62	1.82
Mayer and Jencks (1989) <sup>b</sup>	US	1974	1.4	1.8	2.2	2.6

a The average of his 'younger' and 'older' children results (cf Brashares and Aynsley, 1990)

b An estimate based on their reported result of a scale with an elasticity of about 0.9

**Table B.6**

Budget estimates of child cost in equivalence scale format

	2A	2A+1	2A+2	2A+3	2A+4
German	1.00	1.36	1.72	2.08	2.44
US	1.00	1.23	1.57	1.86	2.09
Beveridge <sup>1</sup>	1.00	1.24	1.48	1.72	1.96
Piachaud	1.00	1.23	1.50	1.82	-
Oldfield <sup>2</sup>	1.00	1.26	1.44	-	-
Henderson <sup>3</sup>	1.00	1.15	1.37	1.68	-
<i>Geometric mean</i>	<i>1.00</i>	<i>1.24</i>	<i>1.51</i>	<i>1.83</i>	

1 At subsistence level (Source: McClements, 1978 , Table 5.10)

2 Excluding childcare

3 For the 'head working' scenario. The 'head not working' option has a very slightly higher scale.

**Table B.7**

Examples of modular based scales

	Original specification		Recalculated for couple household as reference						Average <sup>a</sup> elasticity
	Adults 1 & 2	Children	A	2A	2A+1	2A+2	2A+3	2A+4	$\theta$
German <sup>a</sup>	1.0 0.80	0.65	0.56	1.00	1.36	1.72	2.08	2.44	0.80
O'Higgins <i>et al</i> (1989)	1.0 0.50	0.50	0.67	1.00	1.33	1.67	2.00	2.33	0.75
OECD <sup>b</sup>	1.0 0.70	0.50	0.59	1.00	1.29	1.59	1.88	2.18	0.70
RCDIW <sup>c</sup>	1.0 0.65	0.45	0.61	1.00	1.27	1.55	1.82	2.09	0.65
LIS <sup>d</sup>	1.0 0.40	0.30	0.71	1.00	1.21	1.43	1.64	1.86	0.55
CCSD, Callan <sup>e</sup>	1.0 0.67	0.33	0.60	1.00	1.20	1.40	1.61	1.81	0.50
Jensen (1989) <sup>f</sup>	1.0 0.55	#1 0.35 #2 0.30 #3 0.25	0.65	1.00	1.23	1.42	1.58	1.74	0.50

Notes a Based on a budget standards approach (Burkhauser *et al*, 1990)

b Recommended by the OECD for countries that do not have their own scale, (OECD, 1982). Ringen and Halpin (1995: 20) refer to this scale as a 'middle-of-the-range' one. This is a strange comment - the OECD scale is at the top of the range of scales that are considered 'plausible'. Perhaps they meant that it is mid-way between the two extremes of per capita scale and 'no scale'.

c Used by the Royal Commission on the Distribution of Income and Wealth (1978) [Source: Coulter *et al* (1992: 102f)]

d See Smeeding *et al* (1993) - not all LIS works use this scale however.

e Used by the Canadian Council on Social Development (Phipps, 1993) and in Callan *et al* (1993)

f Designed to fit well with the Revised Jensen Scale (Jensen, 1988)

g These are approximate only and focus on the scales for household size 2 and above. The O'Higgins *et al* scale is particularly difficult to model as all additional family members after the first are allocated the same weighting.

## Appendix C - Scales and elasticities

Source: Atkinson *et al* (1995)

Note that the 'E' in the following table is equivalent to ' $\theta$ ' in this report. Atkinson and colleagues have simply updated the earlier summary of Buhmann *et al* (1988).

Table 2.2 Family Size Exponents in Different Equivalence Scales  
A. Individual Scales

Line	Type of Scale	Value of E				Correlation with Ln (Size)
		Survey Scales		Expert Scales		
		SUBJ	CONS	PROG	STAT	
1	Unadjusted Family Income E = 0					
2	IEQ - France	0.12				1.00
3	IEQ - Belgium	0.17				1.00
4	IEQ - United Kingdom	0.18				1.00
5	MIQ - U.S. Dubnoff data	0.18				
6	MIQ - U.S. ISDP	0.21				1.00
7	IEQ - Netherlands	0.22				1.00
8	Necessities - U.S. 1960-61		0.23			1.00
9	MIQ - U.S. Gallup	0.23				
10	IEQ - Switzerland	0.26				1.00
11	IEQ - Germany	0.27				1.00
12	IEQ - Denmark	0.27				0.98
13	IEQ corrected - Netherlands	0.29				
14	IEQ - Ireland	0.32				1.00
15	PIE - U.S.	0.33				1.00
16	Dutch Poverty			0.35		0.98
17	MIQ corrected - Netherlands	0.36				1.00
18	Expenditures - U.S. 1960-61		0.37			0.95
19	Expenditures - U.S. 1972-73		0.38			0.99
20	Food - U.S. 1960-61		0.47			1.00
21	France		0.57			n.a.
22	Swedish Poverty			0.54		1.00
23	Australian Poverty			0.55		1.00
24	Austria (Pro-Kopf-Haushaltseinkommen)			0.79		0.87
25	Austria (Katholischer Familienverband)			0.81		0.91
26	Austria (Tyrol Benefits)			0.71		0.91
27	Austria (Oberösterreich Benefits)			0.75		0.99
28	Austria (Niederösterreich Benefits)			0.78		0.87
29	Swiss Poverty			0.56		1.00
30	U.S. Official Poverty			0.56		0.98
31	Canadian Official LICOs			0.56		1.00
32	Expenditures - Switzerland		0.57			0.98
33	British Poverty			0.59		0.99
34	German Poverty			0.67		1.00
35	Australian Bureau of Statistics				0.50	0.96
36	Australia Henderson (head not working)			0.51		0.98
37	Australia Henderson (head working)			0.58		0.99
38	European Poverty Line 3, LIS				0.70	1.00
39	Jenkins/O'Higgins				0.72	1.00
40	U.S. Bureau of Labor Statistics				0.72	1.00
41	OECD Social Indicators				0.73	1.00
42	European Poverty Line 1				0.84	1.00
43	Finland (TASKU Scale)		0.65			0.97
44	Germany				0.88	0.89
45	Italy (Sarpellon)		0.70			1.00
46	Italy (Ministero del Lavoro)				0.56	0.99
47	Italy (2nd Report of Poverty Commission)		0.72			1.00
48	Italy (ISPE)		0.76			1.00
49	Italy (CNEL)		0.61			0.98
50	Ireland (Supplementary Welfare Allowance)			0.59		0.94
51	Luxembourg				0.70	0.98
52	Netherlands				0.70	0.88
53	Sweden				0.74	0.97
54	UK (McClements before housing costs)				0.78	0.82
55	UK (McClements after housing costs)				0.91	0.81
56	Per Capita Income E = 1.0					

## B. Summary Statistics

Line	Type of Scale	Value of E			
		Survey Scales		Expert Scales	
		SUBJ	CONS	PROG	STAT
	Minimum Value	0.12	0.23	0.35	0.50
	Maximum Value	0.36	0.76	0.81	0.91
	Median Value	0.25	0.57	0.59	0.72
	Mean Value	0.24	0.55	0.62	0.69

*Notes:* IEQ - Income Evaluation Question; MIQ - Minimum Income Question; PIE - Public Income Evaluation. Summary statistics do not include lines 1 and 56.

*Sources by line:*

2,3,4,10,11,12,14:	Van Praag, Hagenaars and van Weerden [1982]
5:	Rainwater [1987]
6:	Danziger, Van der Gaag, Taussig and Smolensky [1984]
7, 13, 16, 17:	Kapteyn, Kooreman and Willense [1987]
8, 20:	Watts [1967]
9, 15:	Rainwater [1974]
18, 40:	Lazear and Michael [1980]
19:	Van der Gaag and Smolensky [1982]
21:	D. Verger
22:	Wahlstrom [1987]
23:	Henderson [1975]
24, 25, 26, 27, 28:	[ 1990]. Supplied by Herr Wolf.
29:	Buhmann [1988]
30:	U.S. Department of Commerce [1987]
31:	Statistics Canada [1987]
32:	OECD, "Social Indicators" [1982] Scale
33:	Ramprakash [1986]
34:	Dobroschke-Kohn [1987]
35, 36, 37:	Supplied by B. Bradbury
38:	Hauser and Nouverne [1980]; also used in initial LIS research papers, see Smeeding, Rainwater and O'Higgins [1988]
39, 41, 42:	Jenkins and O'Higgins [1987]
43:	Supplied by A. Salomaki
44:	Supplied by I. Fischer
45:	Sarpellon [1982]
46:	Ministero del Lavoro [1983]
47:	Carbonaro [1985]
48:	Di Biase, Di Marco and Di Nicola [1993]
49:	Rossi [1993].
50:	Supplied by B. Whelan
51:	Supplied by CEPS, Luxembourg
52:	Supplied by the Netherlands Ministry of Social Affairs
53:	Supplied by the Swedish Central Statistical Office
54, 55:	Department of Social Security [1993], p 124.

The results in Table 2.2 span almost the entire range from no adjustment to per capita adjustment – extending from 0.12 for a scale developed from the van Praag Income Evaluation Question (IEQ) in France to 0.91 for the equivalence scale by McClements (1978).

Four types of scales were developed: two using experts' knowledge, and two empirically from analyses of survey data. Social science analysts who develop expert scales using various of materials are usually responsive to policy and precedent considerations. Scales may explicitly affirm how need varies by family size, as in the US Poverty Line, or implicitly establish amounts payable by a transfer programme, as in the Income Support scheme (and associated housing supplements) in the United Kingdom. Two somewhat different goals of expert scales are therefore apparent:

– **Expert Statistical (STAT)**

Scales in this case are developed only for statistical purposes to count persons below or above a given standard of living, for example minimum adequacy. The Bureau of Labor Statistics family budgets are a good example, or the scales used in *OECD Social Indicators* or by the European Commission to count low income population.

– **Expert Programme (PROG)**

The second type of expert scale focuses on defining benefits for social programmes – the Swedish "base amount" is an example of a scale used to calculate benefits under social protection programmes. The US

poverty line was initially developed for statistical purposes but now also serves as a guide to the adequacy of programme benefits.

Survey-based scales presenting a second general approach employ multivariate analyses of either consumption expenditures or respondents' assessment of the adequacy of income in terms of some particular target (making ends meet, not being poor, having a very good income, etc.).

– **Consumption (CONS)**

This aims to measure utility indirectly through revealed preferences of consumer spending constrained by disposable income.

– **Subjective (SUBJ)**

The goal here is to measure directly the utility associated with particular income levels for families of given characteristics. These scales address three important topics: Income Evaluation Question (IEQ), Minimum Income Question (MIQ), and Public Income Evaluation (PIE).

Table 2.2 illustrates the various forms of different kinds of scale. Expert scales usually have the highest elasticities, with a median of 0.72 for statistical, and 0.59 for programme oriented. Consumer expenditure scales have a median of 0.57, and subjective scales only 0.25, therefore a family of 4 persons is treated as equivalent to 1.4 adults on the basis of a value of 0.24, but 2.7 adults with a value of 0.72.

Measures of scale used for this study are S1, or per capita household income, and  $S^{0.5}$ . These were chosen because adjustment for need is important and per capita household income is a well recognised international standard which will increase the comparative usefulness of our study for current and future projects. The  $S^{0.5}$  measure provides a good contrast between per capita income S1 and the case of no adjustment S0, which is also considered when conducting sensitivity tests. Of the 54 estimates in Table 2.2, fourteen range from 0.4 to 0.59. Many country studies (Chapter 5) also use S0.

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