

The relationship between well-being and sustainable development

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ABSTRACT

Given the increasing prominence given to well-being and sustainable development in recent academic and policy debates, this paper sets out the various accounts of these concepts and considers the possible synergies and tensions between them. The paper considers the four main accounts of well-being – objective lists, psychological well-being, preference satisfaction, and subjective well-being – and the two accounts of sustainable development – weak sustainability and strong sustainability. Different relationships between well-being and sustainable development can be found for different accounts but it seems that the preference satisfaction account (as it is measured) would seem to be least compatible with sustainable development. On the other hand, it is found that subjective well-being offers synergies with sustainable development, and is a promising way of conceptualising well-being for public policy purposes.

Keywords: well-being, sustainable development, public policy, subjective well-being.

JEL: A13; D60; Q01

1. Introduction

Ecological economics is concerned with the limits of natural capital to handle human impacts and with the potential for human systems to maintain/increase human well-being (WB) (Daly, 1991; Ruth, 2006). Sustainable development (SD) has emerged as the conceptual framework to improve current WB, while maintaining the basis for future WB (Solow, 1991). Although the concept of SD from the Brundtland report (WCED, 1987) includes social and environmental requirements, it is necessarily concerned with the long run preservation of an economy (Munasinghe, 1993). Therefore given that SD is in line with traditional neoclassical economics, its reference point is the satisfaction of human wants (Faber et al, 1998), or alternatively the constrained maximisation of utility (van den Bergh et al, 2000). This usually implies a definition of WB in terms of people's abilities to satisfy their preferences.

Research in behavioural economics, however, has highlighted a number of problems with assuming that satisfaction of preferences is equivalent to utility maximisation (Earl, 1988). For instance, people are often influenced by theoretically irrelevant contextual factors, such as how a choice is framed (Kahneman & Tversky, 2000) and also exhibit tendencies to rely on non-substantive utility (Frey & Stutzer, 2002). These and other factors result in preferences for options which will not produce the greatest utility in terms of how people actually think and feel about the outcome, i.e. 'miswanting' (Wilson and Gilbert, 2003). As a result, clarifying what we mean by WB has become a key emerging research theme within economics (van Praag and Ferrer-i-Carbonell, 2004; Bruni and Sugden, 2007).

Despite this shift in emphasis, relatively little is known about how the different definitions of WB relate to SD. This paper attempts to fill this void in the current literature by examining the relationship between WB and SD, which is crucial to ecological economics for two main reasons. Firstly, if ecological economics can understand and fully establish the coherent link between WB and SD, it can start to fully analyse WB in the context of intertwined economic, social and biophysical systems (Dodds, 1997; Gowdy, 2005). Secondly, although ecological economics aspires to debate

and propel social change toward SD, both the measurement and policies of SD are perceived to be major problem areas (Proops, 1989). Indeed, Herzi and Dovers (2006) have argued that in order to be more policy relevant, ecological economics needs to embed the knowledge on SD further into the fabric of policymaking. We argue that one potential avenue for doing just this is to comprehensively analyse the relationship between WB and SD.

There is increasing interest in SD and WB, and the relationship between them, in policy debates. For instance, the UK Government's SD strategy, 'Securing the Future' (Defra, 2005), commits the Government to a clearer focus on WB. The strategy identified the need to ensure that WB issues are tackled consistently, and that the Government is genuinely making a difference to people's lives. Furthermore, Defra (2006) have incorporated WB within their SD indicators framework without fully recognising the underlying differences in the two concepts. Therefore, it is also important at a practical level to provide an analysis of the relationship between WB and SD.

The concepts of both WB and SD are rooted in several different academic disciplines (e.g. economics, development studies, psychology etc.), as well as being widely recognised in various policy agendas. Therefore, it is important to be clear about exactly what these concepts mean, since different definitions may result in different conclusions about the relationship between WB and SD. In order to address this issue, section 2 will outline the various concepts and definitions of both WB and SD. Section 3 will analyse the relationship between the definitions of WB and SD and section 4 will then produce a discussion of the issues that emerge from section 3.

2. Definitions

2.1 Well-being

According to Parfit (1984), there are three main accounts of WB: objective lists, desire fulfilment and mental states. Objective list accounts argue that WB is highest when a person is able to meet their material, social and psychological needs. Proposed needs

include economic resources, health and political freedom. Objective measures of the satisfaction of these needs are then developed into lists and an individual's WB is measured according to the degree to which the items on these lists can be ticked off. In a similar vein, Rawls (1971) developed an index of primary goods, which included rights, liberties and opportunities, income and wealth and the bases of self-respect. Thus objective lists are made up of both physical (health) and psychological needs, with these latter needs being widely discussed in the psychological literature under the heading of 'psychological WB' (PWB). Ryff and Keys (1995), for instance, have developed a model of six core psychological needs: autonomy, personal growth, self-acceptance, life purpose, mastery and positive relatedness. For the purposes of this paper we discuss objective and psychological WB separately despite the fact that the definitions of both draw on theoretical and intuitive accounts of what is of value.

In terms of desire fulfilment (or preference satisfaction), an individual's life goes better for individuals if they get what they want. In the simplest versions of this account, there are no constraints on what an individual can want and all that matters for their WB is whether a desire is met. More recent formulations of preference satisfaction require that preferences are informed in the sense that they are based on the considered use of all relevant information and some accounts exclude certain 'anti-social' preferences, such as those related to malice or envy, even when they are informed (Harsanyi, 1996). All else equal, if an individual's income increases, they are able to satisfy more of their preferences. It is not the income per se that makes them better off but, rather, the increase in choice that means they can satisfy more of their desires. A classic example of preference satisfaction being used as the definition of WB is within neoclassical environmental economics, with the use of stated preference methods such as willingness-to-pay (WTP) for an environmental good.

In mental state accounts of WB an individual's life goes better if it is experienced more positively by the individual. This incorporates hedonistic accounts, which argue that pleasure is the only thing that is good for us, and pain is the only thing that is bad (Bentham, 1789), as well as broader evaluative accounts, which focus on an individual's cognitive assessment of his/her life. Mental state accounts often refer to subjective WB

(SWB), which includes the thinking as well as the feeling self (Diener et al, 1999). Easterlin (1974) was the first to use this life assessment approach within economics, which has become the most popular measure in the literature. Others have used measures of psychological health as a proxy for SWB, such as in the General Health Questionnaire. See Table 1 for a description and an example of each type of WB.

2.2 Sustainable development

Since the Brundtland report (WCED, 1987), the term ‘sustainability’ has been used by many people, and so many definitions have been developed that Pezzy (1997: p. 448) argues that there is “little point in expanding the collection of fifty sustainability definitions which I made in 1989, to the five thousand definitions that one could readily find today”. This proliferation appears to be partly due to different disciplines focusing on different aspects of SD (Ayres et al, 2001). Although Sneddon et al (2006) argue for a plurality of approaches, we attempt to pin down the main definitions in order to facilitate our analysis.

Mainstream economists started to participate in this SD debate around the mid 1970s, in an effort to determine the effect that non-renewable resources have on economic growth (e.g. Dasgupta and Heal, 1974; Solow, 1974; Stiglitz, 1974). This work enabled Hartwick (1977) to illustrate that the rent derived from resource depletion is exactly the level of capital investment that is always needed to achieve constant consumption over time, which provided the foundation for the weak sustainability (WS) account of SD. The aim of WS is essentially to maintain “non-declining utility of a representative member of society for millennia into the future” (Pezzy, 1992: p. 323). Within WS, the capacity to provide non-declining utility comes in the form of a stock (i.e. man-made capital, human capital, natural capital, and social capital), which provides both current and future utility.

The inclusion of natural capital is important since this determines whether one conforms to WS or strong sustainability (SS). WS states that one can have substitutability between natural capital and other forms of capital in order to provide the non-declining level of utility. However, WS is not purely a neoclassical concept since it views natural capital as

both an input to production and as a direct source of welfare and because it rejects the present-value maximisation principle (Neumayer, 2003). This rejection is significant since it denies the validity of potential Pareto improvements between generations and demands actual compensation to future generations if they suffer from an action that benefits the current generation.

SS on the other hand has two interpretations. One is to preserve natural capital itself in value terms, i.e. very strong sustainability (VSS), and the other is to preserve the physical stock of those forms of natural capital that are regarded as non-substitutable or critical (i.e. SS).¹ The concept of critical natural capital (CNC) can be applied, for instance, to fisheries where fish should not be extracted at a rate above their rate of renewal, or to non-renewable resources, which should not be exploited beyond the rate at which the stock can be substituted for by renewable energies or efficiency in technology (Barbier, 1989). Therefore, SS essentially suggests that some aspects of natural capital are critical and cannot be substituted for other forms of capital, whereas WS allows substitutability between the different capital stocks (see Table 1 for examples).

These differences in sustainability do not, however, really extend beyond the macroeconomic level, and cannot be readily applied at the local or regional level. The spatial dimension of sustainability has largely been ignored by many environmental and ecological economists, in part because the spatial level requires insights from many fields, such as regional economics, growth theories, transport economics, ecology and environmental science (van den Bergh and Verbruggen, 1999). Kahn (2006) illustrates that defining spatial sustainability and even spatial 'greenness' is a difficult task. He believes that spaces can become sustainable and green if they not only have clean air, water, streets and parks, but also if they encourage 'green' behaviour.

As a result, it is not clear at what level sustainability and WB should be compared, as WB is focused primarily at the microeconomic level and is not fully constructed at the national level, whereas sustainability is mostly theoretically constructed at the

macroeconomic level.

{{insert Table 1 here}}

3. The relationship between WB and SD

From a UK perspective, a mutually beneficial relationship between WB and SD has been postulated (DTI, 2003; Defra, 2005). For example, shaping neighbourhoods for health, sustainability and vitality might lead to improvements in resident WB (Colfer et al, 1998; O'Brien and Claridge, 2001; Barton et al, 2003; DTI 2003; Environment Agency, 2004). The UK government has argued that the local environment “effects everyone’s daily life, and directly contributes to their sense of well-being” (Office for the Deputy Prime Minister, 2004: p. 4), and it identifies a “just society that promotes social inclusion, sustainable communities and personal well-being” as a goal for public policy (Defra, 2005). The type(s) of WB and sustainability concept(s) mentioned within the UK government are not described in detail, and sometimes it is implicit that WB will be an obvious result of objective circumstances such as a cleaner environment and increased recreation facilities. Of course, temporal and spatial issues are crucial here. SD is focused more at the intergenerational level, whereas WB is more focused on today’s generation (Neumayer, 2004). Moreover, within any given country there may be an underweighting of externalities that extend across geographical and political boundaries.

3.1 The relationship between objective WB and SD

Objective lists may or may not include aspects of natural capital as essential components of WB. For instance, Nussbaum (2006) stated that humans should be concerned with animals, plants, and the world of nature. Whether the list is derived from a capabilities perspective, PWB, human needs, perfectionist, or items that are held to have intrinsic value, the exact contents of the list will be subject to debate and potential disagreement.

¹ For the rest of the paper, we use the term SS to denote the critical natural capital approach, even though it is a subordinate category of SS itself. We have decided to use this notation as VSS is a special case of SS

The conflict/synergy status of many items on typical lists of objective WB are likely to be difficult to determine theoretically, e.g. political freedom or security, as these may have both positive or negative implications for SD.

Obviously, SD and objective WB are more likely to be compatible if the objective list includes aspects such as freedom from pollution, health and future health, access to green space, avoidance of extreme temperatures, and equality. However, there may be tensions between objective WB and SD if the list includes aspects like income, consumption, freedom, choice and health (if these require the depletion of natural capital). Furthermore, action that strengthens SD is likely to enhance one attribute (e.g. health) at the possible expense of another (e.g. consumption). If the items on the list are non-commensurable, then it becomes difficult to establish if WB has increased/decreased.

Potentially positive relations or synergies between objective WB and SD can be found in the domains of transport and energy production². With respect to transport, for instance, the UK government Future of Transport White paper (DoT, 2004) states that cycling and walking are attractive alternatives to car travel for short journeys, which will improve local air quality. This will promote physical health benefits for all those exercising by walking and cycling between destinations, which can reduce the risk of serious illness such as heart disease, in addition to enhancing mental health and self-esteem (Pretty et al, 2003). This also produces a positive spill-over effect, in that society will benefit from the reduction in smog and air pollution caused by traffic congestion (Newman, 1999).

Synergies between objective WB and both WS and SS can also be found in the area of energy production such as ethanol production in Brazil (Moreira et al, 2005). During the 1970s oil crisis and subsequent fall in sugar prices on the world market, the Brazilian government, in 1975, encouraged the production of alcohol to replace gasoline in vehicles. After much variability in the oil price, additional benefits were reaped from ethanol production as sugar cane residues were used to create electricity and heat. Ethanol production, on average, created much more employment opportunities than the

and is implausible in practice (Dietz and Neumayer, 2007).

² See Goodacre et al (2000) for an example using energy efficiency.

oil industry, and sugar cane workers had relatively higher salaries than other sectors in the economy. Moreover, around 30% of sugar cane production was in the hands of 60,000 independent producers, representing major economic activity for small farmers and increased income equality.³

However, while there are instances where objective WB is compatible with both WS and SS, potential conflict between SD and economic growth remains (e.g. Travers and Richardson, 1997; Raskin and Margolis, 1998; Jackson and Marks, 1999; Anand and Sen, 2000; Diener and Seligman, 2004; Gasper, 2004). It is possible that SS might lead to a slowdown in economic growth, resulting in more unemployment, and decreases in tax revenue and government spending in areas targeted at improving WB. However, WS is not perceived to have the same type of problems, since the revenues from natural capital are invested into other forms of capital which are productive and beneficial for the economy. For example, many developed countries pass a WS test by having positive genuine savings rates; whereas many developing countries would not pass such a test due to sub-optimal investment decisions (see World Bank, 2006, for greater detail).

Moreover, economic growth is positively related to education levels, life expectancy, access to material resources such as clean water, nutritional requirements and adequate housing. This supports the environmental Kuznets curve (EKC) hypothesis, which states that as economies grow, the associated improvements in institutional quality and technology provide the capacity to reduce environmental degradation. This view is supported by the Brudtland report, which argued for “more rapid economic growth in both industrial and developing countries” (WCED, 1987: p. 89), which clearly places great importance upon the WS perspective. Since the early studies by Shafik (1994) and Grossman and Krueger (1995), who found an inverted U-shaped relationship between pollution and per capita income, the methodology of testing the EKC has significantly progressed.

However, although some environmental problems that directly affect human WB have

³ For a total economic evaluation however, one would have to show that the benefits of the production do outweigh the costs of ethanol production, which include the stress placed on both ecosystems and the land

been demonstrated to conform to the EKC, namely sanitation and clean water, others, such as carbon dioxide (CO₂) emissions (Cole et al, 1997) and biodiversity loss (Asafu-Adjaye, 2003), do not. It is possible that the EKC might result from a trade effect (i.e. displacement of ‘dirty’ industries to the developing world) (Cole and Neumayer, 2005). Furthermore, the estimation technique of deriving the EKC has come under question, since per capita income and emissions are typically non-stationary variables and the regressions do not appear to co-integrate (Perman and Stern, 2003; Wagner, 2006). Therefore, given the potential fragility of the EKC result, which implies long-term turning points or no turning points altogether, it is apparent that economic growth might increase environmental degradation, which might negatively affect human WB in the long-run. As a result, there are possible conflicts between WS and objective WB at the national and international level in the long run, but less so for SS and objective WB.

At the regional or local level, it is difficult to determine whether WS and SS are compatible with objective WB. A region or city could be deemed sustainable by some academics if the incidence of environmentally linked diseases is relatively low (see e.g. Friedman et al, 2001), although ecologists would use the ecological footprint to illustrate how much people consume, and how much CO₂ is emitted as a by-product of regional/city consumption (Kahn, 2006). However, if a city has low local pollution levels and high quality of life, but high greenhouse gas emissions, i.e. a large global negative externality, one could question whether this city should be deemed to be sustainable. In this instance, WS and objective WB would be compatible and provide some synergy in the short run, but there would be a tension between SS and objective WB at the city level, since the high levels of CO₂ might be damaging to the CNC stock. In practice, whether a city is deemed sustainable depends on what the regional social planner maximises and whether the planner is concerned with shorter- or longer-term environmental problems.

On the SS side, Pearce et al (2006) argue that local or regional projects which cause environmental damage should be totally mitigated by other projects that result in an environmental improvement. Farmer and Randall (1998) believe that projects should follow the standard CBA unless there is a compelling reason not to do so, for example, to

conserve a critical natural asset, i.e. the safe minimum standards (SMS) rule. However, the problem here is that it is uncertain as to the actual size of the required portfolio needed to maintain SD, although this uncertainty could be reduced if it could be determined which natural assets are critical. Therefore, the way in which objective WB and both WS and SS interact within the spatial equity framework depends upon what is considered to be sustainable at the local level, although one would imagine that there would be more instances of synergy between objective WB and WS rather than SS, depending on the actual construction of the objective list.

Finally, if an aspect of CNC turns out not to be critical then WS will lead to greater long term WB. Since future generations may change their mind about what should be on an objective list of WB attributes, it is difficult to determine what items/aspects should be identified as critical. For example, future generations might think that a really important part of WB is knowing and understanding one's heritage, in which case historical artefacts might need preserving; yet the current society might not value those artefacts to the same extent that future generations may.

3.2 The relationship between psychological well-being and SD

According to some, PWB is inherently associated with a more sustainable lifestyle, at least in developed countries (e.g. Kasser and Ryan, 1996; Kasser, 2002; Brown and Kasser; 2005). Once basic material needs such as food and shelter are met, supporters of this approach argue that people strive to satisfy their social and psychological needs of belongingness and feelings of purpose. However, these could potentially conflict with the attainment of further material possessions, if, for example, further consumption requires less enjoyable but better paid jobs or requires longer working hours that reduces the amount of time that can be spent with friends and family.

It has been argued that a materialistic view, often measured by the importance the individual places on financial success, is negatively related to PWB. This is due to the extrinsic (or 'outward focused') nature of materialist desires which are thought to lack the potential to meet underlying psychological needs (Kasser and Ryan 1996). Moreover,

although there is evidence that we generally have favourable attitudes towards life experiences over material things, our revealed preferences often suggest otherwise (e.g. van Boven and Gilovich, 2002).

Where materialism is oriented around a relative income or consumption position, from a society wide perspective, such attitudes and motivations cannot lead to an increase in total WB. If one of the key roles of consumption beyond basic requirements is to establish a social rank it can only work to alter an individual's position within that rank order, but cannot increase the aggregate level of social WB, i.e. a zero-sum game. It has been argued, for instance, that the acquisition of material possessions and in particular 'conspicuous consumption' leads to a spiral of unnecessary social competition for scarce resources (Frank, 1999; Wright, 2000).

While materialism may create social competition and divisive social relationships, the greater attention given to human flourishing might encourage greater cooperation and a more sustainable use of scarce resources (Frey, 2005; Jackson, 2005). This line of argument is connected with SS and can be applied to the 'tragedy of the commons', for instance, which is typified by a lack of trust and co-operation (Hardin, 1968). As long as each user of a common resource acts for the common good, it can be maintained. When everyone acts out of short term self-interest, everyone will suffer as the resource becomes depleted too quickly to recover.

Nevertheless, one of the problems for the compatibility between SS and PWB is evidence that materialistic people generally earn more than non-materialists and this higher income largely offsets any losses in WB associated with being materialistic per se (Nickerson et al, 2003; Nickerson et al, 2006). For those who achieve their material goals, the achievement of these goals brings WB, much as the attainment of any other goal does. To the extent that material goals are related to status and status is a zero-sum game, it may instead be a desire for status and social recognition that is the problem for SS (Kasser, 2002). Therefore, if PWB includes status, social respect, pride, self-esteem, and such things are achievable through meeting a social norm for high levels of consumption, or consuming more than other people, then conflict between consumption and flourishing

may not arise at the individual level.

A related problem of PWB – and indeed objective lists – is the lack of possible trade-offs between elements of WB once those elements have been specified, limiting their usefulness in applied policy settings. For instance, supporters of PWB may argue that vandalism is not a satisfactory behaviour for true psychological flourishing, even if they do lead to greater social respect from one's peer group, because they go against underlying needs for social cohesion more generally. However, it is unclear what weights should be given to various needs such as social respect and relatedness in order to achieve PWB. Moreover, it is not at all clear that a consensus exists about what should be on the list of objective goods or psychological needs even if the potential trade-offs between them were recognised in policy contexts.

3.3 The relationship between preference satisfaction and SD

The degree of compatibility between preference satisfaction and SD truly depends upon what individuals' preferences are, and how much they discount their own future and incorporate the WB of future generations into their preferences. Even if their discount rate is in line with SD, their actual preferences may be based on incorrect information e.g. they may not be aware of the nature of capital depletion. Furthermore, there is a distinction between total preferences met and preferences met through the market, since economic measures only reveal a sub-section of preferences. The degree of compatibility between WB and SD depends upon which perspective is adopted.

The objectives of both WS and SS might come about by tapping more effectively into the public's current preferences for SD or by encouraging shifts in preferences. Behaviours such as recycling, car sharing and investment in alternative energy sources are all evidence of the potential for preference satisfaction alongside SD. However, Jackson (2005) has argued that people are often 'locked-in' to unsustainable behaviours. Thus, there may be many instances where members of the public might prefer to depreciate natural capital less so than they are currently doing. For example, where clean alternative energy sources are substantially more expensive than fossil-fuel energy sources, weak

preferences towards alternative energy are not revealed in the market. Therefore, this might require policy-makers to make the necessary capital investments in to alternative energies so as to elicit and satisfy these weak preferences.

Alternatively, where people's current preferences are not related to sustainable options, policy-makers may want to attempt to influence them or, more precisely, to influence behaviour. For instance, policy makers can alter incentive structures, e.g. by imposing Pigouvian taxes on unsustainable preferences. This changes the relative prices that consumers face and therefore changes the composition of the bundles of goods and services that maximises their WB, but it does not change the underlying preferences as such (unless the preferences are subject to adaptation). To aid this process, policy makers could adopt defaults which favour WS, or to some degree SS, but at the same time, to avoid paternalism, allow for alternative behaviours (Thaler and Sunstein, 2003). People could still chose to opt out of default schemes, although evidence suggests that they are unlikely to do so once the default is set, in part because of the social norms that are communicated by such defaults (Madrian and Shea, 2000; Johnson & Goldstein, 2003; Mckenzie et al, 2006). An example of such default policies is the default private pensions plan which invests in environmentally friendly practices, but offer an opt out for other plans (Thaler and Benartzi, 2004).

This seems to suggest that both WS and SS might be compatible with preference satisfaction although this compatibility is not straightforward. According to Reeves (2003), we do not want to give up our freedoms to make choices about our own WB, and SS may restrict the choices we face. Johansson et al (2006) provide an example of commuters between Stockholm and Uppsala in Sweden, where the importance of flexibility and comfort are crucial for people's preferred mode of transport to get to and from work. Characteristics such as comfort and control are areas where the personal car dominates other forms of transport, with commuters feeling that these benefits would diminish if they were forced to use public transport facilities. Even car sharing schemes take away some of the flexibility and convenience associated with car use, although there may be benefits associated with greater social interaction, which contributes towards objective and/or flourishing types of WB.

A further example is long distance commuting. People have traditionally wanted to live in the suburbs or the countryside where there is perceived to be tranquillity, safety and more open space. The development of compact cities may have beneficial impacts on the countryside but compact cities may also decrease individual choice and WB as people are forced to live in conditions that are not their preferred option within the city (Nicholson-Lord, 2003). Despite the evidence that commuting may result in losses in SWB (Stutzer and Frey, 2005), and further add to environmental degradation that conflicts with SS, citizens may still resent any policies that restrict their ability to satisfy their preferences, as perceived by themselves.

At the microeconomic level, Pearce et al (2006) argue that WS can be applied to the preference satisfaction approach within the cost-benefit analysis of specific projects.⁴ They argue that the genuine savings rule, i.e. that the change in the real value of total wealth should not be negative in the aggregate, can be applied to a portfolio of local projects, and provides the need for an essential local 'asset check'. However, one of the problems with preference satisfaction is that we currently do not have a good way of measuring it: we rely on income as a proxy, but that only measures those preferences which can be satisfied through the market. However, people may have many other preferences which are likely to exist, such as preferences for endangered species, clean air, seeing friends etc. which cannot be readily expressed through the market. When WB is measured in terms of income, it appears to conflict with SS, but fully accounting for all our preferences would be likely to reduce the conflict. Although the extent to which people have lexicographic preferences for environmental goods over other goods has been analysed (e.g. Spash and Hanley, 1995; Stern, 1997; Lockwood, 1998), how these preferences affect WB is something that is yet to be fully explored.

3.4 The relationship between subjective well-being and SD

Despite the growth in psychological and economic research into the determinants of

⁴ The macroeconomic level could also be explored. For example using preference satisfaction to model and measure the impacts of climate change (Tol, 2002a,2002b; Stern, 2007).

SWB (e.g. Dolan et al, 2006), only a small number of studies have specifically looked in to the interactions of SWB with the natural environment. An example of where SD and SWB might be compatible is provided by Gatersleben (2001), who examined how people judged their quality of life when they adhered to a less energy consumptive lifestyle. In general, people did not feel a burden when reducing their energy use unless they were asked to reduce their current consumption levels by over 25%. The least sustainable consumption patterns were found among high-income groups and young couples, but quality of life overall was relative to the percentage of energy use that was reduced rather than the absolute amount used. This study suggests that the way people feel about their lives is quite flexible in the face of policies aimed at SS. However, it is unclear whether this is entirely supportive of SS, since energy use might have to be cut by more than 25% to be considered as non-damaging to CNC, both on the source and the sink side.

James and Desai (2003) and the Institute for Public Policy Research (IPPR, 2006) suggest that the public often view global environmental threats, such as climate change, as intangible concepts. Small-scale projects such as sustainable housing schemes, on the other hand, provide practical solutions for dealing with some global scale problems. Residents are also likely to take up other practices that have a less damaging effect on natural capital in a bid to improve their own SWB. Jackson (2005) reinforces the idea that SWB is malleable, and once people understand the consequences of their actions, a stronger pathway to SD may be possible. From an attitudinal perspective, Ferrer-i-Carbonell and Gowdy (2007) show that within the UK, concern for biodiversity loss increases WB, whereas concern for the ozone layer decreases WB. However, this causal path is questionable since this concern for biodiversity is a negative emotion; it is possible that people with high levels of SWB have satisfied most of their basic personal needs and are merely looking beyond themselves. As a result, reverse causality could be driving this result.

At the microeconomic level, Van Praag and Baarsma (2005) found that the perception of noise pollution from air transport has a significant affect on individuals' SWB. At the macroeconomic level, Welsch (2006) found that nitrogen dioxide and lead concentrations play a significant role as a predictor of SWB, both across time periods and across ten

European countries. From this study, WS and WB might conflict, since the countries used are perceived as not being weakly unsustainable (see World Bank, 2006). Given that both air and noise pollution from transport, industry etc has a significant damaging affect on WB, SS and WB might be mutually beneficial, in that a reduction of the depreciation of natural capital (especially on the sink side) could increase WB. On balance, however, there may be a net gain to SWB from the production causing the pollution that is not accounted for in the studies – e.g. someone benefits from a flight despite the pollution it causes.

However, the positive linkages between SS and WB might well break down once we examine the behaviour of individuals in every day life. For example, how an individual feels about his/her life is central to the public transport debate. To some individuals, personal cars can be status symbols and can represent identity and types of lifestyle. Other people may be more willing to use public transport but are dissatisfied with the facilities available for use. Using a personal car can often be much quicker than using public transport, with the latter potentially increasing commuter time and reducing SWB, and the time for recreational activities that improve SWB (Michalos et al, 2000; Pretty et al, 2003; Cushman et al, 2005). This finding is similar to that of preference satisfaction, where SS and WB are also incompatible.

SWB has also been connected to the aesthetics of an individual's surrounding environment. Although many people support renewable energy development in principle (Lindley, 1994), there is a trend of opposing specific plans that involve wind turbines or tidal barrages, i.e. NIMBYism (Not-In-My-Back-Yard) (Devine-Wright, 2005). For example, *ex ante*, wind farms are perceived as being an unacceptable level of visual intrusion, and residents may fear noise pollution, a reduction in income from reduced tourism and falling house prices. Indeed, Ladenburg et al (2006) use a preference satisfaction approach, where people are willing-to-pay approximately £30 to move an offshore wind farm from eight to twelve kilometres away. However, *ex post*, anecdotal evidence suggests that once residents live near a wind farm, they adapt to the wind farm, and they can sometimes provide an increase in SWB, especially in terms of increased civic pride. Clearly, an *ex ante* preference satisfaction approach might generate a totally

different policy outcome than the SWB method, which highlights the fundamental problems of the preference approach, namely adaptation and the focusing illusion effects (Sugden and Kahneman, 2005; Dolan and Kahneman, 2007). The latter can be summed up by the line: “nothing in life is as important as you think it is when you’re thinking about it”. Crucially, in this example, what people actually feel has more consistency with SD than what they originally wanted.

A key remaining question concerns the link between SWB and income – i.e. the strength of diminishing marginal returns and the role of income relativities (Ferrer-i-Carbonell, 2005; Luttmer, 2005) – see Clark et al (2006) and Dolan et al (2006) for comprehensive reviews of this literature. This work suggests that theoretically we could lower the consumption of all individuals in the developed world without reducing SWB, although multinational action would be necessary, rendering this impossible in practice. There are also other areas that are important to SWB, e.g. the importance of social capital (Helliwell, 2006), which could help to facilitate both WS and SS. A possible limitation to SWB is that it might not incorporate existence value or non-utility creating environmental attributes into its evaluation. The continued existence of species may just be an intrinsically good thing (i.e. part of objective WB) – but not part of SWB. Just like justice, knowledge or beauty, we may wish to pass on more than just non-declining utility to future generations.

4. Discussion

Given that there is a lack of shared understanding about exactly what is meant by the terms WB and SD, having a common set of definitions allows us to meaningfully discuss the synergies and tensions between them. The WB literature is quite consensual regarding the definitions of each type of WB, and there is a growing realisation about the need to discuss the circumstances under which different accounts will generate different or similar results (Dolan et al, 2006). The analogous literature in relation to SD is large, encompasses many different perspectives and is less consensual. This makes it difficult to define the precise relationship between SD and WB. However, analysing both WS and SS makes SD a more tangible concept, allowing one to obtain some comparisons with the

different types of WB.

At a very general level, there are many examples of where WB and SD complement one another and some cases where they are in conflict. It seems that WS and WB conflict much less than SS and WB. This is not surprising since WB is mostly concerned about the current generation and WS places fewer restrictions than SS in the short term. Furthermore, the SWB account seems to offer the most promising way of conceptualising WB in public policy generally and provides a favourable conceptual approach of comparing WB to SD. A shift from a focus on actual preferences towards SWB might reduce some of the existing tensions between WB and SD.

This advocacy of SWB is primarily due to the problems of the other approaches. Firstly, objective WB lists are context-dependent, rest upon the judgement of the researcher, and it is very difficult to trade-off between the different objects in the list. Secondly, preference satisfaction accounts and PWB seem to be too restrictive as conceptions of WB, focusing on only one aspect of how an individual's life can be thought of as going well. Finally, supporters of PWB often use measures of SWB as their ultimate dependent variable. It is therefore more straightforward to simply monitor an informed individual's assessment of his life overall (i.e. SWB), since ultimately the satisfaction of intrinsic needs will show up in SWB. This avoids the problem of having to distinguish between intrinsic and extrinsic needs, which is particularly difficult when making interpersonal comparisons (as what is intrinsic for one person might be extrinsic for another).

More generally, research efforts should be directed towards a better understanding of precisely why the preferences people reveal in their market behaviour and elsewhere may not be those that maximise SWB, since what we want is often based on predictions of what we think we like, we are often guilty of 'miswanting'; that is, of wanting things that do increase WB and vice versa (Gilbert and Wilson, 2000). Across a range of contexts, it seems that we overestimate the intensity and especially the duration of our reactions to events (Dolan and Kahneman, 2007). Moreover, it seems that people do not take sufficient account of the fact that their preferences, reference norms and expectations may all change when their circumstances change. These findings could be used to explain why

the benefits from our consumption decisions (which may have external costs) often fail to last as long as expected. This might also explain why NIMBYism does not last within individuals.

In fact, the basic discrepancy between wanting and liking may be hard-wired into us. There is now evidence (e.g. Berridge, 1999) from Positron Emission Tomography (PET) scans that the pleasure (liking) system in the brain is located in the amygdala, which acts like an emotional hub, and the nucleus accumbens, which acts as the receiving end of brain cells, which contain dopamine. The “wanting” system of the brain – the lateral hypothalamus – connects directly to the nucleus accumbens but is distinct from it. As the technology of neuroscience continues to develop (see Camerer et al, 2005, and Roe and Haab, 2007, for reviews of the current neurological and molecular genetic methods available to economists), it should be possible to provide fresh insights into how different consumption decisions impact upon our WB and to consider the degree to which sustainable consumption is associated with what we enjoy best and distinct from what we want most.

At a more practical and policy focused level, there is much appeal in disaggregating SWB as currently experienced by the population, as experienced in the future by the current population and as experienced in the future by future populations. However, as things stand, the SWB methodology is limited in its scope because of the problems of measuring and then aggregating the WB of different populations at one point in time, let alone across different time periods. There is the real danger that the current WB of a minority can be used as a proxy for the current and future WB of the majority. Additionally, it is questionable how far into the future consideration should extend and whether consideration should extend beyond national borders. Broome (2004) has raised some of the complexities involved in making comparisons between populations of different sizes and highlights the difficulties involved in accounting for the WB of individuals who will – or would have – come into being under alternative states of the world.

A good example of this future utility problem is CO₂ emissions. It is sensible to assume that CO₂ emissions have a negligible effect on individuals’ SWB today in the developed

world. However, if increasing CO₂ emissions eventually cause changes in the climate, which increase both future health problems and vulnerability to natural disasters, this would have a negative effect upon future WB. The trade-off between current and future WB is made explicit in this example, but is yet to be fully accounted for. In the same way as it is possible to ask respondents to express their willing-to-pay in monetary terms for a benefit that is experienced by other people (Dolan et al, 2003), it is possible to ask respondents what they would be willing-to-pay in WB terms for that same benefit. These are issues that can – and should – be addressed by empirical investigation into how the general public would trade-off the WB of one group against another.

Essentially, it must be recognised that the determinants of WB do not equal the determinants of both WS and SS. There is some potential overlap between WB and SD, e.g. air pollution, but either one cannot be governed by the other. This is not to say that there are no trade-offs to be made between them. Indeed, if a change in the quality of an environmental good increases (decreases) SD (i.e. WS or SS) but decreases (increases) SWB, there might be possible trade-offs to be made between the two which could produce beneficial outcomes. However, it is crucial to determine exactly what environmental factors affect human WB in the current and future generations, and while there might be potential pitfalls in terms of reverse causality, it is an area that would be very fruitful to economic research.

The trade-off of WB and SD against one another within the same macroeconomic indicator is problematic. The Index of Sustainable Economic Welfare (ISEW) has grown out of concern that GDP is not an adequate indicator of both SD and WB. The ISEW includes WB in an objective format, assuming that people would be unhappy with income inequality, crime, commuting and a whole host of defensive expenditures. However, this might not be the best way of expressing WB at the national level (see Kahneman et al, 2004 for an alternative framework), and it is debatable whether there is justification, in SWB terms, for including as much defensive expenditures as many studies have previously proposed (for example, Cobb and Cobb, 1994; Castaneda, 1999; and Hamilton, 1999). While we agree with Dietz and Neumayer (2007) that the ISEW is not a truly adequate way of measuring SD, we would go further to argue that this

indicator makes the relationship between WB and SD even more opaque. The ISEW inherently assumes that what is good for WB is good for SD, and that they can be combined together into one measurement.

The basis for this argument is that the current measurement of WB is only concerned with the current generation, so neither SD nor WB can be superseded by one another. If future WB could be measured correctly, so as to be incorporated in to, for example Dasgupta's (2002) Ramsey-Koopmans social welfare function, then it might be possible to place SD in to an over-riding WB accounting framework. As this is not possible yet, we believe that it is problematic combining SD and WB together in to one macroeconomic indicator.

Within the UK Government's SD indicators framework (Defra, 2006), there is an indicator of WB which is one of sixty-eight indicators of SD. The actual outcome measure for this indicator is currently under consultation, precisely because it is not immediately obvious which definition of WB is most applicable in this context. While many of the indicators also relate to a SS approach, we found that many of the existing indicators relate to both objective WB and SWB accounts. However, there are no indicators that are direct measures of SWB, and although there are a number of proxies and determinants for SWB, the rationale for their inclusion over other possible proxies (such as satisfaction with health) is not clear. Ultimately, governments should directly measure SWB, and ask questions about how satisfied individuals are about their life and its relevant domains (as in the personal well-being index proposed by the International Wellbeing Group, 2006), and possibly questions about how much meaning, energy, vitality etc. they have in life. Governments should attempt to keep SWB separate from SD since, as already discussed, the time frames for them are different, even though there might be potential synergies between the two concepts.

Overall, it is clear that by maximising SWB, as opposed to utility measured by consumption, there may be more synergies with WB and SD. However, one needs to be careful about making this assumption since there is the potential for conflicts between achieving SD and maximising WB of current citizens regardless of which conception of WB is used. Nevertheless there are still many areas of synergy; hence public policy

should take greater steps to those actions which move us towards SD and increasing SWB. At the very least, there is a need for clarity on using WB for future research, and academics, public policy officials and citizens should be consistent upon the actual definitions of WB and SD they use.

Acknowledgments

We are indebted to Andy Dixon, David Phillips and Aki Tsuchiya, who provided significant input into earlier versions of this paper. We would like to thank Isabella Earle, Neil Witney and the steering group at Defra for their helpful comments and suggestions at various stages of this paper, although the views in it do not necessarily reflect Defra policy. Robert Metcalfe and Tessa Peasgood acknowledge funding from the Economic and Social Research Council.

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Table 1: Descriptions and examples of both WB and SD

	Description	Example
Well-being		
Objective lists	WB is achieved if a large amount of variables listed are available to the individual	Human Development Index
Psychological WB	WB is achieved once an individual is flourishing and achieving their maximum potential	Maslow's hierarchy of human needs
Preference satisfaction	WB is achieved when as individual gets what they want	Willingness to pay/accept
Subjective WB	WB is achieved if an individual feels positive about their life	General Health Questionnaire or the Personal well-being index
Sustainable development		
Weak sustainability	SD is achieved if there is the capacity to provide non-declining utility	Cost-benefit analysis with actual compensation
Strong sustainability	SD is achieved if the physical stock of those forms of natural capital that are regarded as non-substitutable or crucial are preserved	Precautionary principle or safe minimum standards