Session Number: Parallel Session 4B
Session Title: Multidimensional Measurement and Comparison of Economic Well-Being
Paper Number: 2
Session Organizers: Thesia Garner, Jean-Yves Duclos, and Lars Osberg
Discussant:Professor Peter Saunders

Paper Prepared for the 28th General Conference of
The International Association for Research in Income and Wealth
Cork, Ireland, August 22-28, 2004

THE MEASUREMENT OF WELL-BEING BASED ON HIERARCHICAL NEEDS: A MULTIDIMENSIONAL APPROACH APPLIED TO SOUTH-EAST ASIA

MATTHEW CLARKE
SALLY PAECH

For additional information please contact:

Dr Matthew Clarke
Centre for Strategic Economic Studies
Victoria University
PO Box 14428
Melbourne City MC
Victoria 8001
AUSTRALIA
matthew.clarke@vu.edu.au
fx. + 61 3 9248 1350
ph. + 61 3 9248 1047

This paper is placed on the following websites: **www.iariw.org**
www.econ.nyu.edu/iariw
www.cso.ie

Abstract
Determining whether well-being has improved is an important task. Numerical measures of well-being are therefore becoming increasingly common and numerous methods of measurement now exist. A limitation of some approaches however, is a lack of multidimensionality in terms of defining well-being. It is important, therefore, to develop a measure of well-being that reflects a wider spectrum of human needs. A new approach is presented in this paper based on multidimensional hierarchical human needs and motivation. Improving well-being within this multidimensional approach requires progressive satiation of hierarchical needs. This hierarchical approach is underpinned by a rigorous psychological theory of human motivation (Maslow 1970). Hierarchical human needs are classified into five categories: basic, safety, belonging, self-esteem and self-actualisation. Within this paper well-being is defined as a function of the extent to which society facilitates the attainment or fulfillment of the ultimate hierarchical need; self-actualisation. It is possible to operationalise this approach by identifying outcomes and indicators that represent or correspond to the four lower levels of needs upon which the achievement of self-actualisation is predicated. Eight indicators have been chosen to reflect these four hierarchical categories . A composite indicator of these eight indicators will be calculated using an approach similar to that of the Human Development Index. Weights will also be assigned to the different levels within this hierarchy to reflect the shift from minimally adequate standards to higher levels of well-being within nations. This paper empirically applies this new measure of well-being to eight south-east Asian countries for the period 1985-2000. The countries surveyed are Singapore, Malaysia, Thailand, Philippines, Vietnam, Indonesia, Cambodia and Lao PDR. Results for Australia are also provided as a comparative benchmark. This new measure of well-being is operational and provides intuitively correct results. This paper argues that widely accepted measures of well-being, both representative (i.e. GDP per capita) and composite (i.e. HDI) fail to fully capture actual movements of well-being within nations across time as they are not sufficiently multidimensional in character. The results of this new approach show a general increase of well-being based on the attainment of hierarchical needs recorded across the region over the past sixteen years. This paper concludes that policy makers must consider multidimensional human needs and motivation when seeking to improve well-being through economic and social development activities.

1. Introduction

Determining whether well-being in developing countries has improved is an important task. Numerical measures of well-being are becoming increasingly common and numerous methods of measurement now exist. This paper provides a systematic empirical study of well-being in Southeast Asia.

Common measures of well-being include single dimension indicators such as Gross Domestic Product (GDP) per capita, life expectancy or literacy rates, or composite indicators using various combinations of these, such as the Human Development Index (HDI) (UNDP 2002) or the Physical Quality of Life Index (PQLI) (Morris 1979). A limitation of such approaches however, is a lack of multidimensionality in terms of defining well-being. It is important, therefore, to develop a measure of well-being that reflects a wider spectrum of human needs. One way to represent this multidimensionality in well-being measurement is to consider hierarchical human needs. Whilst some relative reporting in terms of well-being in the form of hierarchical needs has been undertaken (Daly 1996), the empirical implication of this approach to determine and measure well-being in terms of hierarchical needs is limited (Clarke and Islam 2004; Islam and Clarke 2003).

A new approach is presented in this paper based on multidimensional hierarchical human needs and motivation. Improving well-being within this multidimensional approach requires progressive satiation of hierarchical needs. This hierarchical approach is underpinned by a rigorous psychological theory of human motivation (Maslow 1970). Hierarchical human needs are classified into various categories, including basic, safety, belonging and self-esteem needs. This highest level of need is self-actualisation. Becoming self-actualised is predicated on the attainment or fulfillment of the lower level needs. Therefore, the concept of self-actualisation can be considered analogous with Sen's concept of capabilities (Sen 1985, 1987a, 1987b) and Doyal and Gough's (1991) concept of social and critical participation. Within this paper therefore, well-being is defined as a function of the extent to which society facilitates the attainment or fulfillment of the ultimate hierarchical need; self-actualisation.

It is possible to operationalise this approach by identifying outcomes and indicators that represent or correspond to the four lower levels of needs upon which the achievement of self-actualisation is predicated. Eight indicators have been chosen to reflect these four hierarchical categories. A composite indicator of these eight indicators will be calculated using an approach similar to that of the HDI. Weights will also be assigned to the different levels within this hierarchy to reflect the shift from minimally adequate standards to higher levels of well-being within nations. This paper empirically applies this new measure of well-being to eight south-east Asian countries for the period 1985-2000. The countries surveyed are Singapore, Malaysia, Thailand, Philippines, Vietnam, Indonesia, Cambodia and Lao PDR. In addition, results for Australia will also be provided as a comparative benchmark.

This paper argues that widely accepted measures of wellbeing, both representative (i.e. GDP per capita) and composite (i.e. HDI) fail to fully capture actual movements of well-

being within nations across time as they are not sufficiently multidimensional in character. The results of this new approach show a general increase of well-being based on the attainment of hierarchical needs recorded across the region over the past sixteen years. This paper concludes that policy makers must consider multidimensional human needs and motivation when seeking to improve well-being through economic and social development activities

The paper is divided into seven sections. The second section reviews the unresolved debate on how well-being should be defined. Section 3 introduces Maslow's framework of hierarchy of needs before Section 4 discussed how this approach can be uilitised to measure well-being. Section 5 discusses how this new approach is operationalised. The findings of this new approach to well-being measurement based on the fulfillment of hierarchical needs are reviewed in Section 6. The final section summarises the paper.

2. Defining Well-being

Fundamental to the debate surrounding individual well-being (or welfare) is that a universally acceptable definition has still not been agreed upon (indeed much of the literature discusses well-being without explicitly defining it – see Hudson 1972; Leacomber 1975; Dodds 1997). 'While the term welfare is used repeatedly in economic writings, the precise meaning remains vague' (Brekke 1997, p. 92). Well-being has been defined as a function of consumption (McKenzie 1983; Slesnick 1998), particularly in areas of great poverty (Hueting 1980), as a function of consumption and the environment (Islam 1998), as a function of consumer surplus (Johnson 1996), as a function of consumption weighted by probability of survival (Nordhaus 1998), and as marginal propensity to consume (Islam 2000). Alternatively, well-being is considered to be greater than simply consumption (Bonner 1986), or indeed that well-being is specifically not linked to consumption (Boulding 1949-50, 1992; Sen 1987b) but is rather a function of capital stocks (Daly 1996), or expenditure (Jorgensen 1997), or income (Pearse et al. 1989; Usher 1980; Kakwani 1997b, 1997c), or even the opportunity to consume – but not the consumption itself (Bliss 1993).

The concept of social well-being is similarly vague and is generally assumed to be the aggregation of individual welfare (Ng 1979; Sen 1970, 1976; Hufschmidt et al. 1983; Chakravarty 1990; Kakwani 1997a, 1997b). However, it can be considered greater than the sum of its individual parts (Kiron 1997).

As well-being can be defined in various ways, it can also be measured in different ways. It is possible therefore to list various components that must be considered when developing a measure of well-being. For example, Nassbuam (2000) identified emotions, bodily integrity and health, social basis of self-respect, freedom from discrimination, and control over environment, and Doyal and Gough (1991) identified physical security, economic security, opportunities to participate and cognitive and emotional capacity. However, the lack of an agreed definition often leads to simple representative indicators, such as income or gross domestic product (GDP) per capita, being used to measure well-being. For example, the

World Bank uses income levels to classify nations into categories of development and implicitly uses these classifications as proxy indicators of well-being (World Bank 2003). The use of GDP per capita is attractive to economists and non-economists alike. GDP per capita is tangible and well understood by many. The development of a system of standard national accounts has been heralded as the 'achievement of the century' for its role in winning World War II, stablising economies and promoting prosperity (Moullon 2000). The logic of using GDP per capita as a measure of well-being is therefore simple and attractive; if the economy is growing so must well-being, if GDP per capita falls, so to does well-being.

The limitation of single indictors, such as GDP per capita, is that they exclude from considerations many other aspects of well-being. Composite indicators, such as the Human Development Index (HDI) were designed to compensate this limitation. Whilst a composite approach to measuring well-being is an improvement over single representative measures, composite measures, such as the HDI, can also lack a multidimensionality and are not necessarily based on a substantial theory of human needs. The HDI is a function of life expectancy, literacy and GDP per capita. The purpose of the HDI is to extend consideration of human development of well-being way from the economic-centric nature suggested when simply using GDP per capita. However, the high correlation between the component indicators of the HDI arguably makes this attempt redundant (McGillivray 1991). Similar criticisms can also be made against the forerunner of the HDI, the Physical Quality of Life Index (Morris 1979).

Well-being is a multi-faceted concept and it is affected by various elements, including economic resilience, social supports and relationships, health outcomes, mental robustness, the environment and spirituality (Clarke and Islam 2004). Accurately conceiving and measuring well-being provides important benefits. If this multidimensional concept can be estimated it can:

- depict the social trajectory of a country;
- assist in determining national objectives for social development;
- analyse and operationalise these development goals
- determine alternative feasible trajectories;
- determine optimal alternatives; and
- monitor and evaluate policy interventions.

3. Maslow's Hierarchical Framework

Maslow's (1970) hierarchy of human needs and motivation theory was initially proposed to explain human motivation. It was psychological theory focussing on workplace behaviour rather than a theory of welfare. Within the *hierarchy of human needs*, human well-being is bounded by the fulfillment of a given set of ascending needs. Human effort is exerted to achieve each level. The primary need that must be fulfilled are those basic needs such as food, shelter and water. Until these needs are fulfilled higher needs are not considered. However, once these needs are achieved, consideration moves to the next tier of needs. The

ultimate need to which humans spire is self-actualization. All behaviour is therefore motivated by the ultimate desire to fulfill one's own potential.

Maslow proposed that fundamental human needs can be divided into five categories (from lowest to highest): basic, safety, belonging, self-esteem and self-actualisation. Maslow argued that these needs are hierarchical in nature and humans strive to reach the highest level of their needs. Once the lower level needs are met, human motivation turns to meeting the next level of hierarchical needs (Maslow, 1970).

Maslow's theory of human need and motivation is suited to underpin a measure of well-being, as it provides an explanation of what is required to improve life outcomes. This hypothesis argues that the fundamental or ultimate needs of all human beings do not differ nearly as much as do their conscious everyday desires. A measure of well-being that focuses on these fundamental needs can be applied across societies and time as fundamental needs are universal, whereas daily desires differ both intertemporally and interspatially. This approach is not dissimilar to that presented in Nassbuam (1992, 1993, 2000) and Doyal and Gough (1991). As Maslow (1970) states: 'ends in themselves are far more universal than the roads taken to achieve those ends, for these roads are determined locally in the specific culture'. These needs are achieved through what Max-Neef (1991) coins 'satisfiers' (see Kamenetsky 1981 for a similar approach). Satisfiers change according to each culture and even differ within those cultures.

The first set of hierarchical needs identified by Maslow is *basic needs*. Basic (or physiological) needs include air, water, food, sleep and sex. Unsatisfied basic needs cause feelings of pain, illness and discomfort. Until these needs are satisfied, attention to higher needs is not possible. The attainment of basic needs occurs at a low level of income. Their satisfaction is an absolute outcome and thus not dependent on increasing income (also see Hirsch 1995, for a description of the *Paradox of Affluence* where higher income and consumption does not increase well-being).

The second group is *safety needs*. These needs are psychological rather than physiological and take the form of home and family. Within the approach used in this paper, the attainment of safety needs is not specifically dependent on income. Indeed, other than basic needs, income levels are specifically not important in increasing well-being within this hierarchical needs fulfillment approach.

The third level of need is *belonging needs*. Humans desire to belong to groups such as clubs, work groups, families or gangs. This level of needs incorporates the need to feel (non-sexual) love and acceptance by others.

Closely related to this is the fourth level of self-esteem needs. Once people belong to groups, they seek to be admired by those around them. Self-esteem can be brought about through the mastery of skills or attention and recognition from others.

Finally, once these four levels of needs have been satisfied, a person can become self-actualized. Self-actualization is an ongoing process. It is the need to be what one was born to be. It is self-fulfillment of one's own potential. Self-actualisation can be considered analogous to capability (Sen 1985, 1987a, 1987b; Nassbuam 1988) and social and critical participation (Doyal and Gough 1991).

The concept of hierarchy can be criticised. Whilst Doyal and Gough (1991) utilise a hierarchical concept in their theory of human needs, they do so only in a methodological sense. They argue, that health and autonomy are fundamental universal needs in a thin, Kantian sense. Then, using codified knowledge, it is possible to identify universal satisfier characteristics that everywhere contribute to these. But all are simultaneously necessary even for low levels of functioning. Max-Neef (1991, 1995) argues that a range of human needs (subsistence, protection, affection, understanding, participation, idleness, creation, identity and freedom) exists, but they do so simultaneously and are therefore non-hierarchical. This divergence can be bridged however. Maslow notes that the dominant need is always shifting so that a self-actualised person does become hungry and tired and this basic need becomes the priority. The implication of this shifting dominated need (Maslow 1971) or non-hierarchy of needs (Max-Neef 1991) is that policies aimed at maximising well-being must be more sophisticated to consider explicitly the various forms of needs and their relative significance in achieving optimal well-being. Developing a measure of well-being based on Maslow's approach of hierarchical need fulfillment encourages this outcome.

4. Fulfillment of Hierarchical Needs and Well-being

Malsow did not intend his theory of needs to be used outside of management psychology, however recent studies (Hagerty 1999; Sirgy 1986) have widened its use to consider development and well-being issues.

Hindrances constructed by society can prevent people reaching the highest level of self-actualization. That is why hierarchical needs fulfillment can be applied to national well-being measures. This approach can demonstrate whether a society is assisting or hindering its citizens from becoming self-actualized. Societies that enable their members to achieve each level of this hierarchy will have higher levels of social well-being.

As this approach to well-being is underpinned by a theory of hierarchical needs, appropriate weights are given to the different levels of needs. In this approach therefore, needs at the higher level of the hierarchy are given more weight than those at the lower end of the hierarchy. The use of weights in this fashion demonstrates that the hierarchical structure of needs has been explicitly considered in the conceptualization and measurement of well-being since different hierarchical structures of needs provide different types and levels of well-being.

This approach does not seek to use the Maslow approach to predict patterns of economic development. Rather, it draws on Maslow's description of needs to measure well-being.

Rather than predicting paths of development, this paper is interested in measuring well-being in a manner, which until this time, has yet to be undertaken.

Table 1 summarises the well-being outcomes associated with each level of need.

Table 1 Selected well-being outcomes and indicators that correspond to Maslow's categories of needs.

Maslow's categories of needs	Some well-being outcomes that correspond with this need
Basic (physiological)	• Healthy
	• Vitality
Safety	• Safe
	• Settled
	• Secure
Belonging	• Included
	• Loved
	• Participating
Self-esteem	• Empowered
	• Confident
	• Convivial
Self-actualisation	• Actively seeking knowledge
	• Inspired to reach potential

It is possible to operationalise this approach by identifying outcomes and indicators that represent or correspond to the four lower levels of needs upon which the achievement of self-actualisation is predicated. Eight indicators have been chosen to reflect these four hierarchical categories. The indictors selected are:

Basic
- Daily calories available per person
- Access to safe water

Safety
- Infant mortality
- Life expectancy

Belonging
- Telephone mainlines
- Fertility rates

Self-Esteem
- Adult illiteracy
- Unemployment

Significant literature exists regarding the identification of basic needs (see Streeten 1995 for a summary of the issues surrounding this area). Two measures have been chosen as indicators for this first level of need; calories per person and access to safe water. Without sufficient food or sufficient water quality, long-term survival is not possible. Having attained the lowest level of needs required, attention would focuses on achieving a feeling of safety. Two indicators of safety have been chosen to measure this: infant mortality and life expectancy. Infant morality reflects the safety of society's most vulnerable members (unborn and new born babies) and life expectancy is a reasonable measure of how safe one's life is across society. The relationship one has with one's own family is often rated highly as a factor of self-reported happiness. In this sense fertility rates represent belonging to a family. Belonging to the wider society is represented by telephone mainline connections and fertility rates. Adult illiteracy rates amongst adults and unemployment rates have been selected to represent the concept of self-esteem.

It is acknowledged that all indicators have limitations. However, it is argued that the selected indicators are robust enough to provide a solid basis for this application and subsequent analysis. Each indicator has been selected to represent the various concepts encapsulated in each level of need. The criteria upon which these indicators have been chosen are reliability, availability, reliance and timeliness (Baster 1972). It is acknowledged that no indicator is perfect and strong arguments for alternative choices can be made.

Whilst Hagerty (1999) proposed the indicators that form the basis for this new measure, the ultimate choice of indicators must based on society's preferences and value judgements. To this end, Doyal and Gough (1991) adopt a dual strategy of social policy formation in which decisions are made using 'both the codified knowledge of experts and the experimental knowledge of those whose basic needs and daily life world are under consideration' (1991, p. 141). This approach bears strong resemblance to normative social choice theory (Clarke and Islam 2004). Normative social choice theory is concerned with how the preferences, value judgments and choices of society can be identified and measured. Traditionally, voting systems were the primary focus within this theory. However, it is possible to extend this theory to measure well-being. Normative social choice theory should be applied to well-being measures as it highlights social preferences and value judgments. It is concerned with economic and non-economic activities that are important in determining well-being levels, quality and composition. Normative social choice theory can highlight changes within society and how these changes impact on well-being. Applying normative social choice theory to measuring well-being is dependent upon four operations determining: 1) whose well-being is being measured; 2) whether the well-being of the group is different or equal to the sum of well-being of the group's individual members; 3) how distribution of

the individual well-being effects the group's well-being; and 4) how to aggregate individual well-being to determine the level of group well-being (Bonner 1986).

5. Operationalising the Fulfillment of Hierarchical Needs Index (FHNI)

Having determined the indicators representing each set of hierarchical needs leading to well-being or self-actualisation, it is necessary to construct a social welfare function to operationalise the Fulfillment of Hierarchical Needs index (FHNI).

The social welfare function is:

$$WB = SA(\alpha_1.BN, \alpha_2.SN, \alpha_3.BeN, \alpha_4.SEN)$$

where:
WB = well-being
SA = self actualization
BN = basic needs
SN = safety needs
BeN = belonging needs
SEN = self esteem needs
$\alpha_1,\ldots,\alpha_5$ are the weights assigned to each set of needs

5.1 Weights

If well-being or self-actualisation is achieved through the attainment of various hierarchical components, a decision must be made as to the importance of the different components with respect to their impact on well-being. A decision therefore must be made as to the relative importance between the hierarchical components within that functional relationship.

As an aggregation of different components or as a function of separate forms, weighting is an important issue when measuring different levels of well-being.

The determination of weights is dependent on various value judgments made explicit within the social welfare function and is based on normative social choice theory (Clarke and Islam 2004). Even when explicit weights are not defined, a value judgment has been made in that all components are equally weighted. This decision is just as much a value judgment as setting separate weights for each component.

No agreement exists as to how these weights should be determined. A number of various methods have been suggested (Islam and Clarke 2003; Clarke et al. 2003). Firstly, the decision-maker unilaterally sets the weights according to their own value judgments on equity (Dasgupta and Pearce 1971). Equity may refer to income levels or be beyond income and may be equity in terms of access to social services, ascetic environments, or satisfactory mental health. Secondly, the weights may be set to reflect society's preferences

on equity reflected in such policy instruments as marginal taxation rates. The justification for this approach is that society, represented through successive governments, has determined that through progressive tax rates, the benefits of those on higher incomes should be weighted less than the benefits of those on lower incomes. As such, the calculation of well-being should be biased in favour of those on lower incomes rather than those on higher incomes as this is society's preferences (Dasgupta and Pearce 1971). Thirdly, a similar approach, first suggested by Foster (1966), has that the aggregation of well-being based on individual well-being be weighted by the ratio of the average national income to the individual's income. Fourthly, rather than use the ratio of national average income to individual income, the shape and elasticity of the marginal utility of income could determine the weights. The major difficulty of this approach however rests on the assumption that such a calculation of utility can be determined. Whilst some estimates have been made (see Theil and Brooks 1970 for an example of an early attempt) 'most economists remain unshaken in their belief in the impossibility of measuring differences in the marginal utility of income across individuals' (Pearce and Nash 1981, p. 27).

Clearly then, weights can take any reasonable form, being only dependent on the value judgments upon which they are based.

Within this paper the weights have been set by the authors based on a value judgment that the appropriate weights should reflect a hierarchical and linear progression. As the fulfillment of these needs is hierarchical, greater weight is given to the higher needs. As a simple linear progression is used, basic needs are weighted least (x1), safety needs are weighted as twice as important (x2), belong needs three times as important (x3) and self-esteem needs four times as important (x4). This decision is consistent with normative social choice theory in which society's preferences and value judgments are interpreted by the analyst (Bonner 1986). A case could be made for reversing the weights to reflect a country's level of development, i.e. greater weight given to lower level needs as that should be a developing country's priority. However, this undermines the strength of the hierarchical approach. Appendix 10 indicates that such a reversal does not significantly affect the final analysis.

5.2 Aggregation

The estimation of this measure of well-being relies on aggregating changes in illiteracy rates, calorie intake, telephone mainlines, etc. Such an aggregation requires finding a common denominator. A *normalised* index for each component can be calculated in order to find this common denominator. A *normalised* index is calculated by dividing each year's figure by the highest figure occurring throughout the time series. Such an index therefore compares movements within a span of numbers rather than the numbers themselves. By using this approach, different indicators can be compared (and aggregated).

This approach is similar to that used in calculating the HDI with one significant difference. Within the HDI, the normalised number is calculated by comparing one country's performance against the performance of all other countries for that year. Thus, countries are ranked against one another. In the approach taken in this paper, a country is compared

against itself over the period being reviewed (i.e. 1985-2000). Thus comparisons between countries are actually comparisons of how countries have improved (or worsened) relative to their own standards. Therefore, whilst the indicators across all levels of needs may be substantially higher in "rich" developed countries, the measurement of well-being will not necessarily be higher in these countries than in countries with lower indicators. This is because well-being is based on movements within these indicators, not on their absolute numbers. Thus, a country with a poor record of infant mortality (of say, 100 in every 1000) will improve in terms of well-being if the infant mortality is reduced over the specified time period, compared to a country with a low level of infant mortality (of say, 10 in every 1000) that remains static.

This outcome could be considered a significant flaw in the calculation of the index of well-being based on the fulfillment of hierarchical needs. It appears to reward countries with low starting points and penalises countries that are already developed. However, this outcome can also be seen as a major advantage as well. Human beings are adaptive by nature. Small mercies can be found in the most miserable of circumstances and tedium found in lavish surrounds (Sen 1990; Hirsch 1995). If an increase in wealth leads to happiness it is only a temporary situation, a disequilibrium of sorts. 'Happiness is not the results of being rich, but a temporary consequence of having recently becoming richer' (Inglehart 1990 cited in Myers 1999, p. 3; also see Pusey 1998; Brekke 1997; Travers and Richardson 1993. Ng 2001 provides an extensive review of this literature). Equilibrium soon returns and peoples' levels of satisfaction will subsequently fall. Thus increasing well-being is partly dependant upon regular improvements in satiating various hierarchical needs. It therefore may be that well-being within developed countries will plateau at a certain point when all hierarchical needs have been reached and constant improvements within each category is no longer possible. It is thus not difficult to accept that there maybe a cap on levels of human happiness or well-being (Cummins et al. 2001).

6. Analysis

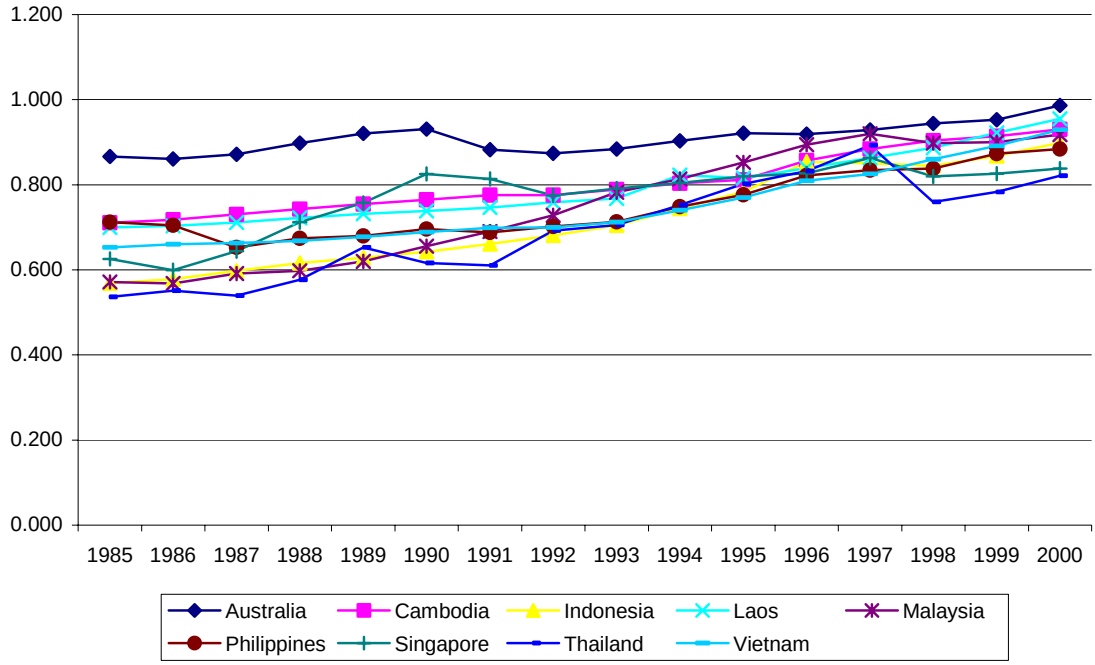
As this new measure of well-being is based on fulfilling hierarchical needs within society, it is able to provide useful insights into the structure of society in terms of those needs. It provides information on which needs are being successfully attained and which needs are failing to be met. Alternative measures of well-being do not adequately provide such information (Islam and Clarke 2000, 2001).

As discussed in Section 5.1, the components of the FHNI have been weighted in a linear manner so that the highest need (self-esteem) is four times as important as the lowest need (basic) and so forth. The results (see Figure 2) show that well-being, of all countries discussed as defined by the FHNI, has risen over the period 1985-2000.

Interestingly though, this general increase occurs for most countries in a series of falls and rises. Thailand recorded the most striking falls between 1989-1991 and 1997-1998. The latter fall being linked to the Asian Financial Crisis. (Little change is observed when the weights are reversed – see Appendix 10. This may be explained by the fact that consistent

economic growth has not impacted on the two lowest needs (needs and safety) as these can be reached with relatively low levels of national income.)

Figure 2 Comparison of FHNI, 1985-2000

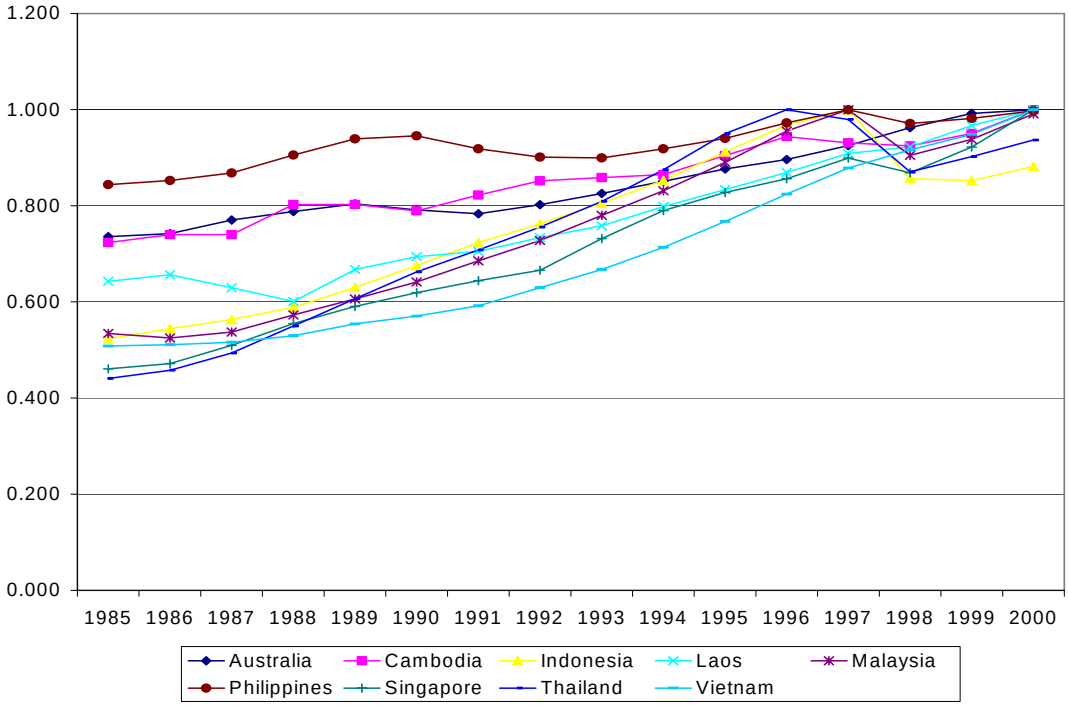


6.1 FHNI and GDP per capita

Economic well-being is often measured in the literature by a single, representative indicator – GDP per capita (see for example World Bank 2001; Gylfasson 1999). It is therefore useful to compare these two measures of well-being. The increase in GDP per capita (constant in 1995 US$) (normalised in the same manner) for this period can be seen in Figure 3. The increase in constant GDP per capita is greater than that experienced in the FHNI. The increase in constant GDP per capita is quite accelerated between 1985-1996. Following the Asian Financial Crisis, the rate of growth within these countries shrank, and actually was negative in a number of countries.

Compared to the large increases in well-being as measured by constant GDP per capita, the rise in well-being as measured by the fulfillment of hierarchical needs is quite modest. The average increase in FHNI between 1985 and 2000 was 39% compared to an average increase in GDP of 70%. The smallest increase in the FHNI was 14% (Australia) compared to 18% (Philippines). But the gap between the maximum increases range from 61% for the FHNI (Malaysia) to 117% for constant GDP per capita (Singapore).

Figure 3 Comparison of GDP per capita (1995 US$), 1985-2000



It may be argued that economic growth therefore has a limited impact on well-being, or at the very least the relationship between economic growth and well-being is overstated. For all countries, FHNI actually rose and fell independently of the accelerated growth in GDP per capita recorded during this period. If well-being is able to fall or remain unchanged during periods of strong economic growth, such growth has arguably limited impact on well-being.

Comparing well-being (measured by FHNI) and economic growth (measured by constant GDP per capita) may provide some new insights into the efficiency of converting income (Y) into well-being:

$$WB = Y\,\alpha$$

where α is the efficiency rate of converting income into well-being.

Ruskin, writing in the mid 19th century, defined well-being not simply as the measurement of economic possessions but the capability of utilizing them in an appropriate manner (Smith 1993). Cochrane and Shaw Bell's definition of well-being is based on a similar approach. 'The consuming unit buys food, clothing, shelter, and recreation and transforms them into satisfaction, or utility' (Cochrane and Shaw Bell 1956, p. 95).

Sen (1985a, 1987a, 1987b) takes this approach further and argues that well-being is not measured by the possession of a commodity, nor the utility of the commodity, but rather by what the person actually does with the commodity. Sen terms this the 'functioning' of a commodity. A person's total set of functionings is termed their capability. An attempt at evaluating the ordering of these capabilities can be taken and this 'can indeed take us some distance – often quite a distance' (Sen 1992, p. 43) in measuring well-being. As discussed, self-actualisation can be considered a similar concept to capabilities.

Increasing attempts have been made to operationalise Sen's functioning and capability concept (Sen 1985a, 1987b; Lovell et al. 1993; Travers and Richardson 1993; Comin 2001; Martinetti 2001). Lovell et al. (1993) found that resources are not related strongly to capabilities and therefore the attainment of a high quality of life (capabilities) is not dependent on high levels of material standard of living (resources). The key is the efficiency by which people use their resources (Denison 1971). Thus, efficiency or skills or social habit allow 'people with relatively low levels of resources to lead a relatively high quality of life, and vice-versa' (Travers and Richardson 1993, p. 48).

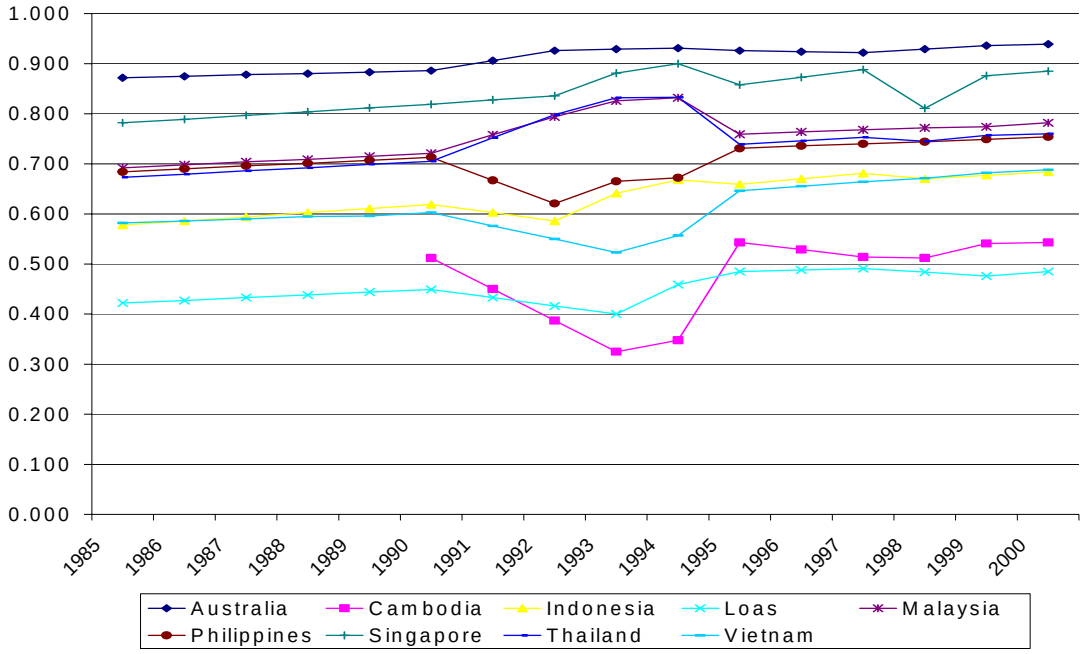
6.2 FHNI and HDI

It is also useful to compare the results of the FHNI to another measure of well-being. The HDI is now widely accepted as an accurate measure of well-being. However a significant limitation in terms of capturing multidimensional aspects of well-being is that its three component indicators (life expectancy, literacy and income) are closely correlated to one another bring rise to claims of redundancy (McGillivray 1991).

The general movement in well-being, as measured by the HDI, is a slight increase over the time period (with the notable fall of Cambodia in the early 1990s) (see Figure 4, also see Appendix 11). The greatest increase in HDI was 18% achieved by Vietnam and Indonesia. The smallest increase was 6% (Cambodia) and the average increase across all nine countries was only 13% (compared to 39% for the FHNI and 70% for GDP per capita). It is important to note though that movement of the HDI represents inter-country comparisons across the three component indicators. This differs significantly from how the FHNI has been developed in which movements are reflections of intra-country movements across eight indicators. This may account for the larger general shift in the FHNI compared to the HDI.

This focus on intra-country comparisons should be considered a strength of the FHNI as the relevancy of the well-being indicators rests upon their authority in representing shifts in well-being actually experienced by populations. Whilst some aspects of well-being are relative (Hirsch 1995; Atkinson 1983a; Kanbur 1987; Thurow 1980; Clayton and Radcliffe 1996), a reduction in a neighbour's well-being does not impact as positively on one's own well-being as an increase in one's own circumstances. The focus on intra-country comparisons is thus valid.

Figure 4 Comparison of HDI, 1985-2000



Source: Various issues of Human Development Report.

The results of the FHNI, as compared to the HDI, indicate that well-being experienced by these nine countries has increased at a greater rate than indicated by movements in the HDI, but not as great as suggested by movements in GDP per capita.

6.3 Advantages of FHNI

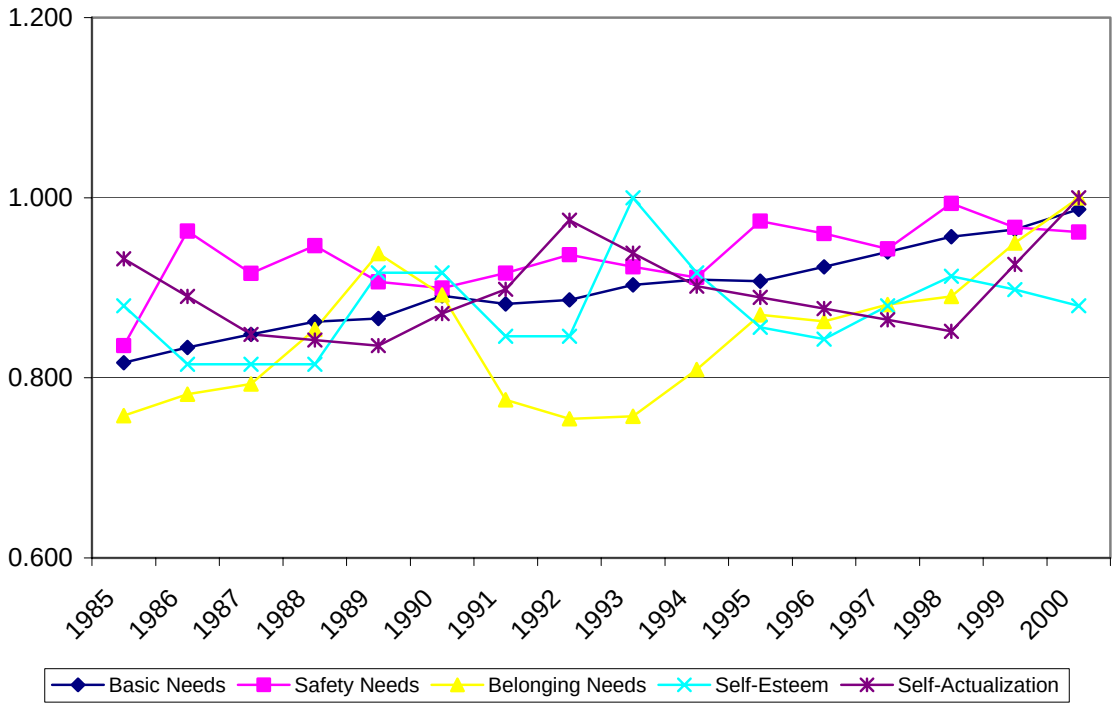
There are three main advantages therefore of this new measure of well-being based on the fulfillment of hierarchical needs. Firstly, it provides an intuitively correct measure of well-being. Secondly, it provides insights into the structure of society and how society is assisting its members achieve higher levels of well-being. Thirdly, it provides policy implications. Recently, some attention has focussed on Maslow's (1970) hierarchy of needs and the appropriateness of this theory for formulating public policies (Hagerty 1999; Sirgy 1986). Hagerty (1999) has shown that economic development for nations generally follows an S-shape in terms of Maslow's hierarchy of needs. This work adds to various other theories predicting stages of development (see Rostow 1971).

It can also be seen that the various hierarchical needs, in Australia for example have also changed at different rates over time (see Figure 5). By disaggregating this new measure of well-being based on the fulfillment of hierarchical needs, it is possible to view how the

structure of the vector of needs that impact on well-being have changed, and thus changing the total system, over time.

Figure 5 shows the disaggregated hierarchical needs (unweighted) during this time period for Australia. It highlights that basic needs increased steadily overtime, whereas the overall increase in safety needs occurred in fits of rises and falls. Self-esteem and self-actualization needs did not record a great growth over the full period, but did rise and fall throughout the fifteen years. Interesting, belonging needs increased the most of the period, but reflect a sense of the lost decade discussed above with a sustained drop during the period 1989-1999. This is most likely linked to the increase in unemployment rates during the recession of the early 1990s.

Figure 5 Disaggregated Hierarchical Needs for Australia (unweighted)



Source: Clarke, Islam and Paech 2003.

The significance of being able to disaggregate this new hierarchical measure of well-being is twofold. First of all, it allows policy-makers to view society as a system and understand how different policies can impact on those different systems. Secondly, and closely related, it allows a greater understanding of the hierarchical nature of both human needs but also how these needs are linked to a hierarchical understanding of different concepts within well-being.

7. Conclusions

The approach developed in this paper is different to previous extensions of Maslow's approach outside of the realm of management psychology. It is not an attempt to predict movements in development (Hagerty 1999) in a similar vein to Rostow's (1971) stages of growth theory, but rather it is an approach to measure well-being.

Within this calculation, the attainment of these needs for the entire society is considered. An alternative approach may be to measure the success of a society by the attainment of these hierarchical needs by a low-income section of a society. Countries can increase their well-being without increasing economic growth or even during times of decreasing economic growth (conversely, well-being can fall despite increases in economic growth). Well-being is dependent on fulfilling a given set of hierarchical needs and the role of the state should be to support this attainment.

Acknowledgements

The authors gratefully acknowledge the work of Dr Sardar M. N. Islam in previous research, and the financial support from Australian Research Council (LPO348013), World Vision of Australia, and the Victoria Department of Premier and Cabinet allowing them to undertake this research.

Appendix 1 Data for Australia, 1985-2000

Country: Australia

	Basic needs		Safety		Belonging		Self-esteem	
	Daily calorie intake	Access to safe water	Infant morality	Life expectancy	Telephone mainlines per '000	Fertility rate	Illiteracy rate	Unemploy-ment
1985	3091.0	99.9	9.90	75.7	391.8	1.89	1.0	8.0
1986	3159.8	99.9	9.85	75.9	405.8	1.87	1.0	8.5
1987	3178.0	99.9	9.80	76.1	419.1	1.85	1.0	8.1
1988	3196.0	99.9	9.20	76.4	429.3	1.84	1.0	7.2
1989	3215.9	99.9	7.70	76.7	441.5	1.84	1.0	6.9
1990	3385.0	99.9	8.00	77.0	456.3	1.91	1.0	6.9
1991	3305.0	99.9	7.10	77.2	465.5	1.86	1.0	9.6
1992	3316.0	99.9	7.00	77.5	472.0	1.90	1.0	10.8
1993	3338.0	99.9	6.10	77.6	483.5	1.87	1.0	10.9
1994	3288.0	99.9	5.90	77.7	495.6	1.85	1.0	9.7
1995	3200.0	99.9	5.70	77.9	492.4	1.82	1.0	8.5
1996	3230.6	99.9	5.80	78.0	500.7	1.80	1.0	8.6
1997	3224.0	99.9	5.30	78.1	512.7	1.77	1.0	8.6
1998	3220.0	99.9	5.00	78.6	509.3	1.76	1.0	8.0
1999	3210.0	99.9	5.60	78.7	515.3	1.75	1.0	7.2
2000	3297.5	99.9	4.90	78.9	524.6	1.75	1.0	6.6

Source: World Development Indicators (2004).

Appendix 2 Data for Cambodia, 1985-2000

Country: Cambodia

	Basic Needs		Safety		Belonging		Self-esteem	
	Daily calorie intake	Access to safe water	Infant morality	Life expectancy	Telephone mainlines per '000	Fertility rate	Illiteracy rate	Unemploy-ment
1985	1784.0	19.0	95.00	47.1	0.25	6.04	41.64	n/a
1986	1804.3	19.0	92.00	47.8	0.25	5.92	40.88	n/a
1987	1893.0	19.0	89.00	48.5	0.30	5.80	40.08	n/a
1988	2002.0	20.0	86.00	49.1	0.30	5.72	39.32	n/a
1989	2166.0	20.0	83.00	49.7	0.30	5.64	38.62	n/a
1990	2113.8	22.0	80.00	50.3	0.30	5.56	37.98	n/a
1991	2089.0	25.0	81.60	50.9	0.40	5.48	37.48	n/a
1992	2021.0	25.0	83.20	51.5	0.40	5.40	37.03	n/a
1993	2030.0	36.0	84.80	52.0	0.40	5.18	36.55	n/a
1994	2197.0	36.0	86.40	52.5	0.60	4.96	36.07	n/a
1995	2011.0	36.0	88.00	52.9	0.80	4.74	35.51	n/a
1996	2045.4	36.0	89.40	53.4	1.50	4.52	34.88	n/a
1997	2048.0	36.0	90.80	53.9	1.90	4.30	34.22	n/a
1998	2078.0	38.0	92.20	53.8	2.10	4.20	33.47	n/a
1999	2103.0	37.0	93.60	53.7	2.20	4.10	32.73	n/a
2000	2119.0	37.0	95.00	53.8	2.36	4.00	31.99	n/a

Source: World Development Indicators (2004).

Appendix 3 Data for Indonesia, 1985-2000

Country: Indonesia

	Basic Needs		Safety		Belonging		Self-esteem	
	Daily calorie intake	Access to safe water	Infant morality	Life expectancy	Telephone mainlines per '000	Fertility rate	Illiteracy rate	Unemploy-ment
1985	2398.0	19.0	69.50	58.6	3.60	3.61	25.41	n/a
1986	2412.0	22.0	67.60	59.4	4.00	3.47	24.42	n/a
1987	2572.0	35.0	65.70	60.2	4.40	3.32	23.43	n/a
1988	2598.0	46.0	63.80	60.7	4.80	3.23	22.44	n/a
1989	2749.7	46.0	61.90	61.2	4.90	3.13	21.45	n/a
1990	2630.7	47.0	60.00	61.7	5.90	3.04	20.49	n/a
1991	2763.0	47.0	57.20	62.2	7.10	2.95	19.66	n/a
1992	2755.0	48.0	54.40	62.7	8.90	2.86	18.85	n/a
1993	2790.0	51.0	51.60	63.1	9.90	2.84	18.04	n/a
1994	2812.0	62.0	48.80	63.6	12.90	2.82	17.24	n/a
1995	2896.0	62.0	46.00	64.1	16.80	2.80	16.45	n/a
1996	2900.4	63.0	43.80	64.6	21.10	2.78	15.80	4.0
1997	2886.0	61.0	41.60	65.1	24.70	2.75	15.15	4.7
1998	2873.0	60.0	39.40	65.4	27.00	2.66	14.50	5.5
1999	2909.0	64.0	37.20	65.7	29.00	2.58	13.85	5.5
2000	2893.0	69.0	35.00	66.0	32.30	2.49	13.19	5.5

Source: World Development Indicators (2004).

Appendix 4 Data for Laos, 1985-2000

Country: Laos

	Basic Needs		Safety		Belonging		Self-esteem	
	Daily calorie intake	Access to safe water	Infant morality	Life expectancy	Telephone mainlines per '000	Fertility rate	Illiteracy rate	Unemploy-ment
1985	2205.0	22.0	127.50	47.2	1.60	6.46	47.55	n/a
1986	2088.2	22.0	126.00	47.7	1.60	6.38	46.73	n/a
1987	2256.0	22.0	124.50	48.2	1.60	6.30	45.94	n/a
1988	2398.3	25.0	123.00	48.7	1.60	6.20	45.11	n/a
1989	2629.9	27.0	121.50	49.2	1.50	6.10	44.34	n/a
1990	2475.2	29.0	120.00	49.7	1.60	6.00	43.48	n/a
1991	2377.5	32.0	117.00	50.2	1.60	5.90	42.66	n/a
1992	2259.0	34.0	114.00	50.7	1.90	5.80	41.86	n/a
1993	2233.0	36.0	111.00	51.0	1.90	5.70	41.01	n/a
1994	2198.0	45.0	108.00	51.4	3.90	5.60	40.21	n/a
1995	2175.2	39.0	105.00	51.8	3.50	5.50	39.40	n/a
1996	2055.8	44.0	102.00	52.1	4.10	5.40	38.55	n/a
1997	2108.0	44.0	99.00	52.5	4.80	5.30	37.71	n/a
1998	2100.0	45.0	96.00	52.9	5.50	5.20	36.88	n/a
1999	2099.0	49.0	93.00	53.3	6.60	5.10	36.06	n/a
2000	2106.0	48.0	90.00	53.7	7.78	5.00	35.21	n/a

Source: World Development Indicators (2004).

Appendix 5 Data for Malaysia, 1985-2000

Country: Malaysia

	Basic Needs		Safety		Belonging		Self-esteem	
	Daily calorie intake	Access to safe water	Infant morality	Life expectancy	Telephone mainlines per '000	Fertility rate	Illiteracy rate	Unemploy-ment
1985	2684.0	44.0	23.50	68.8	61.40	4.10	23.72	6.9
1986	2616.5	48.0	22.00	69.1	65.20	4.05	22.83	8.3
1987	2698.2	59.0	20.50	69.5	68.40	4.00	21.96	7.3
1988	2701.0	51.0	19.00	69.8	73.60	3.92	21.07	7.2
1989	2774.3	51.0	17.50	70.1	80.00	3.85	20.18	6.3
1990	2697.0	58.0	16.00	70.5	89.20	3.77	19.32	5.1
1991	2765.0	65.0	15.50	70.8	99.10	3.70	18.61	4.3
1992	2884.0	71.0	15.00	71.2	111.40	3.62	17.89	3.7
1993	2875.5	78.0	13.67	71.3	125.40	3.55	17.17	3.0
1994	2893.0	78.0	12.33	71.6	145.60	3.47	16.44	2.9
1995	2873.0	88.0	11.00	71.7	165.70	3.40	15.70	2.8
1996	2938.1	90.0	10.25	71.8	178.10	3.33	15.10	2.5
1997	2977.0	93.0	9.50	71.8	194.80	3.26	14.47	2.5
1998	2970.0	93.0	8.30	72.0	201.50	3.18	13.84	3.2
1999	2985.5	92.0	7.90	72.3	202.90	3.09	13.22	3.4
2000	2964.0	92.0	7.90	72.5	199.16	3.01	12.61	3.1

Source: World Development Indicators (2004).

Appendix 6 Data for Philippines, 1985-2000

Country: Philippines

	Basic Needs		Safety		Belonging		Self-esteem	
	Daily calorie intake	Access to safe water	Infant morality	Life expectancy	Telephone mainlines per '000	Fertility rate	Illiteracy rate	Unemploy-ment
1985	2309.0	68.0	55.00	63.4	9.30	4.48	10.01	6.1
1986	2203.5	68.0	53.00	63.8	9.50	4.39	9.66	6.4
1987	2284.0	67.0	51.00	64.2	9.50	4.30	9.33	9.1
1988	2340.2	70.0	49.00	64.7	9.70	4.24	9.00	8.3
1989	2375.1	71.0	47.00	65.1	9.90	4.18	8.65	8.4
1990	2452.1	75.0	45.00	65.6	10.00	4.12	8.27	8.1
1991	2386.1	75.0	43.20	66.0	10.40	4.06	7.93	9.0
1992	2258.0	79.0	41.40	66.5	10.30	4.00	7.58	8.6
1993	2205.0	82.0	39.60	66.9	12.10	3.93	7.21	8.9
1994	2309.0	83.0	37.80	67.3	16.50	3.85	6.85	8.4
1995	2373.0	85.0	36.00	67.7	20.50	3.78	6.50	8.4
1996	2362.7	83.0	34.80	68.1	25.50	3.71	6.21	7.4
1997	2425.0	85.0	33.60	68.5	28.60	3.64	5.92	7.9
1998	2469.0	85.0	32.40	68.7	34.10	3.56	5.64	9.6
1999	2860.0	85.0	31.20	69.0	38.80	3.48	5.35	9.6
2000	2800.5	87.0	30.00	69.2	40.02	3.40	5.07	10.1

Source: World Development Indicators (2004).

Appendix 7 Data for Singapore, 1985-2000

Country: Singapore

	Basic Needs		Safety		Belonging		Self-esteem	
	Daily calorie intake	Access to safe water	Infant morality	Life expectancy	Telephone mainlines per '000	Fertility rate	Illiteracy rate	Unemploy-ment
1985	3098.0	99.9	9.40	72.8	294.20	1.61	14.42	4.1
1986	3079.6	99.9	7.40	73.2	307.80	1.43	13.76	6.5
1987	3087.4	99.9	7.40	73.5	319.30	1.62	13.09	4.7
1988	3105.0	99.9	7.00	73.8	329.80	1.96	12.48	3.3
1989	3197.9	99.9	7.50	74.0	340.50	1.75	11.77	2.2
1990	3114.3	99.9	6.70	74.3	349.40	1.87	11.19	1.7
1991	3167.0	99.9	5.50	74.5	356.30	1.77	10.87	1.9
1992	3186.4	99.9	5.00	74.8	367.80	1.76	10.46	2.7
1993	3204.0	99.9	4.70	75.5	382.10	1.78	10.10	2.7
1994	3195.0	99.9	4.70	76.3	395.90	1.75	9.73	2.6
1995	3220.0	99.9	4.00	76.4	411.90	1.71	9.31	2.7
1996	3243.7	99.9	3.60	76.7	432.60	1.70	9.04	3.0
1997	3281.5	99.9	3.60	77.0	450.90	1.64	8.75	2.4
1998	3299.0	99.9	4.10	77.4	459.90	1.49	8.43	3.1
1999	3265.5	99.9	3.20	77.5	481.90	1.48	8.09	4.1
2000	3244.0	99.9	2.90	77.9	484.48	1.45	7.73	4.4

Source: World Development Indicators (2004).

Appendix 8 Data for Thailand, 1985-2000

Country: Thailand

	Basic Needs		Safety		Belonging		Self-esteem	
	Daily calorie intake	Access to safe water	Infant morality	Life expectancy	Telephone mainlines per '000	Fertility rate	Illiteracy rate	Unemploy-ment
1985	2178.0	38.0	39.50	65.8	12.60	2.79	9.75	3.7
1986	2115.8	47.0	38.40	66.0	15.80	2.73	9.32	3.5
1987	2284.0	55.0	37.30	66.2	17.50	2.57	8.90	5.9
1988	2209.0	66.0	36.20	67.0	19.10	2.47	8.47	3.1
1989	2316.0	59.0	35.10	67.7	21.60	2.37	8.05	1.4
1990	2270.6	63.0	34.00	68.5	24.20	2.27	7.62	2.2
1991	2200.0	65.0	33.00	69.2	28.10	2.17	7.28	2.7
1992	2443.0	70.0	32.00	69.9	32.10	2.10	6.93	1.4
1993	2382.0	77.0	31.00	69.6	39.30	2.07	6.59	1.5
1994	2387.0	86.0	30.00	69.2	48.30	2.05	6.24	1.3
1995	2305.0	81.0	29.00	68.9	60.50	2.02	5.89	1.1
1996	2350.9	90.0	28.20	68.6	71.50	1.96	5.63	1.1
1997	2360.0	91.0	27.40	68.2	82.10	1.90	5.36	0.9
1998	2322.0	90.0	26.60	68.4	84.80	1.88	5.09	3.4
1999	2328.0	90.0	25.80	68.6	86.90	1.86	4.81	3.0
2000	2336.0	89.0	25.00	68.8	92.25	1.84	4.52	2.4

Source: World Development Indicators (2004).

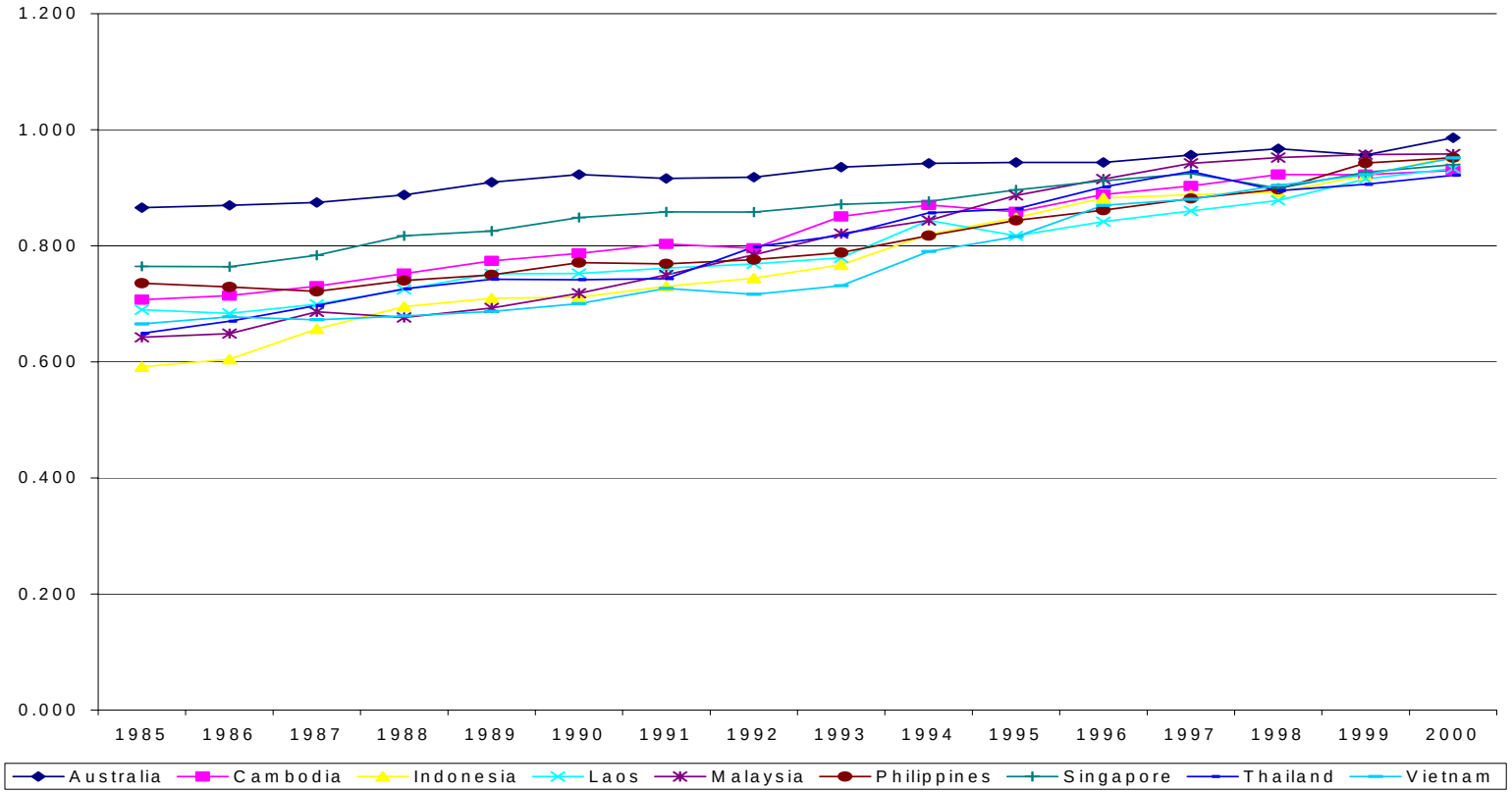
Appendix 9 Data for Vietnam, 1985-2000

Country: Vietnam

	Basic Needs		Safety		Belonging		Self-esteem	
	Daily calorie intake	Access to safe water	Infant morality	Life expectancy	Telephone mainlines per '000	Fertility rate	Illiteracy rate	Unemploy-ment
1985	2186.0	19.0	43.00	62.5	1.20	4.20	10.81	n/a
1986	2244.0	20.0	41.60	62.0	1.20	4.08	10.55	n/a
1987	2200.4	19.0	40.20	63.4	1.20	3.96	10.32	n/a
1988	2221.0	20.0	38.80	61.9	1.20	3.88	10.11	n/a
1989	2232.5	20.0	37.40	63.4	1.20	3.80	9.88	n/a
1990	2251.1	20.0	36.00	67.7	1.40	3.62	9.65	n/a
1991	2360.5	24.0	35.20	66.7	2.00	3.44	9.43	n/a
1992	2250.0	24.0	34.40	65.7	2.20	3.25	9.20	n/a
1993	2389.0	24.0	33.60	65.2	3.60	3.06	8.96	n/a
1994	2399.0	35.0	32.80	65.7	6.00	2.86	8.73	n/a
1995	2437.1	36.0	32.00	67.1	10.50	2.67	8.51	n/a
1996	2471.1	43.0	31.12	67.6	15.70	2.54	8.30	n/a
1997	2484.0	43.0	30.23	68.0	17.40	2.40	8.09	n/a
1998	2422.0	45.0	29.34	67.7	22.40	2.35	7.89	n/a
1999	2457.0	44.0	28.46	68.0	26.70	2.30	7.69	n/a
2000	2463.0	45.0	27.57	69.0	31.85	2.23	7.49	n/a

Source: World Development Indicators (2004).

Appendix 10 Comparison of FHNI (reversed weights), 1985-2000



Appendix 11 Compilation of HDIs, 1985-2000

	Australia	Cambodia	Indonesia	Laos	Malaysia	Philippines	Singapore	Thailand	Vietnam
1985	0.872	n/a	0.578	0.422	0.692	0.684	0.782	0.673	0.582
1986	0.875	n/a	0.586	0.427	0.698	0.690	0.789	0.679	0.586
1987	0.878	n/a	0.594	0.433	0.704	0.696	0.797	0.686	0.590
1988	0.880	n/a	0.603	0.438	0.709	0.701	0.804	0.692	0.595
1989	0.883	n/a	0.611	0.444	0.715	0.707	0.812	0.699	0.596
1990	0.886	0.512	0.619	0.449	0.721	0.713	0.819	0.705	0.603
1991	0.906	0.450	0.603	0.433	0.758	0.667	0.828	0.752	0.576
1992	0.926	0.387	0.586	0.416	0.794	0.621	0.836	0.798	0.550
1993	0.929	0.325	0.641	0.400	0.826	0.665	0.881	0.832	0.523
1994	0.931	0.348	0.668	0.459	0.832	0.672	0.900	0.833	0.557
1995	0.926	0.543	0.659	0.485	0.759	0.731	0.858	0.739	0.646
1996	0.924	0.529	0.670	0.488	0.764	0.736	0.873	0.746	0.655
1997	0.922	0.514	0.681	0.491	0.768	0.740	0.888	0.753	0.664
1998	0.929	0.512	0.670	0.484	0.772	0.744	0.811	0.745	0.671
1999	0.936	0.541	0.677	0.476	0.774	0.749	0.876	0.757	0.682
2000	0.939	0.543	0.684	0.485	0.782	0.754	0.885	0.760	0.688

Source: Various issues of Human Development Report.

References

Atkinson, A. (1983), *The Economics of Inequality*, Clarendon Press, Oxford.

Baster, N. (1972), 'Development Indicators: An Introduction', *Journal of Development Studies*, Vol. 8, No. 3, pp. 1-20.

Bliss, C. (1993), 'Life Style and the Standard of Living' in M. Nussbaum & A. Sen (eds), *The Quality of Life*, Clarendon Press, Oxford.

Bonner, J. (1986), *The Introduction to the Theory of Social Choice*, The John Hopkins University Press, Baltimore.

Boulding, K. (1949-1950), 'Income or Welfare', *The Review of Economic Studies*, Vol. 17, pp. 77-86.

Boulding, K. (1992), 'The Economics of the Coming Spaceship Earth', in A. Markandya & J. Richardson (eds), *Environmental Economics*, Earthscan Publications, London.

Brekke, K. (1997), *Economic Growth and the Environment*, Edward Elgar, Cheltenham.

Chakravarty, S. (1990), *Ethical Social Index Numbers*, Springer Verlag, Berlin.

Clarke, M. (2003), *E-development? Development and the New Economy*, WIDER Policy Brief No. 7, WIDER/UNU, Helsinki.

Clarke, M. and Islam, S. (2004), *Economic Growth and Social Well-being: Operationalising Normative Social Choice Theory*, North Holland, Amsterdam.

Clarke, M., Islam, S. and Paech, S. (2003), 'Australia's Well-being based on Hierarchical Needs', paper presented at 5th Australian Conference on Quality of Life, Deakin University, Melbourne, 21 November.

Clayton, A. and Radcliffe, N. (1996), *Sustainability: A Systems Approach*, Earthscan Publications, London.

Cochrane, W. and Shaw Bell, C. (1956), *The Economics of Consumption*, McGraw-Hill Book Co., New York.

Comin, F. (2001) 'Operationalizing Sen's Capability Approach', paper presented at Justice and Poverty: Examining Sen's Capability Approach, Cambridge, 5-7 June.

Cummins, R., Eckersley, R., Pallant, J., Van Vugt, J., Sheeley, J., Pusey, M. and Misajon, R. (2001), 'Australian Unity Well-being Index – Report #1', http://acqol.deakin.edu.au/index_wellbeing/index.htm

Daly, H. (1996), *Beyond Growth*, Beacon Press, Boston.

Dasgupta, A. and Pearce, D. (1972), *Cost-Benefit Analysis*, Macmillan, London.

Denison, E. (1979), *Accounting for Change*, The Brookings Institute, Washington D.C.

Dodds, S. (1997), 'Economic Growth and Human Well-Being' in M. Diesendorf and C. Hamilton (eds), *Human Ecology and Human Economy*, Allen and Unwin, Sydney.

Doyal, L. and Gough, I. (1991), *A Theory of Need*, MacMillian, London.

Foster, C. (1966), 'Social Welfare Functions in Cost-Benefit Analysis', in M. Lawrence (ed.) *Operational Research in the Social Services*, Macmillan, London.

Gylfason, T. (1999), *Principles of Economic Growth*, Oxford University Press, Oxford.

Hagerty, M. (1999), 'Testing Maslow's Hierarchical of Needs: National Quality of Life Across Time', *Social Indicators Research*, Vol. 46, pp. 249-271.

Hirsch, F. (1995), *Social Limits to Growth*, Routledge, London.

Hudson, H. (1972), *The Diseconomies of Growth*, Earth Island, London.

Hueting, R. (1980), *New Scarcity and Economic Growth* (translated by Trevor Preston), North Holland Publishing Co. Amsterdam.

Hufschmidt, M., James, D., Meister, A., Bower, B. and Dixon, J. (1983), *Environment, Natural Systems, and Development*, The John Hopkins University Press, Baltimore.

Islam, S. (2001), *Optimal Growth Economics*, North Holland Publishing Co., Amsterdam.

Islam, S. and Clarke, M. (2000), *Social Well-being and GDP: Can We Still Use GDP For Well-being Measurement?*, Seminar Paper presented at the Centre for Strategic Economic Studies, Victoria University, 7 September.

Islam, S. and Clarke, M. (2001), 'Measuring Quality of Life: A New Approach Empirically Applied to Thailand', paper presented at the Centre for International Environmental Co-operation of Russian Academy of Science INDEX2001 Quality of Life Indicators Conference, Rome 2-5 October 2001.

Islam, S. and Clarke, M. (2003), 'La relation entre niveau de vie, utilitie et capacities: unu nouvelle approche de la mesure du bien-etre social basee sur la hierarchisation des besoins selon Maslow', in J-L.

Dubois, J-P. Lachaud, J-M. Montaud, and A. Pouille (eds) *Pauvreté et Développement Socialement Durable*, Presses Universitaires de Bordeaux, Bourdeaux (in French).
Johnson, D. (1996), *Poverty, Inequality and Social Welfare in Australia*, Physica-Verleg, Heidelberg.
Jorgenson, D. (1997), *Welfare*, Vol. 2, The MIT Press, Cambridge, Ma.
Kamenetzky, M. (1981), 'The Economics of the Satisfaction of Needs', *Human Systems Management*, Vol. 2.
Kakwani, N. (1997a), *Social Cost of Living Indices with Application to Thailand*, Discussion Paper 10, School of Economics, The University of New South Wales, Sydney.
Kakwani, N. (1997b), *Welfare Based Approaches to Measuring Real Economic Growth with Application to Thailand*, Discussion Paper 14, School of Economics, The University of New South Wales, Sydney.
Kakwani, N. (1997c), *On Measuring Growth and Inequality Components of Changes in Poverty with Application to Thailand*, Discussion Paper 16, School of Economics, The University of New South Wales, Sydney.
Kanbur, E. (1987), 'The Standard of Living: Uncertainty, Inequality and Opportunity' in G. Hawthorn (ed.) *The Standard of Living*, Cambridge University Press, Cambridge.
Kiron, D. (1997), 'Economics and the Good I: Individuals', in F. Ackerman, D. Kiron, N. Goodwin, J. Harris and K. Gallagher (eds), *Human Well-Being and Economic Goals*, Island Press, Washington D.C.
Leacomber, R. (1975), *Economic Growth Verses the Environment*, Macmillan, London.
Lovell, K., Richardson, S., Travers, P. and Wood, L. (1993), 'Resources and Functionings: A New View of Inequality in Australia' in W. Eichhorn (ed.), *Models and Measurement of Welfare and Inequality*, Springer Verlag, Berlin.
Martinetti, E. (2001), 'A Multidimensional Assessment of Well-being Based on Sen's Functioning Approach', paper presented at Justice and Poverty: Eexamining Sen's Capability Approach, Cambridge, 5-7 June.
Maslow, A. (1970), *The Farther Reaches of the Human Mind*, Viking Press, New York.
Max-Neef, M. (1991), *Human Scale Development*, The Apex Press, New York.
McGillivray, M. (1991), 'The Human Development Index: Yet Another Redundant Composite Development Indicator?', *World Development*, Vol. 19, No. 10.
McKenzies, G. (1983), *Measuring Economic Welfare*, Cambridge University Press, Cambridge.
Morris, M. (1979), *Measuring the Condition of the World's Poor: The Physical Quality of Life Index*, Pergamon, New York.
Moullon, B. (2000), 'Getting the Twenty-First Century GDP Right: What's Underway?' *The American Economic Review*, Vol. 90, No. 2, pp. 252-258.
Myers, D. (1999), *Does Economic Growth Improve Human Morale?*, see http://www.newdream.org/newsletter/myers.html
Ng, Y. (1979), *Welfare Economics*, MacMillian Press, London.
Ng, Y. (2001), *From Preference to Happiness: Towards a More Complete Well-being Economics*, mimeo available from Faculty of Economics, Monash University, Clayton, Australia.
Nordhaus, W. (1998), *The Health of Nations: Irving Fisher and the Contribution of Improved Longevity to Living Standards*, Cowles Foundation Discussion Paper No. 1200, Cowles Foundation for Research in Economics, New Haven.
Nussbaum, M. (1988), 'Nature, Function and Capability', *Oxford Studies in Ancient Philosophy* Supplement Vol. 1, pp. 145-84.
Nussbaum, M. (1992), 'Human Functioning and Social Justice', *Political Theory*, Vol. 20, No.2, pp. 202-246
Nussbaum, M. (1993), 'Non-relative Values: An Aristotelian Approach', in M. Nussbaum and A. Sen (eds.) *Quality of Life*, Oxford University Press, Oxford.
Nussbaum, M. (2000), *Women and Human Needs*, Oxford University Press, Oxford.
Pearce, D. and Nash, C. (1981), *The Social Appraisal of Projects*, Macmillan, London.
Pearce, D., Markandya, A. and Barbier, E. (1989), *Blueprint for a Green Economy*, Earthscan Publications, London.
Pusey, M. (1998), 'Incomes, Standards of Living and Quality of Life', in R. Eckersley (ed.), *Measuring Progress*, CSIRO Publishing, Melbourne.
Rostow, W. (1971), *The Stages of Economic Growth*, Cambridge University Press, London.
Sen, A. (1970), *Collective Choice and Social Welfare*, North Holland Publishing Co., Amsterdam.
Sen. A. (1976a), 'Poverty: An Ordinal Approach to Measurement', *Econometrica*, vol. 44, no. 2.

Sen, A. (1985), *Commodities and Capabilities*, North Holland, Amsterdam.
Sen, A. (1987a), 'The Standard of Living: Lecture I, Concepts and Critiques' in G. Hawthorn (ed.) *The Standard of Living*, Cambridge University Press, Cambridge.
Sen, A. (1987b), 'The Standard of Living: Lecture II, Lives and Capabilities' in G. Hawthorn (ed.), *The Standard of Living*, Cambridge University Press, Cambridge.
Sen, A. (1990), 'Individual Freedom as a Social Commitment', *New York Review of Books*, vol. 37, June 14, pp. 49-54.
Sen, A. (1999), 'The Possibility of Social Choice' *The American Economic Review*, June, pp. 349-378.
Sirgy, M. (1986), 'A Quality-of-Life Theory Derived from Maslow's Developmental Perspective', *American Journal of Economics and Sociology*, vol. 45, no. 3, pp. 329-42.
Slesnick, D. (1998), 'Empirical Approaches to the Measurement of Welfare', *Journal of Economic Literature*, vol. 36, December, pp. 2108-2165.
Smith, G. (1993), 'The Purpose of Wealth: A Historical Perspective' in H. Daly and K. Townsend (eds), *Valuing the Earth*, The MIT Press, Cambridge, Ma.
Streeten, P. (1995), *Thinking About Development*, Cambridge University Press, Cambridge.
Thiel, H. and Brooks, R. (1970), 'How Does the Marginal Utility of Income Change When Real Income Changes?', *European Economic Review*, Vol. 2, Winter.
Thurow, L. (1980), *The Zero-Sum Society*, Basic Books Inc., New York.
Travers, P. and Richardson, S. (1993), *Living Decently*, Oxford University Press, Melbourne.
United Nations Development Program (UNDP) (various), *The Human Development Report*, UNDP, New York.
Usher, D. (1980), *The Measurement of Economic Growth*, Basil Blackwell, Oxford.
World Bank (2001), *World Development Report 2000/2001: Attacking Poverty*, Oxford University Press, New York.
World Bank (2004), *World Development Indicators*, World Bank, New York.