Griffith Business School

Submitted in fulfilment of the requirements of the degree of

Doctor of Philosophy

by

Christopher Ambrey

September 2014

Essays on the Influence of the Environment on Life Satisfaction: Evidence from Australia

Christopher Ambrey
Bachelor of Economics with Honours
Bachelor of Commerce (Economics)

Department of Accounting, Finance and Economics
Griffith Business School
Griffith University

Submitted in fulfilment of the requirements of the degree of
Doctor of Philosophy

September 2014

Abstract

The environment in which the majority of Australians live is likely to undergo rapid change due to the pressures of population growth, economic growth and urbanisation. It is, therefore, useful to understand the extent to which well-being depends on this environment. Employing data from the Household, Income and Labour Dynamics in Australia survey and Geographic Information Systems, this thesis investigates the extent to which a number of environmental factors affect an individual's self-reported life satisfaction. Environmental factors considered include: scenic amenity, air pollution, ecosystem diversity, protected areas and public greenspace. In doing so, this thesis extends existing literature on the economics of happiness as well as the literature devoted to valuing non-market goods and services.

Research into life satisfaction (or happiness) is increasingly the *foci* of a great deal of empirical investigation in economics. This research has been motivated, at least in part, by dissatisfaction with traditional means of measuring economic progress, as clearly evidenced by the findings of the *Report by the Commission on the Measurement of Economic Performance and Social Progress* (Stiglitz, Sen, & Fitoussi, 2009). This area of research also reflects a broader re-evaluation of the epistemological foundations of economics, as seen in 2002 by Daniel Kahneman and Vernon Smith together being awarded the Nobel Prize in Economic Sciences.

This thesis investigates the link between the environment and well-being using several related essays. The substance of this thesis involves linking data from the Household, Income, and Labour Dynamics in Australia (HILDA) survey at the level of the individual and household, and explicitly incorporating environmental dimensions using variables derived from Geographic Information Systems (GIS) and Census data. In doing so, this thesis employs and extends what has become known as the life satisfaction approach to non-market valuation. Simply, this approach entails the inclusion of non-market goods as explanatory variables within a micro-econometric function of life satisfaction along with income and other covariates. The estimated coefficient for the non-market good yields first, a direct valuation in terms of life satisfaction, and second, when compared to the estimated coefficient for income, the implicit willingness-to-pay for the non-market good in monetary terms (Frey, Luechinger, & Stutzer, 2010). The life

satisfaction approach offers several advantages over more conventional non-market valuation techniques. For example, the approach neither relies on housing markets being in equilibrium (an assumption underpinning the hedonic property pricing method), nor asks individuals to directly value the non-market good in question (as is the case in contingent valuation and, to a lesser extent, choice modelling). Instead, individuals are asked to evaluate their general life satisfaction. This is perceived to be less cognitively demanding as specific knowledge of the good in question is not required, nor are respondents asked to perform the unfamiliar task of placing a monetary value on a non-market good. Further, there is no reason to expect strategic behaviour or social desirability bias in relation to the good being valued (Welsch & Kühling, 2009).

Specifically, the thesis: (1) gives an overview of the level, determinants and distribution of life satisfaction in Australia, in addition to the prevalence and severity of dissatisfaction (2) highlights the implicit value individuals in South East Queensland derive from scenic amenity; (3) demonstrates the implicit value of ecosystem diversity preservation or improvement; (4) reveals the implicit value of different types of protected areas in Australia; (5) shows how public greenspace matters more for some groups than for others; (6) illustrates the implicit value of air pollution abatement; and finally (7) demonstrates the importance of using exogenous variation in income to arrive at non-market values.

These findings epitomise the current utilitarian hedonistic school of thought emanating from the economics of happiness non-market valuation literature and provide new evidence on the influence of the environment on life satisfaction. These observations have the potential to inform decision makers and public policy in the context of an overt and growing appreciation once again in economics of the discord between the means (income) and the end (happiness).

JEL Classification:I31; D61; Q51; Q53; Q57

Keywords: Environment; Geographic Information Systems (GIS); Happiness; Household, Income and Labour Dynamics in Australia (HILDA) survey; Life satisfaction; Non-market Valuation

Disclaimer

This thesis uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and is funded by the Australian Government Department of Social Services (DSS) and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views reported in this thesis, however, are those of the author and should not be attributed to either DSS or the Melbourne Institute.

Statement of Originality

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

_____

Christopher Ambrey

Acknowledgements

First and foremost, I would like to gratefully acknowledge and thank my supervisors Dr Chris Fleming and Associate Professor Helen Higgs of the Department of Accounting, Finance, and Economics, Griffith University. I would like to thank Dr Fleming for his continuing support, patience, advice, guidance, enthusiasm, encouragement and expertise over the past four years. I would like to thank Associate Professor Higgs for her advice, guidance, encouragement, expertise, belief and continuing support. My gratitude extends to all members of the academic and administrative staff in the Department of Accounting, Finance and Economics, and the Griffith Business School more broadly.

I am very grateful to Griffith University for awarding me the Griffith University Postgraduate Research Award scholarship and to the Griffith Business School for awarding me the Griffith Business School Top-up scholarship. Undoubtedly, I would not have been able to undertake a PhD at Griffith University without them.

I was fortunate to be given the opportunity to present my research at various fora, including: the 2011 New Zealand Agricultural and Resource Economics Society annual conference in Nelson, New Zealand; the 2012 Australian Agricultural and Resource Economic Society annual conference in Fremantle, Australia; the 2013 Australian Agricultural and Resource Economic Society annual conference in Sydney, Australia; the 2013 European Association of Environmental and Resource Economics annual conference in Toulouse, France; and the 2013 PhD conference in Economics and Business in Canberra, Australia. I appreciate the feedback offered by all discussants and participants. I also appreciate the feedback from reviewers of discussion papers and peer-reviewed journals articles. Thank you also, to my fellow PhD colleagues and thank you to my friends for their support throughout this journey.

Finally, I reserve my greatest thanks to my parents, my brother, and my sister, who have always given me the best emotional support and have always encouraged me. Their patience, their advice, their belief and continuing support have enabled me to complete this thesis. Thus, it is fitting that I dedicate this achievement to them.

List of publications by candidate

Journal articles

Ambrey, C., Fleming, C., & Manning, M. (forthcoming). Perception or reality, what matters most when it comes to crime in your neighbourhood? *Social Indicators Research, doi:10.1007/s11205-013-0521-6*.

Ambrey, C., & Fleming, C. (2014). Public greenspace and life satisfaction in urban Australia. *Urban Studies, 50*(6), 1290-1321.

Ambrey, C., & Fleming, C. (2014). The causal effect of income on life satisfaction and the implications for valuing non-market goods. *Economics Letters, 123*(2), 131-134.

Ambrey, C., & Fleming, C. (2014). Life satisfaction in Australia: Evidence from ten years of the HILDA survey. *Social Indicators Research, 115*(2), 691-714.

Ambrey, C., & Fleming, C. (2014). Valuing ecosystem diversity in South East Queensland: A life satisfaction approach. *Social Indicators Research, 115*(1), 45-65.

Ambrey, C., Fleming, C., & Chan, A. (2014). Estimating the cost of air pollution in South East Queensland: An application of the life satisfaction non-market valuation approach. *Ecological Economics, 97*(1), 172-181.

Ambrey, C., & Fleming, C. (2012). Valuing Australia's protected areas: A life satisfaction approach. *New Zealand Economics Papers, 46*(3), 191-209.

Ambrey, C., & Fleming, C. (2011). Valuing scenic amenity using life satisfaction data. *Ecological Economics, 72*(1), 106-115.

Discussion papers

Ambrey, C., Fleming, C. & Chan, A. 2013. Estimating the cost of air pollution in South East Queensland: An application of the life satisfaction non-market valuation approach, Discussion Papers in Economics No. 2013-02. Griffith University, Nathan, Australia.

Ambrey, C., Fleming, C. & Manning, M. 2013. The life satisfaction approach to estimating the cost of crime: An individual's willingness-to-pay for crime reduction, Discussion Papers in Economics No. 2013-01. Griffith University, Nathan, Australia.

Ambrey, C., & Fleming, C., 2012. Valuing ecosystem diversity in South East Queensland: A life satisfaction approach, Discussion Papers in Economics No. 2012-10. Griffith University, Nathan, Australia.

Ambrey, C., & Fleming, C., 2012. The lucky country? Life satisfaction in Australia 2001-2010, Discussion Papers in Economics No. 2012-09. Griffith University, Nathan, Australia.

Ambrey, C., & Fleming, C., 2012. Valuing Australia's protected areas: A life satisfaction approach, Discussion Papers in Economics No. 2012-03. Griffith University, Nathan, Australia.

Ambrey, C., & Fleming, C., 2012. Public greenspace and life satisfaction in urban Australia, Discussion Papers in Economics No. 2012-01. Griffith University, Nathan, Australia.

Ambrey, C., & Fleming, C., 2011. Valuing scenic amenity using life satisfaction data, Discussion Papers in Economics No. 2011-03. Griffith University, Nathan, Australia.

Ambrey, C., & Fleming, C., 2011. The influence of the natural environment and climate on life satisfaction in Australia, Discussion Papers in Economics No. 2011-01. Griffith University, Nathan, Australia.

Conference papers

Ambrey, C., Fleming, C. & Manning, M. 2013. Greenspace and life satisfaction: The moderating role of fear of crime in the neighbourhood, The Australia New Zealand Society for Ecological Economics 2013 conference, Canberra, Australia.

Ambrey, C., & Fleming, C. 2013. The causal effect of income on life satisfaction and the implications for the life satisfaction approach to non-market valuation, PhD conference in Economics and Business 2013 conference, Canberra, Australia.

Ambrey, C., Fleming, C. & Manning, M. 2013. Happiness, economics and the environment: Evidence from Australia, OECD Economics for a Better World, New Directions in Welfare Economics III 2013 conference, Paris, France.

Ambrey, C., Chan, A. & Fleming, C. 2013. Estimating the cost of air pollution in South East Queensland: An application of the life satisfaction non-market valuation approach, European Association of Environmental and Resource Economics 2013 conference, Toulouse, France.

Ambrey, C., Fleming, C. & Manning, M. 2013. Happiness, economics and the environment: Evidence from Australia, Green Economics Institute 2013 conference, Oxford, United Kingdom.

Ambrey, C., & Fleming, C., 2013. Estimating the cost of air pollution in South East Queensland: An application of the life satisfaction non-market valuation approach, Australian Agricultural and Resource Economics Society 2013 conference (57th), Sydney, Australia.

Ambrey, C., & Fleming, C., 2012. Public greenspace and life satisfaction in urban Australia, Australian Agricultural and Resource Economics Society 2012 conference (56th), Fremantle, Australia.

Ambrey, C., & Fleming, C., 2011. Valuing ecosystem diversity in South East Queensland: A life satisfaction approach, New Zealand Agricultural and Resource Economics Society 2011 conference, Nelson, New Zealand.

Ambrey, C., & Fleming, C., 2011. The influence of the natural environment and climate on life satisfaction in Australia, Australian Agricultural and Resource Economics Society 2011 conference (55th), Melbourne, Australia.

ALL PAPERS INCLUDED ARE CO-AUTHORED

Acknowledgement of Papers included in this Thesis

Section 9.1 of the Griffith University Code for the Responsible Conduct of Research ("Criteria for Authorship"), in accordance with Section 5 of the Australian Code for the Responsible Conduct of Research, states:

> To be named as an author, a researcher must have made a substantial scholarly contribution to the creative or scholarly work that constitutes the research output, and be able to take public responsibility for at least that part of the work they contributed. Attribution of authorship depends to some extent on the discipline and publisher policies, but in all cases, authorship must be based on substantial contributions in a combination of one or more of:
>
> - conception and design of the research project
> - analysis and interpretation of research data
> - drafting or making significant parts of the creative or scholarly work or critically revising it so as to contribute significantly to the final output.

Section 9.3 of the Griffith University Code ("Responsibilities of Researchers"), in accordance with Section 5 of the Australian Code, states:

> Researchers are expected to:
>
> - offer authorship to all people, including research trainees, who meet the criteria for authorship listed above, but only those people.
> - accept or decline offers of authorship promptly in writing.
> - include in the list of authors only those who have accepted authorship
> - appoint one author to be the executive author to record authorship and manage correspondence about the work with the publisher and other interested parties.
> - acknowledge all those who have contributed to the research, facilities or materials but who do not qualify as authors, such as research assistants, technical staff, and advisors on cultural or community knowledge. Obtain written consent to name individuals.

Included in this thesis are papers in *Chapters 3, 4, 5, 6, 7, 8, and 9* which are co-authored with other researcher(s). My contribution to each co-authored paper is outlined at the front of the relevant chapter. The bibliographic details for these papers including all authors are:

Chapter 3:

Ambrey, C., & Fleming, C. (2014). Life satisfaction in Australia: Evidence from ten years of the HILDA survey. *Social Indicators Research, 115*(2), 691-714.

URL: http://link.springer.com/article/10.1007%2Fs11205-012-0228-0

Appropriate acknowledgements of those who contributed to the research but did not qualify as authors are included in each paper.

(Signed) _____ (Date)_____

Christopher Ambrey

(Countersigned) _____ (Date)_____

Supervisor: Dr Christopher Fleming

Chapter 4:

Ambrey, C., & Fleming, C. (2011). Valuing scenic amenity using life satisfaction data. *Ecological Economics, 72*(1), 106-115.

URL: http://www.sciencedirect.com/science/article/pii/S0921800911003879

Appropriate acknowledgements of those who contributed to the research but did not qualify as authors are included in each paper.

(Signed) _____ (Date)_____

Christopher Ambrey

(Countersigned) _____ (Date)_____

Supervisor: Dr Christopher Fleming

Chapter 5:

Ambrey, C., & Fleming, C. (2014). Valuing ecosystem diversity in South East Queensland: A life satisfaction approach. *Social Indicators Research, 115*(1), 45-65.

URL: http://link.springer.com/article/10.1007%2Fs11205-012-0208-4

Appropriate acknowledgements of those who contributed to the research but did not qualify as authors are included in each paper.

(Signed) _____ (Date)_____

Christopher Ambrey

(Countersigned) _____ (Date)_____

Supervisor: Dr Christopher Fleming

Chapter 6:

Ambrey, C., & Fleming, C. (2012). Valuing Australia's protected areas: A life satisfaction approach. *New Zealand Economics Papers, 46*(3), 191-209.

URL: http://www.tandfonline.com/doi/abs/10.1080/00779954.2012.697354

Appropriate acknowledgements of those who contributed to the research but did not qualify as authors are included in each paper.

(Signed) _____ (Date)_____

Christopher Ambrey

(Countersigned) _____ (Date)_____

Supervisor: Dr Christopher Fleming

Chapter 7:

Ambrey, C., & Fleming, C. (2014). Public greenspace and life satisfaction in urban Australia. *Urban Studies, 50*(6), 1290-1321.

URL: http://usj.sagepub.com/content/early/2013/07/18/0042098013494417.abstract

Appropriate acknowledgements of those who contributed to the research but did not qualify as authors are included in each paper.

(Signed) _____ (Date)_____

Christopher Ambrey

(Countersigned) _____ (Date)_____

Supervisor: Dr Christopher Fleming

Chapter 8:

Ambrey, C., Fleming, C., & Chan, A. (2014). Estimating the cost of air pollution in South East Queensland: An application of the life satisfaction non-market valuation approach. *Ecological Economics, 97*(1), 172-181.

URL: http://www.sciencedirect.com/science/article/pii/S0921800913003479

Appropriate acknowledgements of those who contributed to the research but did not qualify as authors are included in each paper.

(Signed) _____ (Date)_____

Christopher Ambrey

(Countersigned) _____ (Date)_____

Supervisor: Dr Christopher Fleming

Chapter 9:

Ambrey, C., & Fleming, C. (2014). The causal effect of income on life satisfaction and the implications for valuing non-market goods. *Economics Letters, 123*(2), 131-134.

URL: http://www.sciencedirect.com/science/article/pii/S0165176514000457

Appropriate acknowledgements of those who contributed to the research but did not qualify as authors are included in each paper.

(Signed) _____ (Date)_____

Christopher Ambrey

(Countersigned) _____ (Date)_____

Supervisor: Dr Christopher Fleming

Table of contents

Chapter 1: Introduction

1. Introduction

Economic growth has long been *the* measure by which economic and social progress is gauged. Despite theoretical and empirical criticisms of Gross Domestic Product (GDP) as an indicator of progress, it has its advantages. For example; GDP is an objective measure of market-based economic activity, it has a long history of being measured across countries and over time, and it provides a good starting point for determining if production is growing or if spending on goods and services has increased or decreased. These qualities have seen GDP endure as the primary measure of economic and social progress for over 60 years (Stiglitz, 2009). However, for an equally long period, GDP has fallen short as a measure of social welfare (cf. Kuznets, 1934) and has confined the object of investigation to that part of social welfare which can be brought more easily within the measuring-rod of money (cf. Pigou, 1932). This criticism of GDP as a measure of social welfare is recognised and accepted by many economists, although the relevance of the disconnect between GDP and social welfare is often erroneously denied (van den Bergh, 2009).

Many facets of life that are important to the individual and to broader social welfare are not captured by GDP. These facets include the quality of the environment, the quality of education, the degree of inequality, or the level of social mobility (Bromley, 1997; Stiglitz, 2009). GDP, when employed as the sole measure of social and economic progress, yields some perverse outcomes. For example, the replacement depreciated capital stock, the shifting of non-traded goods and services into market-based transactions, the depletion of natural resources or environmental damage, the additional expenditure required to extract natural resources from an already degraded environment, and the defensive expenditures required to mitigate negative externalities that stem from economic growth itself, all contribute towards increasing GDP (Daly, 1987).

Nonetheless, the schism between GDP and social welfare is easily forgotten. This leads policy prescriptions that reflect diligent attention to GDP and productivity growth with little regard to individual's lived experienced in terms quality of life and broader societal *development* (Max-Neef, Elizalde, & Hopenhayn, 1991). Governments who produce and rely on such economic statistics need to be wary that they maintain the

confidence of citizens or a superior way to organise social provisioning can be expected to emerge (Bromley, 1997). In such circumstances, it seems helpful to reflect that goods only serve to benefit individuals to the extent that they provide a way in which individuals may satisfy their needs (Max-Neef, Elizalde, & Hopenhayn, 1991). Further, many basic needs like water, food, shelter, company, respect and freedom cannot be traded off against luxury services and material goods. As noted by van den Bergh (2009) the latter can often serve as a sublimation of the basic needs themselves (for instance, buying status goods to gain respect from peers).

There has been a recent re-emergence of the study of happiness in economics, as evidenced by a 1997 symposium on economics and happiness in *The Economic Journal* (Frank, 1997; Ng, 1997; Oswald, 1997). This symposium set in motion a flurry of research that would advocate a more central role of happiness in economics; taking up notions of public policy based on private and public happiness articulated by Italian economists over 200 years ago (Dixon, 1997).

Borne out of dissatisfaction with existing measures of social and economic progress, in particular GDP, French President Nicolas Sarkozy asked three economists (Joseph Stiglitz, Amartya Sen and Jean-Paul Fitoussi) to create a commission to consider better ways of measuring social progress. The resulting *Report by the Commission on the Measurement of Economic Performance and Social Progress* (2009) is a landmark document, very significant for economics as it specifically endorses (although not in isolation from objective measures of well-being) the use of subjective measures of well-being for designing and assessing social progress. As illustrated in the following passage:

> *Research has shown that it is possible to collect meaningful and reliable data on subjective as well as objective well-being. Subjective well-being encompasses different aspects (cognitive evaluations of one's life, happiness, satisfaction, positive emotions, such as joy and pride, and negative emotions such as pain and worry): each of them should be measured separately to derive a more comprehensive appreciation of people's lives.*

(Stiglitz, Sen, & Fitoussi, 2009, p. 16)

Some have characterised the report as highly polarising (cf. Kassenboehmer & Schmidt, 2011) while others have likened it to a watershed moment in history akin to when governments took up the measurement of national income (cf. Easterlin, 2010). The Sarkozy Commission advocates a shift of emphasis from a production-oriented measurement system to one focused on the well-being of current and future generations (Stiglitz, Sen, & Fitoussi, 2009).

The Sarkozy Commission highlights the importance of both economic growth and the environment to well-being. The environment, however, is complex, limited and subject to a number of pressures (including population growth, economic growth, and urbanisation).In order to make decisions that are allocatively efficient and socially optimal, the total value (inclusive of social costs and benefits) of non-market goods needs to be acknowledged (Perman, Ma, McGilvray, & Common, 2003). If goods traded in formal markets are treated as superior to goods not traded in formal markets, the shortcomings of markets will be overlooked and the benefits of markets exaggerated (Bromley, 1997).

1.1. Global pressures on the environment

Throughout the twentieth century, and it is expected well into the twenty-first century, three dominant trends have exerted pressure on the world's limited resource base: population growth; economic growth; and urbanisation. At the beginning of the twentieth century the world's population stood at just under 1.6 billion, in mid-2013 this had grown to 7.2 billion, and is projected to reach 9.6 billion in 2050 and 10.9 billion by 2100 (United Nations Population Fund, 2013).

Accompanying this population growth has been economic growth. In the early part of the twentieth century income per capita was $1,525, by 2001 this had risen to $6,049 (Sachs, 2008).[1] This economic growth is expected to continue, with economic growth being one of the highest public policy priorities of almost every nation in the world (even wealthy developed countries).

1 Figures in 1990 international Geary-Khamis dollars. Unless otherwise stated all subsequent figures in Australian Dollars. As at 18th March 2014, 1 AUD = 0.91 USD/0.65 EUR/0.55 GBP.

Independent of any assumptions made regarding technological progress, the impacts of population and economic growth on the environment are well known (cf. Ehrlich and Holdren 1971; United Nations Population Fund 2012; Kiel, Matheson, & Golembiewski, 2010). Population and economic growth have brought about large scale deforestation, depleted water resources, polluted the air and water, caused soil erosion (and salinity), resulted in biodiversity loss and reduced the amenity of value provided by the environment, such as the beauty of the countryside.

Furthermore, as the gap between developing and developed economies reduces and per capita incomes converge, people are able to consume more. While higher per capita income enables a greater level of material wealth, the extent to which this economic growth translates into improved well-being or social welfare relies on the appreciation of the negative externalities that such growth generates (Sachs, 2008).

Globally there has also been a trend towards migration from rural to urban areas. It is estimated that just over 50 per cent of the world's population currently reside in urban areas and that these urban areas will absorb all of the population growth over the next four decades and continue to draw some of the rural population (United Nations, 2010). This concentration of people presents both benefits and challenges to the environment. The benefits of urbanisation include lower costs per person in providing public services and utilities, and productivity improvements through specialisation and the division of labour. However, urbanisation also means that pollutants are concentrated beyond the assimilation capacity of the receiving environment. These challenges are most evident for coastal cities and towns, where the world's population is disproportionately concentrated. As a consequence of these three global trends of population growth, economic growth and urbanisation the environment is changing (Sachs, 2008).

1.2. Pressures on the environment in Australia

Australia has not been immune to these global trends. The *Australia to 2050: Future Challenges - The 2010 Intergenerational Report* (Commonwealth of Australia, 2010a) projects a 65 per cent increase in Australia's population to over 35 million by 2049, coupled with a per capita growth in real GDP of 1.5 per cent per annum. Currently 90

per cent of the population live in cities, making Australia one of the most urbanised countries in the world (Lavelle, 2006).

These trends have implications for greenhouse gas emissions; biodiversity; water availability; urban amenity; and infrastructure and government service delivery requirements. While the Intergenerational Report acknowledges the broader threat to Australia's biodiversity, the Report is quiet on the issue of the broader environment and well-being. *The State of the Australian Cities 2010* report (Commonwealth of Australia, 2010b) has little more to say on the issue.

Moreover, population growth presents a challenge to Australia's existing land use and transportation patterns, which the Commonwealth Scientific and Industrial Research Organisation (2004) has already described as poorly integrated and resulting in cities that are in the long-term economically and environmentally less sustainable. The Commonwealth Scientific and Industrial Research Organisation (2004) predicts that if Australia's cities continue to grow as urban sprawl, in just 10 to 15 years air pollution in our cities will be as much as 70 per cent higher compared to 1990 levels. Both sprawling cities and outer suburbs encroach on water catchment areas, reduce the quality of water supplies, displace agricultural land supplying cities, make fresh food more expensive and impinging on recreational spaces like parks and bushland (Lavelle, 2006). As noted by Hamilton (2002), the increasing pressures of population growth pose a threat to the very amenities that define Australia.

The negative externalities of these globally relevant environmental pressures are pervasive. Further, the nearer the environment comes to the limits of the Earth's carrying capacity, the less it can be assumed that economic growth and social welfare move in the same direction (Daly, 1987). Contemporary research in the economics of happiness seeks to redress the disjunct between GDP and well-being by providing policy makers with evidence on social welfare, beyond GDP or income.

1.3. The purpose and general approach of this thesis

The purpose of this thesis is to extend the existing body of literature that investigates the link between the environment and well-being. This thesis is couched within, and provides a distinct contribution to, two bodies of literature: First, the literature on the

economics of happiness, which explores the determinants of happiness or well-being; and second, the literature on the monetary valuation of non-market goods and services.

Specifically, this thesis investigates the link between the environment and well-being using several related essays. The substance of this thesis involves linking data from the Household, Income, and Labour Dynamics in Australia (HILDA) survey at the level of the individual and household, and explicitly incorporating the environmental dimension using variables derived from Geographic Information Systems (GIS) and Census data. In the main, this thesis employs and extends what has become known as the life satisfaction approach to non-market valuation. Simply, this approach entails the inclusion of non-market goods as explanatory variables within a micro-econometric function of life satisfaction along with income and other covariates. The estimated coefficient for the non-market good yields first, a direct valuation in terms of life satisfaction, and second, when compared to the estimated coefficient for income, the implicit willingness-to-pay for the non-market good in monetary terms (Frey, Luechinger, & Stutzer, 2010).

This non-market valuation technique goes some way to reconciling the longstanding disconnect between market-based transactions and well-being. This technique has many advantages over more conventional non-market valuation methods and has the potential to provide useful information to policy makers on the well-being effects of policy, which were previously incommensurable with other monetary aggregates. The life satisfaction approach provides the opportunity to monetise these well-being effects, potentially providing useful inputs to cost-benefit analysis and facilitating socially optimal outcomes (Welsch, 2009). Some have gone so far as to suggest that it has the potential to supplant cost-benefit analysis entirely. Despite the technique's relative infancy, it is already being applied to public policy issues (cf. Bronsteen, Buccafusco, & Masur, 2013). Further research linking the environment and well-being has the potential to contribute to the state of scientific knowledge as well as improve policy outcomes.

This thesis takes an epistemological view consistent with a significant body of literature (including, Stiglitz, Sen, & Fitoussi (2009)), which emphasises the subjective

evaluation of the individual's experience, employing the individual's self-reported life satisfaction as the measure of well-being. As with all research, there are limitations, these are discussed in Section 1.4.

The thesis proceeds as follows. Chapter 2 traces the evolution of happiness in economics from its beginnings in the foundations of Political Economy, through to the recent revival of the topic as a meaningful area of study. Chapter 3 examines the level, determinants and distribution of self-reported life satisfaction, as well as the prevalence and severity of dissatisfaction in Australia over the period 2001–2010. Chapters 4 through 7 explicitly model the link between life satisfaction and: scenic amenity (Chapter 4); ecosystem diversity (Chapter 5); protected areas (Chapter 6); public greenspace (Chapter 7); and air pollution (Chapter 8). Chapter 9 takes up a persistent challenge facing this body of literature, that is, the need to identify exogenous variation in income. The Chapter, while taking the case of physical health in Australia, rather than an environmental non-market good (enabling the analysis to take full advantage of the longitudinal nature of the HILDA survey), provides a valuable step forward with dramatic implications for the life satisfaction approach. Finally, Chapter 10 concludes.

References

Bromley, D. (1997). Rethinking markets. *American Journal of Agricultural Economics, 79*(5), 1383-1393.

Bronsteen, J., Buccafusco, C., & Masur, J. (2013). Well-being analysis vs. cost-benefit analysis. *Duke Law Journal*, *62*(8) 1603-1689.

Commonwealth of Australia. (2010a). Australia to 2050: Future Challenges - The 2010 Intergenerational Report (A.-G. s. Department, Trans.). Canberra.

Commonwealth of Australia. (2010b). State of Australian Cities 2010 (Major Cities Unit). Canberra: Infrastructure Australia.

Commonwealth Scientific and Industrial Research Organisation. (2004). Reshaping the future of cities. *ECOS*.

Daly, H. (1987). The economic growth debate: What some economists have learned but many have not. *Journal of Environmental Economics and Management, 14*(4), 323-366.

Dixon, H. (1997). Controversy: Economics and happiness (editorial note). *The Economic Journal, 107*(1), 1812-1814.

Easterlin, R. (2010). Well-being, front and center: A note on the Sarkozy report. *Population and Development Review, 36*(1), 119-124.

Frank, R. (1997). The frame of reference as a public good. *The Economic Journal, 107*(445), 1832-1847.

Frey, B., Luechinger, S., & Stutzer, A. (2010). The life satisfaction approach to environmental valuation. *The Annual Review of Resource Economics, 2*(1), 139-160.

Hamilton, C. (2002). Population growth and environmental quality: Are they compatible? *People and Place, 10*(2), 1-5.

Kassenboehmer, S., & Schmidt, C. (2011). *Beyond GDP and back: What is the value-added by additional components of welfare measurement?* Ruhr Economic Papers No. 239. Ruhr University. Essen, Germany.

Kiel, K., Matheson, V., & Golembiewski, K. (2010). The life satisfaction approach to environmental valuation. *Ecological Economics, 69*(7), 1365-1367.

Kuznets, S. (1934). National Income, 1929-1932. 73rd US Congress, 2d session, Senate document no. 124, page 7. Retrieved 04-06-2014, from http://fraser.stlouisfed.org/docs/publications/natincome_1934/19340104_nationalinc.pdf.

Lavelle, P. (2006). Are our cities killing us? *ABC Health & Wellbeing: The Pulse.* Retrieved 28-10-2010, from http://www.abc.net.au/health/thepulse/stories/2006/10/26/1773114.htm.

Max-Neef, M., Elizalde, A., & Hopenhayn, M. (1991). Human Scale Development: Conceptions, application and further reflections. Retrieved 04-06-2014, from

http://www.area-net.org/fileadmin/user_upload/papers/Max-neef_Human_Scale_development.pdf.

Ng, Y. (1997). A case for happiness, cardinalism, and interpersonal comparability. *The Economic Journal, 107*(445), 1848-1858

Oswald, A. (1997). Happiness and economic performance. *The Economic Journal, 107*(445), 1815-1831.

Perman, R., Ma, Y., McGilvray, J., & Common, M. (2003). *Natural Resource and Environmental Economics* (3rd ed.). Harlow, England: Pearson Education Ltd.

Pigou, A. (1932). *The Economics of Welfare* (4th ed.). London: Macmillan.

Sachs, J. (2008). *Common Wealth: Economics for a Crowded Planet*. London: Penguin Books.

Stiglitz, J. (2009). Progress, what progress? *The OECD Observer,* 27-28.

Stiglitz, J., Sen, A., & Fitoussi, J. (2009). Report by the Commission on the Measurement of Economic Performance and Social Progress. Paris: Commission on the Measurement of Economic Performance and Social Progress.

United Nations. (2010). World urbanization prospects: The 2009 revision (P. Division, Trans.) *Economic & Social Affairs*. New York: Department of Economic and Social Affairs.

United Nations Population Fund. (2013). Linking population, poverty and development, Retrieved 08-02-14, from http://www.unfpa.org/pds/trends.htm.

van den Bergh, J. (2009). The GDP paradox. *Journal of Economic Psychology, 30*(2), 117-135.

Welsch, H. (2009). Implications of happiness research for environmental economics. *Ecological Economics, 68*(11), 2735-2742.

Chapter 2: Literature review

2. Literature review

> *The professed object of Dr. Adam Smith's inquiry is the nature and causes of the wealth of nations. There is another inquiry, however, perhaps still more interesting, which he occasionally mixes with it, I mean an inquiry into the causes which affect the happiness of nations.*
>
> (Malthus, 1798/1966, pp.303-304)

The study of happiness[2] may seem beyond the borders of the economic discipline and more the domain of psychology. However, as evidenced by the quotation above, happiness has not always appeared out of place in economics and wealth has not always appeared to accord with happiness. Yet the achievement of happiness has long been perceived as important, not only for the individual, but for society as a whole (Pasinetti, 2005).

This Chapter begins by tracing the (de)evolution of happiness in economics from its beginnings in the foundations of Political Economy through tothe more recent resurgence of happiness in economics in the last decade or so. The Chapter proceeds by discussing debates that have originated from this research before highlighting the origins and development of the economics of happiness literature.

2.1. Happiness in the Political Economy

While the emergence of the economics of happiness as a distinct field within the discipline of economics is a relatively recent event, the substance of the issue of happiness has much earlier antecedents. In 1749, Ludovico Antonio Muratori introduced the phrase *pubblica felicita* (public happiness), which he saw as the purpose of public policy. He, along with other Italian economists of the mid-1700s (notably Antonio Genovesi) developed the link between the theory of value (in terms of the calculus of pain and pleasure) and the theory of public policy based on *pubblica felicita* (Dixon, 1997).

[2] Throughout much of the literature, especially in economics, the words happiness, life satisfaction, quality of life, subjective well-being, utility, welfare, and well-being are used synonymously.

For Genovesi, similar to the ancient perspectives, sincerely motivated civic virtues serve an important role in underpinning happiness or *eudaimonia*. Happiness was more than just fleeting pleasure, it was long-lasting and a by-product of undertaking virtuous actions that are right for their own sake. Further, according to Genovesi and common to the Neapolitan tradition, only within the laws and institutions of civic life can the pursuit of private happiness be transformed into public happiness; that is, the good of society as a whole (Bruni, 2007).

The Italian economists of this period saw themselves as distinct from the English and Scottish schools of thought, which had eliminated important dimensions of the field of political economy, such as wealth and ethics, and wealth and happiness. However, Adam Smith's *Theory of Moral Sentiments* (1759) maintained the importance of virtues and a civic nature in underpinning happiness. Furthermore, like Aristotle, Smith was of the opinion that wealth was only instrumental in achieving happiness rather than an end in itself and the pursuit of excessive wealth is a deception; happiness is cultivated by an active life, modest wealth, not by idleness, luxury or excessive affluence (Bruni, 2007). This helps explain why, in his *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776/1994), the central subject is not happiness, but material wealth, because it was how, *a priori*, the happiness of nations was to be achieved (Bruni & Porta, 2005; Pasinetti, 2005).

This focus on material wealth rather than happiness continued as Smith, Ricardo, Malthus and others started engaging in what has been termed the *analytical* stage of economic science. This analysis required abstraction, and abstraction required a coherent and unambiguously definable subject matter; wealth was thus seen as a more suitable object of investigation. While this focus necessarily narrowed the scope of analysis, it offered a more coherent and less elusive subject than would otherwise have been the case; a decision now considered vital to subsequent developments in economic theory (Pasinetti, 2005).

The tradition that followed Smith forgot the complex relationship between wealth and happiness that Smith articulated in his *Theory of Moral Sentiments* (1759) and instead focused on Smith's *An Inquiry into the Nature and Causes of the Wealth of Nations*

(1776/1994). It is not surprising that modern day findings appear so 'paradoxical' (Bruni, 2007).

2.2. Happiness and the utilitarian perspective

The reduction of happiness to some more measurable object of inquiry in economics provides only part of the narrative of why happiness may seem foreign in economics today. Utilitarianism, the moral philosophical position which holds that actions are right if they increase happiness or pleasure and wrong if they decrease it, plays a pivotal role in the devolution of happiness in economics. The utilitarian perspective of happiness was a *hedonistic* view rather than the *eudaimonic* one shared by the Ancient philosophers, many of the Italian economists and even Adam Smith. As evidenced by the first few lines of Jeremy Bentham's *An Introduction to the Principles of Morals and Legislation* (1789/1996): "Nature has placed mankind under the governance of two sovereign masters, pain and pleasure". For Bentham, the founder of utilitarianism, *happiness* is equivalent to *pleasure* and societal happiness was simply the sum of individual pleasures.

This view on happiness contrasts starkly with Aristotle's e*udaimonia*; that is, happiness is achieved by giving oneself up entirely to superior activities such as the pursuit of knowledge, contemplation and other-regarding virtues and civic practices. Aristotle's view however, required as a necessary prerequisite of happiness that one was already rich. Cicero had a more pragmatic view. He appreciated the instrumental and exhaustible nature of one's wealth, and emphasised that one should be content with little material support while attending to higher order virtuous activities (Vivenza, 2007).

With Bentham the distinction between happiness and wealth disappeared. Bentham uses the words happiness, pleasure and utility interchangeably throughout all his works, yet he defines utility as a property of objects, whereas happiness and pleasure are related to the individual. The possession of objects meant pleasure and pleasure was happiness (Bruni, 2007). This view extricates happiness any of its lingering Aristotelian or *eudaimonic* vestiges and the idea that living for happiness is anything more than choosing to live the life of dumb grazing animals (Bruni and Porta 2005; Nussbaum, 2005).

Bentham, maintaining his utilitarian perspective, reduced happiness to pleasure and precipitated the disappearance of the distinction between the means and the ends. Nevertheless, the utilitarian version of happiness was later championed by mainstream economics and Jevons in particular (Bruni, 2007).

2.3. Neoclassical revolution

During the neoclassical revolution of the 1870s the hedonistic utilitarian perspective of happiness continued, admitting a limited and simplified form of psychology (Hands, 2009). This is evidenced by Jevons in his *Theory of Political Economy* (1871/1970), in which he describes consumer choice theory where pleasure can be maximised through purchasing material objects:

> *The theory which follows is entirely based on a calculus of pleasure and pain and the object of economics is to maximise happiness by purchasing pleasure as it were, at the lowest cost of pain.*
>
> (Jevons, 1871/1970)

Inspired by Bentham, Jevons (1871/1970) and Edgeworth (1881) employed psychological hedonism and consequentialism as the basis for mainstream consumer theory. Pleasure from consumption was known through introspection (Bruni & Sugden, 2007). Edgeworth (1881) argued that utility was directly measurable and that new developments in 'physio-psychology' would make it possible to develop a 'hedonimeter' that would allow economists to develop a firm physiological underpinning of utility (Colander, 2007).

After two centuries of being concerned with the growth of resources and the rise of wants, economics after 1870 became largely a study of the principles that govern the efficient allocation of resources when both resources and wants are given. That is, economics became regarded as a science that analysed "…human behaviour as a relationship between given ends and scarce means which have alternative uses" (Blaug, 1997, p.4).

Consistent with the perspective of Jevons and Fisher, Marshall (1920/1982) saw the 'material' as a requisite of well-being. Marshall came to substitute the term happiness

for well-being (Bruni, 2007; Marshall, 1920/1980). However, Marshall did not disregard the subtler elements of happiness (Bruni, 2007), expressing that:

> *"…a person's stock of wealth yields by its usance and in other ways an income of happiness, among which of course are to be counted the pleasures of possession: but there is little direct connection between the aggregate amount of that stock and his aggregate happiness."*
>
> (Marshall, 1920/1982 p. 111)

Nonetheless, Pigou (1932) translation of Marshall's well-being into 'welfare' is quite illustrative of the material school of thought and explained that welfare is a wide ranging concept, and that as such:

> *...the range of our inquiry becomes restricted to that part of social welfare that can be bought directly or indirectly into relation with the measuring rod of money...*
>
> (Pigou, 1932, I.III.I)

Pigou goes on to explain how a part of social welfare can be measured using money and how a certain level of non-economic welfare could be obtained with money. Pigou cites Cannan's observation that:

> *We must face, and face boldly, the fact that there is no precise line between economic and non-economic satisfactions, and, therefore, the province of economics cannot be marked out by a row of posts or a fence, like a political territory or a landed property. We can proceed from the undoubtedly economic at the other end without finding anywhere a fence to climb or a ditch to cross.*
>
> (Cannan, 1948, p.4)

In lieu of a precise boundary between the economic and the "non-economic", Pigou uses the test of a money measure as a rough criterion. Kahneman (1999) observes Bernoulli (1738/1954, §4-§5) to do the same, arguing that economic analysis of decision making has assumed that people evaluate their options according to the level of wealth that they can yield and what impact this will have on their utility. Kahneman

(1999) is not alone in this interpretation of Bernoulli, Marshall (1920/1982) interpreting similarly, describing the "happiness-yielding power" of money (pp. 111-112). Pigou, like other economists of the material welfare school, used the concept of *welfare* for analysis at the aggregate national level; the term *utility* was reserved for the individual level. For Pigou, increases in gross national product, *ceteris paribus*, must increase economic welfare.

2.4. Cardinalism and interpersonal comparability

Inherent in Pigou's conditions for establishing an increase in material welfare, as well as in Marshall's consumer utility measures (Blaug, 1997), is the idea that cardinality and interpersonal comparisons of utility are possible (Cooter & Rappoport, 1984; Pigou, 1932). However, Robbins' *Essay on the Nature and Significance of Economic Science* (1932), one of the most important methodological works in twentieth century economics, redefined the discipline of economics, providing an epistemological boundary that took interpersonal comparisons of utility to be unscientific and measurement of utility unnecessary (Cooter & Rappoport, 1984; Hands, 2009, 2010).

Happiness had degenerated further; forbidding the use of some concepts because they are 'not operational' had very deep and lasting consequences on the development of the discipline (Bruni & Guala, 2001). While the interval dimension of utility is difficult to measure (and at times difficult for an individual to perceive), there is no denying utility is a cardinal quantity. As Ng (1997) persuasively remarks, by denying a ratio dimension of utility:

> *...you can only say that you prefer your present situation (A) to that plus an ant bite (B) and also prefer the latter to being bodily thrown into a pool of sulphuric acid (C). You cannot say that your preference of A over B is less than your preference of B over C.*
>
> (Ng, 1997, p.1852)

The inability to compare the utilities of individuals has a long tradition from the time of Wicksteed and Robbins. These authors declared every mind to be totally inscrutable to any other mind and considered interpersonal comparisons of utility to be pure value judgements without any objective basis (Robbins, 1932). However, the judgement that

one individual may be made better or worse off than another individual is not a value judgement in itself, merely a description of the status quo. A subsequent choice to make an individual better or worse off represents a value judgement. In general, it may be said that any policy recommendation must be based on some value judgment yet economic analysis itself need not be value-loaded (Ng, 1997). At most these interpersonal comparisons of utility are subjective judgements of fact, not value judgements (Ng, 1972). By rejecting the cardinality of utility and not permitting interpersonal comparisons when it is useful or necessary, economics became divorced from fundamental concepts, and even misleading. In detaching economics from the psychology of feelings, economists have found it difficult, or even impossible, to say something helpful about many important social welfare questions (Ng, 1997; van Praag & Frijters, 1999).

Some economists such as, Bergson (1938), Scitovsky (1951, 1952), Lange (1942), Samuelson (1947) and Little (1950) recognise that interpersonal comparisons were useful and unavoidable. With the emergence of economic theories of justice and social choice theory during the 1950s, economists such as Harsanyi (1955) and Sen (1970) explored ways of reintroducing interpersonal comparisons to welfare economics. These varied reactions, intertwined with different concepts of well-being, lead to the diversification of welfare economics and a shift in the object of analysis and measurement to the well-being of specific individuals as opposed to the dominant concept of well-being as the preference satisfaction of theoretically conceived economic agents (Edwards & Pellé, 2011).

2.5. The ordinalist revolution

According to Robbins (1932), utility should only be used to explain the choices made by individuals between various goods and can, therefore, be inferred from observations of choices actually made (the 'revealed' preference). The concept of a scale of preferences replaced the idea of measurable cardinal utility and was successful in economics for two reasons: (1) the difficulty with objectively measuring the amount of satisfaction or pleasure associated with the consumption of a good or service; and (2) the fact that cardinal utility is not necessary for economic theory. Hicks and Allen (1934a, 1934b) were instrumental in the ordinalist revolution, showing that demand

theory can be entirely grounded on ordinal utility in the form of a preference index. Hicks and Allen (1934a, 1934b), reproposing Pareto's earlier results, expressed that:

> *Of all Pareto's contributions there is probably none that exceeds in importance his demonstration of the immeasurability of utility. To most earlier writers...utility had been a quantity theoretically measurable; that is to say, a quantity that would be measurable if we had enough facts. Pareto definitely abandoned this, and replaced the concept of utility by the concept of a scale of preferences.*
>
> (Hicks & Allen, 1934a)

Bruni and Guala (2001) revisit the purported 'Paretian shift', which paints Pareto as the protagonist (or would be protagonist) of the ordinalist revolution, and provide a more nuanced interpretation of Pareto's perspective and broader philosophy. In contrast to Hicks and Allen (1934a, 1934b), Bruni and Guala (2001) contend that Pareto considered utility to be cardinal; for Pareto, recognising that a quantity exists and measuring it were two different things (Bruni & Guala, 2001). While Hicks and Allen (1934a, 1934b) assert that Pareto definitely abandoned (or intended to abandon) the concept of utility as a quantity that might be measured, the paradigm that Hicks and Allen (1934a, 1934b) advance is at odds with Pareto's own philosophy of economics, which was more in line with that of his nineteenth predecessors (Bruni & Guala, 2001).[3]

From the late thirties onwards, Samuelson (in a series of works (cf. Sameulson, 1948, 1938, 1947, 1950)) took the ordinalist revolution to the extreme with his 'revealed preference' approach (Bruni & Guala, 2001). In doing so, Samuelson (1938) formulated the general behaviouristic foundations of standard theory, in which it is axiomatically taken that utility is no more than preference. Becker (1962) extends this idea further, demonstrating that the law of demand can be derived without using any concept of utility at all.

[3] As pointed out by an examiner while Pareto efficiency was the dominant welfare standard in the core of economics, interpersonally comparable survived only in some subfields of public economics (such as normative theory of taxation).

This narrow ordinal definition of utility (or happiness) is now subject to considerable criticism. In one of the more stinging critiques, van Praag (1991) remarks that:

> *…it is rather remarkable that mainstream economics for half a century since Robbins, has followed a way which is so different from what is going on in the development of most sciences. Mostly science is actually following reality instead of ignoring it.*
>
> (van Praag, 1991, p.71)

Echoing these remarks, Max-Neef, Elizalde, & Hopenhayn (1991) express that in economics:

> *We seek the justification of the models in the models themselves, so that when the solutions fail, it is not due to a failure of the model but to entrapments set up by reality. That reality, the presence of which is strongly felt, is not perceived as a challenge to be faced, but rather as a problem to be brought under control by re-applying the model with greater tenacity.*
>
> (Max-Neef, Elizalde, & Hopenhayn, 1991, p.12)

2.6. Positivism, operationalism, and *unscientific* subjectivity

Throughout the 1930s and 1940s economics required an operational, externally observable, subject of investigation that was consistent with the dominant epistemological view. In this respect, Robbins' (1932) delineation of the boundaries of economics allowed the discipline to move forward and provided a delicate solution to the scientific credibility problem facing marginalism. From various directions marginalism was criticised on the basis that psychological hedonism, on which marginalist economics relied, was an outmoded psychological theory that was either empirically inadequate (false) or simply not testable. Robbins' (1932) solution of scarcity-based choice focused on the externally observable, while allowing introspection in the limited form of purposeful choice. This introspection (purposeful choice) provided motivation for observed choices that a pure behaviourist reconstruction of a social science, more closely mimicking the natural sciences, would not have (Hands, 2009).

This limited form of introspection in economics is subtle and pervasive. Like breathing, an economist may not notice that this introspection occurs with little scrutiny, further that it takes on a distinctive utilitarian flavour (McCloskey, 1989). The philosophy of science in economics has meant that economics does not take questionnaires seriously. As expressed by McCloskey (1983) a confused argument that people sometimes (shockingly) do not tell the whole truth suffices to kill questionnaires in economics:

> *Unlike other social scientists, economists are extremely hostile toward questionnaires and other self-descriptions.... One can literally get an audience of economists to laugh out loud by proposing ironically to send out a questionnaire on some disputed economic point. Economists... are unthinkingly committed to the notion that only the externally observable behavior of economic actors is admissible in arguments concerning economics.*
>
> (McCloskey, 1983, p.514)

This position is emboldened by attempts to summarize 'a large experimental literature' which purportedly supports economists' *a priori* reluctance to employ subjective questions (cf. Bertrand & Mullainathan, 2001). The truth of this matter is more likely better captured by Davis (2006):

> *Environments of competing approaches in economics generate methodological arguments from 'practitioners who are willing to make use of such arguments, but might not be prepared or interested in engaging the relevant professional literatures in depth'*
>
> (Davis, 2006, p.12)

The questions put to rest in the 1930s and 1940s are being revisited again today (Colander, 2007). Authors are increasingly arguing that the exclusive reliance on the objectivist approach is unnecessarily limiting and the subjectivist approach complements it and adds richness to the understanding of human well-being which would otherwise not exist (Frey & Stutzer, 2002b).

2.7. Recent developments in the economics of happiness

More recently, economists have again turned their attention to the subject of happiness. Building upon the work of Cantril (1965) and responding to a call by Ambramovitz (1959), who expressed dissatisfaction with GDP as a measure of well-being, many scholars consider Easterlin's *Does Economic Growth Improve the Human Lot?* (Easterlin, 1974) to be the path-breaking contribution to this subject of inquiry. In this study, Easterlin observed what has become known as the 'Easterlin paradox'. The finding that, at a point in time, both within and between countries, higher levels of income are associated with higher levels of happiness; while over time, substantial increases in income have not been accompanied by higher levels of happiness (Easterlin, 1974, 1995; Easterlin, McVey, Switek, Sawangfa, & Zweig, 2010). Easterlin explained his findings with reference to Duesenberry's (1949) relative income hypothesis; increasing the income of one individual would increase his happiness, however, raising the income of all individuals would leave happiness unchanged (Easterlin, 1974).

Soon after Easterlin's book chapter, Scitovsky (1976) in his book *The Joyless Economy*, beyond more popular interpretations based on comparisions of consumption and habituation, argues that satisfaction depends *especially* on novelty, such as the experience of having one's faculties challenged. The book was not well recieved by economists, with his theorectical analysis being too far removed from the norm in the discipline at the time. Today, Scitovsky's (1976) efforts are rarely properly recognised, with some of the most influential surveys (cf. Clark, Frijters, & Shields, 2008; Dolan, Peasgood, & White, 2008) on the economics of happiness completely omitting his book (Pugno, 2014).

Parallel to the work of Easterlin and Scitovsky, as explained by Bruni and Porta (2005), van Praag (1968), demonstrating complete indifference to mainstream economics, investigates wealth and well-being. van Praag discovered, *preference drift* (van Praag, 1971) that is, the idea that satisfaction adapts to the material level, meaning that welfare derived from an income increase is appreciated much more *ex ante* than *ex post*. This is similar to Brickman, Coates, & Janoff-Bulman's (1978) study of lottery winners, which revealed that lottery winners were no happier than the control group,

indicating complete hedonic adaptation in the material goods domain (Easterlin, 2004). van Praag and collaborators also observed a separate *reference drift* (van Praag, Kapteyn, & van Herwaarden, 1979) that is, apart from one's adaptation to their own income over time, the income of some reference group from a social reference space was also important.

Economists seeking to explain the Easterlin paradox have tended to continue the hedonistic, utilitarian Benthamite school of thought (Kahneman, Wakker, & Sarin, 1997). Specifically, seeking psychological explanations from the new field of hedonic psychology, announced by Kahneman, Diener, and Schwarz (1999) with their book, *Well-Being: The Foundations of Hedonic Psychology*. Such explanations rely on concepts of hedonic treadmills (Brickman & Campbell, 1971; Brickman, Coates, & Janoff-Bulman, 1978; Fredrick & Loewenstein, 1999), satisfaction treadmills (Kahneman, 1999), and set-point theory. The latter argues that individual happiness may vary around a base level, however, happiness is fundamentally determined by stable personality traits (cf. Diener & Lucas, 1999) and inborn temperament (cf. Lykken & Tellegen, 1996).

There are economic counterparts to these adaptation level and social comparison theories. For instance, the concept of conspicuous consumption (Veblen, 1899). This idea is also the basis for Duesenberry's (1949) relative income hypothesis, for Galbraith's (1958) criticism of the affluent society (reaffirmed by Dutt (2008)), Mishan's (1960) critique of consumer preferences, and the concept of positional goods (Harrod, 1958; Hirsch, 1976). Both Frank (1985, 1989) and Layard (1980) took up this concept in exploring the implications of interdependent preferences and status seeking. More recently, Layard (2005) has come to term these relative consumption or income effects; habit (adaptation effect) and rivalry (social comparison effect).

With respect to answering the question raised by the Easterlin paradox, does economic growth increase social welfare? Ng (1978) suggests what is required is a multidisciplinary approach. Ng (1978) employs the concept of positional goods (cf. Harrod, 1958; Hirsch, 1976). Positional goods are those goods or aspects of goods, services, work positions and other social relationships that are: (1) scarce in some absolute or socially imposed sense; and (2) subject to congestion or crowding through

more extensive use. Ng (1978) suggests that economic growth, to the extent that it actually increases socially unrealisable aspirations, may actually reduce social welfare. Further, with a certain Scitovskyian air, Ng (1978) points out a consideration neglected by Hirsch (1976), that apart from aspirations, individuals may change tastes and even learn how to enjoy non-positional goods more effectively.

While Easterlin's *Does Economic Growth Improve the Human Lot?* (Easterlin, 1974) is usually considered the watershed moment for happiness in economics, the renewed appreciation of, and enthusiasm for, happiness in economics really began with a symposium on economics and happiness in *The Economic Journal* (Frank, 1997; Ng, 1997; Oswald, 1997). The admission of what was previously considered the domain of psychology to economics reflected a distinct re-evaluation of the epistemological foundations of economics. This is most clearly reflected by Daniel Kahneman and Vernon Smith together being awarded the Nobel Prize in economic sciences in 2002. In that same year, a tellingly titled seminal review of the literature, *What can economists learn from happiness research?* by Frey and Stutzer (2002b), brought together a vast body of knowledge and served as a catalyst for a multitude of empirical investigations in economics into the determinants of happiness.

2.8. Methodological developments

In addition to the contributions to the literature noted above, empirical research into the economics of happiness has been furthered by: (1) readily available household panel datasets (cf. Haisken-DeNew, 2001); (2) repeated representative cross-sectional surveys (for example, the General Social Survey data collected in many Organisation for Economic Co-operation and Development countries); and (3) surveys referring to several countries (for example, the World Values Survey or the Eurobarometer Survey). These datasets have become routinely employed and include single-item measures of happiness and/or life satisfaction (cf. Lucas & Donnellan, 2011), used to operationalise *experienced utility* (Kahneman & Thaler, 2006). While the experience sampling method may be the gold standard according to hedonic psychologists, notably Kahneman, Krueger, Schkade, Schwarz, and Stone (2004), many authors (cf. Diener, Inglehart, & Tay, 2013; Diener & Suh, 1999; Frey & Stutzer, 2002b; Lucas & Donnellan, 2011) including those of the school of hedonic psychology (cf. Kahneman &

Krueger, 2006) have provided evidence on the validity of life satisfaction as a retrospective subjective measure of experience. A number of available panel datasets contain measures of life satisfaction or happiness and follow the same individuals over time, facilitating the exploration of natural experiments (Metcalfe, Powdthavee, & Dolan, 2011) and allowing researchers to control for time-invariant individual specific confounders such as stable personality traits and measurement error (Bertrand & Mullainathan, 2001; Ferrer-i-Carbonell & Frijters, 2004).

The now voluminous empirical literature into the economics of happiness has brought with a number of methodological innovations. For instance, a recognition of social desirability bias, the idea that individuals may report higher levels of life satisfaction in the presence of others and the further research on panel conditioning effects or learning effects, where respondents learn to use the middle points of the 0-10 scale, rather than the extremes (Feddersen, Metcalfe, & Wooden, 2012; Wooden & Ning, 2013). In addition, to a growing consideration given to the exogeneity of determinants of life satisfaction (cf. Luechinger, 2010; Pischke & Schwandt, 2012; Powdthavee, 2010).

For a long while researchers employing this data have argued that, provided stable personality traits are controlled for appropriately (for example, through individual specific fixed effects estimation or through the inclusion of direct personality trait controls), the difference between treating the dependent variable (life satisfaction or happiness) as cardinal versus ordinal is not material, that is the differences are quantitative rather than qualitative (Ferrer-i-Carbonell & Frijters, 2004; Geishecker & Riedl, 2010). Nevertheless, the dependent variables are of an ordered nature and hence should really be modelled as such, otherwise estimates are biased and inconsistent (Hill, Griffiths, & Lim, 2008). Considerable research effort has been summoned to capture the ordinal nature of the dependent variable, while concurrently controlling for individual specific fixed effects. This has culminated most recently in the 'blow up and cluster' (BUC) estimator or fixed effects ordered logit model (cf. Baetschmann, Staub, & Winkelmann, 2013).

2.9. Determinants of life satisfaction

The use of large panel datasets is increasingly seeing a convergence between the two fields of economics and psychology. Economists have brought a very new and fresh perspective to the study of happiness, admittedly with a preoccupation with traditional economic variables (especially by more mainstream economists and within more mainstream economic journals). Undoubtedly though, economists are also surprised and fascinated by the considerable and enduring impact factors such as personal relationships have on well-being (cf. Brown, Woolf, & Smith, 2012; Easterlin, 2003; Lucas, 2007; Lucas, Clark, Georgellis, & Diener, 2003; Powdthavee, 2008, 2009; Zimmerman & Easterlin, 2006). Further, early empirical work provides, at most, weak evidence that individuals maximise happiness or life satisfaction (cf. Frijters, 2000); while other empirical evidence indicates consumer choices are not utility maximising and are systematically distorted away from intrinsically motivated choices (Welsch, 2009; Welsch & Kühling, 2010). From the now extensive economics of happiness literature, some stylised facts on the determinants of life satisfaction have emerged, many of which are reviewed in literature elsewhere (cf. Argyle, 1999; Clark, Frijters, & Shields, 2008; Di Tella & MacCulloch, 2006; Diener, 1984; Diener, Suh, Lucas, & Smith, 1999; Dolan, Peasgood, & White, 2008; Frey & Stutzer, 2002a, 2002b; MacKerron, 2012; Ryan & Deci, 2001; Stutzer & Frey, 2012).

2.9.1. Microeconomic determinants of life satisfaction

In terms of microeconomic level determinants of life satisfaction, a common finding is that males are less satisfied with their lives than females. Life satisfaction is U-shaped with age, typically reaching a minimum in an individual's mid-forties (cf. Blanchflower & Oswald, 2004a, 2004b, 2008, 2009), although, there is some controversy surrounding this finding (Frijters & Beatton, 2012; Kassenboehmer & Haisken-DeNew, 2012). Blacks and other non-white races are less happy than whites, an effect which is both large and well-defined (Blanchflower & Oswald, 2004b). Further, immigrants from a non-English speaking country, even after controlling for poor English speaking ability (which itself is associated with lower levels of life satisfaction) are also observed to report being less satisfied with their lives (Shields, Price, & Wooden, 2009).

Being married is associated with higher levels of life satisfaction (Evans & Kelley, 2004), some of this effect is attributable to happier people self-selecting into marriage. Similarly, there is some evidence for self-selection into divorce, with people who get divorced not only less happy during marriage but also less happy before they get married (Stutzer & Frey, 2006). Lone parents, even after controlling for the number of children, report being less satisfied with their lives, while the number of children in the household is often reported to be negatively associated with life satisfaction (Shields, Price, & Wooden, 2009). This association, while a common finding, is complex (cf. Margolis & Myrskylä, 2011) and can depend on the age of the children at home (Shields & Wooden, 2003). Poor health, unsurprisingly, is invariably associated with lower levels of life satisfaction (Powdthavee & van den Berg, 2011).

An additional year of compulsory schooling has been found to have meaningful and positive pecuniary and non-pecuniary impacts for individuals (Oreopoulos, 2007; Powdthavee, Lekfuangfu, & Wooden, 2013). Many studies, however, have reported that higher education, in developed countries at least appears to have a negative association or no association at all with life satisfaction (Shields, Price, & Wooden, 2009; Veenhoven, 1996). A gamut of possible explanations has been offered for this curious result. These include for instance, a lack of employment opportunities requiring a high-level skills and the earlier advantages of higher education fading in the context of social equalisation (Veenhoven, 1996). A further alternate explanation posits that the benefits of education flow less through a direct impact on life satisfaction than through its positive effects on the creation and maintenance of human and social capital (Florida, Mellander, & Rentfrow, 2013; Helliwell, 2003). Certainly, education presents a puzzle which undoubtedly calls for further research.

Employment status, in particular unemployment, has been the focus of a great deal of research attention. A strong result is that unemployed individuals report lower levels of life satisfaction above and beyond the effect of income alone (Carroll, 2007; Kassenboehmer & Haisken-DeNew, 2009). For employed individuals, the reported levels of life satisfaction associated with working full-time or working part-time are complicated and at times perplexing (Booth & Van Ours, 2009, 2007). *Prima facie*, females employed part-time report higher levels of life satisfaction, while males report

higher life satisfaction for being employed full-time (Booth & Van Ours, 2007; Shields, Price, & Wooden, 2009).

Income has been the focus of intense research in economics. Income is positively associated with life satisfaction, although the relatively small magnitude of the observed association when compared to other non-economic factors is both surprising and concerning to many economists. This may in part reflect the common natural log transformation of income (to capture diminishing marginal utility of income) (Easterlin, 2004), the role of adaptation over time, aspirations and social comparisons (Clark, Frijters, & Shields, 2008; Paul & Guilbert, 2013).

Distinct from these points is the endogenous (reverse causal) relationship between income and life satisfaction, which may bias the income coefficient to an unknown degree and in an unknown direction. Some earlier studies seeking to address this endogeneity have indicated that there is a downward bias in the income coefficient; understating the extent to which income matters (Pischke, 2011). However, the results of these studies have been questioned (Pischke & Schwandt, 2012; Stutzer & Frey, 2012). Hence, the question of precisely how to address this issue presents a significant challenge to researchers in the field.

Among the myriad of determinants of life satisfaction that have been reported in the literature, commuting time to place of work, has been shown to be associated with lower levels of life satisfaction, even after controlling for income, a result at odds with location equilibrium theory (Stutzer & Frey, 2008). Providing further evidence against location equilibrium theory, living in a major city is also found to be associated with lower levels of life satisfaction or conversely living in more rural areas is associated with higher levels of life satisfaction *ceteris paribus* (Morrison, 2011; Shields, Price, & Wooden, 2009; Sørensen, 2013). This suggests that despite the benefits (cf. Howley, 2010; Howley, Scott, & Redmond, 2009), the negative externalities of higher density city living are not adequately compensated for. It is not surprising then that some authors have sought to understand the determinants of life satisfaction in cities (Ballas, 2013).

2.9.2. Macroeconomic determinants of life satisfaction

At a macro-economic level, GDP (as expected) serves to support welfare (cf. Di Tella, MacCulloch, & Oswald, 2003). However, over time, despite large increases in income, happiness has typically remained relatively unchanged at a national level (the Easterlin paradox). At the international level, cross-country comparisons show lower levels of happiness for low income countries, but the positive correlation between income and happiness is not statistically significant after approximately US $7,500 per capita per annum (Inglehart & Klingemann, 2000).

Contrary to Edwards' (2009) view that economists are more interested in broad social subjects than specific economic problems, economists have devoted a considerable amount of energy to investigating *inter alia*, the Easterlin paradox. A number of studies have presented results confirming it (cf. Di Tella & MacCulloch, 2008; Easterlin, 1995; Easterlin, McVey, Switek, Sawangfa, & Zweig, 2010; Inglehart, 1996), while others have found evidence which they argue suggests otherwise (cf. Angeles, 2011; Stevenson & Wolfers, 2008). The ultimate conclusion is that relative income matters (Frank, 2012).

Economists have also investigated the life satisfaction implications for the trade-off between unemployment and inflation. Notably, Di Tella, MacCulloch, & Oswald (2001) find across 12 European countries and the United States that people appear to be more satisfied with their lives when inflation and unemployment are low. Although, contrary to the 'Misery Index', which weights inflation and unemployment equally, at the margin people would implicitly trade off a 1 percentage point increase in the unemployment rate for a 1.7 percentage point increase in inflation.

Using the same data as Di Tella, MacCulloch, & Oswald (2001), Welsch (2007b) employs the 'Barro Misery Index'. Welsch (2007b) finds that the Misery Index overweights inflation to a much lesser extent. Further, Welsch's (2007b) results suggest people have preferences for growth, employment and stability, where stability is captured by the inflation rate or the long-term interest rate. Consistent with these findings, Di Tella, MacCulloch, & Oswald (2003) provide evidence demonstrating that recessions are detrimental to an individual's life satisfaction beyond the effects of the fall in GDP and the increase in unemployment.

With respect to income inequality the evidence is mixed. Some studies suggest the distribution of income is important for societal welfare (cf. Alesina, Di Tella, & MacCulloch, 2004; Schwarze & Härpfer, 2007; Veenhoven, 1996), whilst others suggest income inequality and life satisfaction are unrelated (cf. Veenhoven, 1996, 2005). Senik's (2009) survey of the literature, however, suggests that people are generally averse to income inequality. Recent evidence indicates that preferences for more equal incomes may depend on perceptions of fairness, conditional on actual fairness (mobility). Specifically, countries with lower (higher) actual fairness and higher (lower) fairness perceptions inequality is positively (negatively) associated with happiness (Bjørnskov, Dreher, Fischer, Schnellenbach, & Gehring, 2013).

Not unexpectedly, declining social capital has been put forward as an explanation for the Easterlin paradox. For instance, the pursuit of positional goods destroys social capital (Eaton & Eswaran, 2009; Pugno, 2009). Further, in line with expectations, terrorism, civil war and corruption have considerable negative effects on happiness (Frey, 2012; Frey, Luechinger, & Stutzer, 2007, 2009; Metcalfe, Powdthavee, & Dolan, 2011; Welsch, 2008a, 2008b), while good quality institutions and political freedoms are positively associated with happiness (Frey & Stutzer, 2000, 2002a).

2.10. Environment, welfare, and the life satisfaction approach

A growing area of investigation within the economics of happiness literature explores the relationship between happiness and the environment (cf. Ambrey, 2010; Brandolini, 2007; Brereton, Clinch, & Ferreira, 2008; Marans & Stimson, 2011; Moro, Brereton, Ferreira, & Clinch, 2008; O'Brien, 2008; Rehdanz & Maddison, 2008; Smyth, Mishra, & Qian, 2008; Smyth et al., 2011; Tesfazghi, Martinez, & Verplanke, 2010). Broadly, the impact of the environment on an individual's well-being has been long established. For example, Mill's *Principles of Political Economy* (1857/1965) formally adopts a broader view of the role of natural resources in human welfare. Not only did he consider the agricultural and extractive value of land, he also acknowledged it as a source of amenity value; a value he envisaged increasing as standards of living rose. This view is clearly expounded in the following passage:

> *…nor is there much satisfaction in contemplating the world with nothing left to the spontaneous activity of nature: with every rood of land brought*

> *into cultivation, which is capable of growing food for human beings; every flowery waste or natural pasture ploughed up, all quadrupeds or birds which are not domesticated for man's use exterminated as his rivals for food, every hedgerow or superfluous tree rooted out, and scarcely a place left where a wild shrub or flower could grow without being eradicated as a weed in the name of improved agriculture. If the earth must lose that great portion of its pleasantness which it owes to things that the unlimited increase of wealth and population would extirpate from it, for the mere purpose of enabling it to support a larger, but not a happier or better population, I sincerely hope, for the sake of posterity, that they will be content to be stationary long before necessity compels them to it.*
>
> (Mill, 1857/1965 Book IV)

A substantial part of environmental and resource economics has been concerned with how economies might avoid inefficiencies in the allocation of scarce resources for instance, by ensuring that both private *and* social marginal costs and benefits are considered in cost-benefit analysis to achieve a socially optimal outcome (Perman, Ma, McGilvray, & Common, 2003). The discipline has been severely constrained by the inability to observe some of its most fundamental concepts; preference and utility. This constraint has forced economists to base their analyses on theoretically conceived economic agents, which: trade off absolute levels of utility of respective goods against each other; make choices which are utility maximising; and value environmental goods by making choices in other markets (Welsch, 2009).

Two clear developments in psychology and economics have made it possible to use life satisfaction or happiness as a measure of unobservable utility: (1) a distinct shift in the object of analysis and measurement in welfare economics to the well-being of specific individuals as opposed to the dominant concept of well-being as preference satisfaction of theoretically conceived economic agents (Edwards & Pellé, 2011); and (2) a body of evidence attesting to the validity of life satisfaction self-reports as measures of experienced utility (see Section 1.9). The use of life satisfaction or happiness as a proxy for an individual's true utility offers methods and results that are both relevant to welfare analysis and are under explored (Welsch, 2009).

2.10.1. The life satisfaction approach

An approach to develop at the intersection of the economics of happiness and the existing non-market valuation literature is the life satisfaction approach to non-market valuation. This approach which may supplement or even supplant (cf. Bronsteen, Buccafusco, & Masur, 2013) existing cost-benefit analysis (Welsch, 2009) is described by Frey, Luechinger, & Stutzer (2010) as entailing the inclusion of a non-market good as explanatory variables within a micro-econometric function of life satisfaction along with income and other covariates. The estimated coefficient for the non-market good yields first, a direct valuation in terms of life satisfaction, and second, when compared to the estimated coefficient for income, the implicit willingness-to-pay for the non-market good in monetary terms.

By convention, valuation techniques are divided into two approaches. The *revealed preference* approach relies on observations about peoples' behaviour in markets that are some way related to the environmental good or service under consideration, while the *stated preference* approach uses surveys to question how respondents value that good or service. Techniques can be further divided into *direct* and *indirect*, depending upon whether a value is directly measured or inferred. Commonly used revealed preference techniques include hedonic pricing and the travel cost method, commonly used stated preference techniques include contingent valuation and choice modelling. An extensive review of the theory, methods and literature across a range of non-market valuation techniques and applications can be found in Freeman (2003).

2.10.2. Advantages of the life satisfaction approach

A strong motivation for the use of the life satisfaction approach is that it has many advantages over traditional non-market valuation techniques. For example, the approach does not rely on the assumption of weak complementarity between the non-market good and consumption expenditure (an assumption underpinning the travel cost method), nor does it rely on housing markets being in equilibrium (an assumption underpinning the hedonic property pricing method). The life satisfaction approach also avoids the issues of incomplete information and mistaken perceptions of pollution levels or risks that may otherwise lead to, for example, hedonic property pricing estimates understating the cost of pollution. Unlike using healthcare expenditure as a

proxy for the cost of pollution (or other environmental bads), the life satisfaction approach does not understate the amount individuals are willing-to-pay to avoid being sick in the first place (Levinson, 2012).

Further, unlike the contingent valuation method, the life satisfaction approach does not ask individuals to value the non-market good directly. Instead, individuals are asked to evaluate their general life satisfaction. This is perceived to be less cognitively demanding as specific knowledge of the good in question is not required, nor are respondents asked to perform the unfamiliar task of placing a monetary value on a non-market good. This addresses many of the concerns surrounding the hypothetical bias that may arise from the lack of real monetary incentives, credible policy mechanisms, or convincing changes in policy or environmental condition. It also avoids the problem of protest responses. Strategic behaviour (for example, free riding) and social desirability bias (where an individual responds to a contingent valuation question in what they perceive to be a socially desirable way) are avoided (Welsch & Kühling, 2009). The life satisfaction approach also avoids the problem of lexicographic preferences, where respondents to contingent valuation or choice modelling questionnaires demonstrate unwillingness to trade off the non-market good (or bad) for income (Spash & Hanley, 1995). From a non-market valuation practitioner's perspective, the life satisfaction approach avoids the problem of how to make the environmental issue understandable to the population of interest; a task that can be particularly difficult when valuing complex environmental goods such as biodiversity (cf. Christie, Hanley, Warren, Murphy, Wright, & Hyde, 2006). In the context of pollution, the life satisfaction approach avoids problems associated with attempting to define the issue in terms of mortality or morbidity (cf. Dziegielewska & Mendelsohn, 2005).

2.10.3. Applications of the life satisfaction approach

In one particularly novel experience sampling study, *Mappiness*, MacKerron and Mourato develop an iPhone application, generating a large geo-coded panel data set, of over 3 million responses from 50,000 individuals, providing a new source of information to help better understand the impact of the environment on happiness.

The majority of existing investigations using the life satisfaction approach, however, rely on data collected in by more conventional means.

In an early example of the approach being used in practise, Welsch (2002) uses cross-section data on reported well-being for 54 countries to value urban air pollution. The author finds that, on average, an individual needs to be given USD 70 per annum compensation in order to accept a one-kiloton per capita increase in urban nitrogen dioxide load. While the valuation of air quality has dominated the literature (cf. Ferreira et al., 2013; Ferreira & Moro, 2010; Luechinger, 2009, 2010; MacKerron & Mourato, 2009; Menz, 2011; Menz & Welsch, 2012; Welsch, 2006, 2007a), other non-market environmental goods valued via the life satisfaction approach include airport noise (cf. van Praag & Baarsma, 2005), climate (cf. Frijters & van Praag, 1998; Maddison & Rehdanz, 2011), weather (cf. Feddersen, Metcalfe, & Wooden, 2012), species diversity (cf. Rehdanz, 2007), greenspace (Smyth, Mishra, & Qian, 2008), natural areas (Kopmann & Rehdanz, 2013; MacKerron & Mourato, 2013), and natural capital (cf. Costanza et al., 2007; Engelbrecht, 2009; Mulder, Costanza, & Erickson, 2006; Vemuri & Costanza, 2006). Further, natural environmental disasters to also be valued using this approach include floods (cf. Luechinger & Raschky, 2009), droughts (cf. Carroll, Frijters, & Shields, 2009) and forest fires (Kountouris & Remoundou, 2011). Other studies have also considered environmental attitudes and behaviour (Ferrer-i-Carbonell & Gowdy, 2007; Welsch & Kühling, 2010).

2.11. Conclusions from the literature review

The concept of happiness has varied quite considerably throughout the history of economic thought. Today the boundaries drawn in the 1930s have been reconsidered, yielding an explosion of subfields within economics of which the economics of happiness is one. These subfields appear to, at times, shelter starkly different perspectives preserving the variety and the mainstream discourse. However, happiness has certainly found its way back into the mainstream conversation due to a broad epistemological change within economics that allows the assumptions of conventionally theorised economic agents to be empirically tested and even relaxed. Now by admitting direct measures of utility to the domain of economic science, it is

possible to merely observe behaviour and infer indirectly, utility or welfare implications.

Furthermore, continuing the utilitarian and hedonistic perspective (Dolan & Kahneman, 2008; Kahneman & Sugden, 2005) relying on observed behaviour and self-reported life satisfaction it is possible to infer indirectly, through the life satisfaction approach, the implied value, or welfare effects associated with the environment. Using this life satisfaction approach for non-market valuation represents a remarkably simple and compelling opportunity (Welsch, 2009). The research conducted throughout this thesis explores through a series of scientific papers the investigation of determinants of life satisfaction and the nature of life satisfaction in Australia. Subsequently, the thesis then explores the application of this technique to different environmental goods (and bads) throughout Australia. Finally, the thesis seeks to resolve a persistent methodological challenge to this area of research.

References

Ambramovitz, M. (1959). The welfare interpretation of secular trends in national income and product. In M. Abramovitz, A. Alchian, K. Arrow, P. Baran, P. Cartwright, H. Chenery, G. Hilton, H. Houthakker, C. Lindblom, M. Reder, T. Scitovsky, E. Shaw & L. Tarshis (Eds.), *The Allocation of Economic Resources: Essays in Honor of Bernard Francis Haley* (pp. 1-22). Standford: Standford University Press.

Ambrey, C. (2010). *The influence of the natural and built environment on life satisafaction.* (Bachelor of Economics with Honours), Griffith University.

Angeles, L. (2011). A closer look at the Easterlin Paradox. *The Journal of Socio-Economics, 40*(1), 67-73.

Argyle, M. (1999). Causes and correlates of happiness. In D. Kahneman, E. Diener & N. Schwarz (Eds.), *Well-Being: The Foundations of Hedonic Psychology* (pp. 353-373). New York: Russell Sage Foundation.

Baetschmann, G., Staub, K., & Winkelmann, R. (2013). Consistent estimation of the fixed effects ordered logit model. Bonn, Germany: IZA Working Paper.

Ballas, D. (2013). What makes a 'happy city'? *Cities, 32*(S1), 539-550.

Becker, G. (1962). Irrational behavior and economic theory. *The Journal of Political Economy, 70*(1), 1-13.

Bentham, J. (1789/1996). An Introduction to the Principles of Morals and Legislation. In J. Bruns & H. Hart (Eds.), *The Collected Works of Jeremy Bentham*. Oxford: Clarendon Press.

Bergson, A. (1938). A reformulation of certain aspects of welfare economics. *The Quarterly Journal of Economics, 52*(2), 310-334.

Bernoulli, D. (1738/1954). Exposition of a new theory on the measurement of risk. *Econometrica, 22*(1), 23-36.

Bertrand, M., & Mullainathan, S. (2001). Do people mean what they say? Implications for subjective survey data. *The American Economic Review, 91*(2), 67-72.

Bjørnskov, C., Dreher, A., Fischer, J., Schnellenbach, J., & Gehring, K. (2013). Inequality and happiness: When perceived social mobility and economic reality do not match. *Journal of Economic Behavior & Organization, 91*(1), 75-92.

Blanchflower, D., & Oswald, A. (2004a). Money, sex and happiness: An empirical study. *Scandinavian Journal of Economics, 106*(3), 393-415.

Blanchflower, D., & Oswald, A. (2004b). Well-being over time in Britain and the USA. *Journal of Public Economics, 88*(7-8), 1359-1386.

Blanchflower, D., & Oswald, A. (2008). Is well-being u-shaped over the life cycle? *Social Science & Medicine, 66*(8), 1733-1749.

Blanchflower, D., & Oswald, A. (2009). The u-shape without controls: A response to Glenn. *Social Science & Medicine, 69*(4), 486-488.

Blaug, M. (1997). *Economic Theory in Retrospect* (5th ed.). Cambridge: Cambridge University Press.

Booth, A., & Van Ours, J. (2009). Hours of work and gender identity: Does part-time work make the family happier? *Economica, 76*(301), 175-196.

Booth, A. L., & Van Ours, J. (2007). Job satisfaction and family happiness: The part-time work puzzle. *The Economic Journal, 118*(526), F77-F99.

Brandolini, S. (2007). Happiness and sustainability: A modern paradox. In L. Bruni & P. Porta (Eds.), *Handbook on the Economics of Happiness* (pp. 512-531). Cheltenham, UK: Edward Elgar.

Brereton, F., Clinch, J., & Ferreira, S. (2008). Happiness, geography and the environment. *Ecological Economics, 65*(2), 385-396.

Brickman, P., & Campbell, D. (1971). Hedonic relativism and planning the good society. In M. Appley (Ed.), *Adaptation Level Theory: A Symposium* (pp. 287-302). New York: Academic Press.

Brickman, P., Coates, D., & Janoff-Bulman, R. (1978). Lottery winners and accident victims: Is happiness relative. *Journal of Personality and Social Psychology, 36*(8), 917-927.

Bronsteen, J., Buccafusco, C., & Masur, J. (2013). Well-being analysis vs. cost-benefit analysis. *Duke Law Journal*, 1603-1689.

Brown, D., Woolf, J., & Smith, C. (2012). An empirical investigation into the determinants of life satisfaction in New Zealand. *New Zealand Economics Papers, 46*(3), 239-251.

Bruni, L. (2007). The 'technology of happiness' and the tradition of economic science. In L. Bruni & P. Porta (Eds.), *Handbook on the Economics of Happiness* (pp. 24-52). Cheltenham, UK: Edward Elgar.

Bruni, L., & Guala, F. (2001). Vilfredo Pareto and the epistemological foundations of choice theory. *History of Political Economy, 33*(1), 21-49.

Bruni, L., & Porta, P. (2005). *Economics and Happiness: Framing the Analysis*. New York: Oxford University Press.

Bruni, L., & Sugden, R. (2007). The road not taken: How psychology was removed from economics, and how it might be brought back. *The Economic Journal, 117*(516), 146-173.

Cannan, E. (1948). *Wealth*. London: Staples Press.

Cantril, H. (1965). *The Pattern of Human Concerns*. New Jersey: Rutgers University Press.

Carroll, N. (2007). Unemployment and psychological well-being. *The Economic Record, 83*(262), 287-302.

Carroll, N., Frijters, P., & Shields, M. (2009). Quantifying the costs of drought: New evidence from life satisfaction data. *Journal of Population Economics, 22*(2), 445-461.

Christie, M., Hanley, N., Warren, J., Murphy, K., Wright, R., & Hyde, T. (2006). Valuing the diversity of biodiversity. *Ecological Economics, 58*(2), 304-317.

Clark, A., Frijters, P., & Shields, M. (2008). Relative income, happiness, and utility: An explanation for the Easterlin Paradox and other puzzles. *Journal of Economic Literature, 46*(1), 95-144.

Colander, D. (2007). Retrospectives: Edgeworth's hedonimeter and the quest to measure utility. *Journal of Economic Perspectives, 21*(2), 215-225.

Cooter, R., & Rappoport, P. (1984). Were the ordinalists wrong about welfare economics? *Journal of Economic Literature, 22*(2), 507-530.

Costanza, R., Fisher, B., Ali, S., Beer, C., Bond, L., Boumans, R., . . . Snapp, R. (2007). Quality of life: An approach integrating opportunities, human needs, and subjective well-being. *Ecological Economics, 61*(2–3), 267-276.

Davis, J. (2006). The turn in economics: Neoclassical dominance to mainstream pluralism? *Journal of Institutional Economics, 2*(1), 1-20.

Di Tella, R., & MacCulloch, R. (2006). Some uses of happiness data in economics. *The Journal of Economic Perspectives, 20*(1), 25-46.

Di Tella, R., & MacCulloch, R. (2008). Gross national happiness as an answer to the Easterlin Paradox. *Journal of Development Economics, 86*(1), 22-42.

Di Tella, R., MacCulloch, R., & Oswald, A. (2001). Preferences over inflation and unemployment: Evidence from surveys of happiness. *The American Economic Review, 91*(1), 335-342.

Di Tella, R., MacCulloch, R., & Oswald, A. (2003). The macroeconomics of happiness. *The Review of Economics and Statistics, 85*(4), 809-827.

Diener, E. (1984). Subjective well-being. *Psychological Bulletin, 95*(3), 542-575.

Diener, E., Inglehart, R., & Tay, L. (2013). Theory and validity of life satisfaction scales. *Social Indicators Research, 112*(3), 497-527.

Diener, E., & Lucas, R. (1999). Personality and subjective well-being. In D. Kahneman, E. Diener & N. Schwarz (Eds.), *Well-being: The Foundations of Hedonic Psychology* (pp. 213-229). New York: Russell Sage Foundation.

Diener, E., & Suh, E. (1999). National differences in subjective well-being. In D. Kahneman, E. Diener & N. Schwarz (Eds.), *Well-being: The Foundations of Hedonic Psychology* (pp. 434-450). New York: Russell Sage Foundation.

Diener, E., Suh, E., Lucas, R., & Smith, H. (1999). Subjective well-being: Three decades of progress. *Psychological Bulletin, 125*(2), 276-302.

Dixon, H. (1997). Controversy: Economics and happiness (editorial note). *The Economic Journal, 107*(1), 1812-1814.

Dolan, P., & Kahneman, D. (2008). Interpretations of utility and their implications for the valuation of health. *The Economic Journal, 118*(525), 215-234.

Dolan, P., Peasgood, T., & White, M. (2008). Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. *Journal of Economic Psychology, 29*(1), 94-122.

Duesenberry, J. (1949). *Income, Savings and the Theory of Consumer Behavior*. Cambridge: Harvard University Press.

Dutt, A. (2008). The dependence effect, consumption and happiness: Galbraith revisited. *Review of Political Economy, 20*(4), 527-550.

Dziegielewska, D., & Mendelsohn, R. (2005). Valuing air quality in Poland. *Environmental and Resource Economics, 30*(2), 131-163.

Easterlin, R. (1974). Does economic growth improve the human lot? Some empirical evidence. In P. David & M. Reder (Eds.), *Nations and Households in Economic Growth: Essays in Honour of Moses Abramowitz* (pp. 89-125). New York: Academic Press.

Easterlin, R. (1995). Will raising the incomes of all increase the happiness of all? *Journal of Economic Behavior and Organization, 27*(1), 35-47.

Easterlin, R. (2003). Explaining happiness. *Science, 100*(19), 11176–11183.

Easterlin, R. (2004). The economics of happiness. *Daedalus, 133*(2), 26-33.

Easterlin, R., McVey, L., Switek, M., Sawangfa, O., & Zweig, J. (2010). The happiness–income paradox revisited. *Proceedings of the National Academy of Sciences of the United States of America, 107*(52), 22463-22468.

Eaton, B., & Eswaran, M. (2009). Well-being and affluence in the presence of a Veblen good. *The Economic Journal, 119*(539), 1088-1104.

Edgeworth, F. (1881). Mathematical Physics. London: C. Kegan Paul & Co.

Edwards, J. (2009). *Joyful economists: Remarks on the history of economics and psychology from the happiness studies perspective.* (PhD), Universite´ Paris 1 Panthe´on-Sorbonne. Retrieved 04-06-2014, from http://tel.archives-ouvertes.fr/tel-00486771

Edwards, J., & Pellé, S. (2011). Capabilities for the miserable; happiness for the satisfied. *Journal of the History of Economic Thought, 33*(3), 335-355.

Engelbrecht, H. (2009). Natural capital, subjective well-being, and the new welfare economics of sustainability: Some evidence from cross-country regressions. *Ecological Economics, 69*(2), 380-388.

Evans, M., & Kelley, J. (2004). Effect of family structure on life satisfaction: Australian evidence. *Social Indicators Research, 3*(69), 303–349.

Feddersen, J., Metcalfe, R., & Wooden, M. (2012). *The differential impacts of weather and climatic change on subjective wellbeing: Evidence from a large nationally representative panel dataset*. Melbourne Institute. Melbourne.

Ferreira, S., Akay, A., Brereton, F., Cunado, J., Martinsson, P., Moro, M., & Ningal, T. (2013). Life satisfaction and air quality in Europe. *Ecological Economics, 88*(1), 1-10.

Ferreira, S., & Moro, M. (2010). On the use of subjective well-being data for environmental valuation. *Environmental and Resource Economics, 46*(3), 249-273.

Ferrer-i-Carbonell, A., & Frijters, P. (2004). How important is methodology for the estimates of the determinants of happiness? *The Economic Journal, 114*(497), 641–659.

Ferrer-i-Carbonell, A., & Gowdy, J. (2007). Environmental degradation and happiness. *Ecological Economics, 60*(3), 509-516.

Florida, R., Mellander, C., & Rentfrow, P. (2013). The happiness of cities. *Regional Studies, 47*(4), 613-627.

Frank, R. (1985). The demand for unobservable and other nonpositional goods. *The American Economic Review, 75*(1), 101-116.

Frank, R. (1989). Frames of reference and the quality of life. *The American Economic Review, 79*(2), 80-85.

Frank, R. (1997). The frame of reference as a public good. *The Economic Journal, 107*(445), 1832-1847.

Frank, R. (2012). The Easterlin paradox revisited. *Emotion, 12*(6), 1188-1191.

Fredrick, S., & Loewenstein, G. (1999). Hedonic adaptation. In D. Kahneman, E. Diener & N. Schwarz (Eds.), *Well-Being: The Foundations of Hedonic Psychology* (pp. 302-329). New York: Russell Sage Foundation.

Freeman, A. (2003). *The Measurement of Environmental and Resource Values: Theory and Methods* (second ed.). Washington DC: Resources for the Future.

Frey, B. (2012). Well-being and war. *International Review of Economics, 59*(4), 363-375.

Frey, B., Luechinger, S., & Stutzer, A. (2007). Calculating tragedy: Assessing the costs of terrorism. *Journal of Economic Surveys, 21*(1), 1-24.

Frey, B., Luechinger, S., & Stutzer, A. (2009). The life satisfaction approach to valuing public goods: The case of terrorism. *Public Choice, 138*(3-4), 317–345.

Frey, B., Luechinger, S., & Stutzer, A. (2010). The life satisfaction approach to environmental valuation. *The Annual Review of Resource Economics, 2*(1), 139-160.

Frey, B., & Stutzer, A. (2000). Happiness, economy and institutions *The Economic Journal, 110*(466), 918-938

Frey, B., & Stutzer, A. (2002a). *Happiness & Economics: How the Economy and Institutions Affect Human Well-Being*. Princeton: Princeton University Press.

Frey, B., & Stutzer, A. (2002b). What can economists learn from happiness research? *Journal of Economic Literature, 40*(2), 402-435.

Frijters, P. (2000). Do individuals try to maximize general satisfaction? *Journal of Economic Psychology, 21*(3), 281-304.

Frijters, P., & Beatton, T. (2012). The mystery of the U-shaped relationship between happiness and age. *Journal of Economic Behavior & Organization, 82*(2-3), 525-542.

Frijters, P., & van Praag, B. (1998). The effects of climate on welfare and well-being in Russia. *Climatic Change, 39*(1), 61-81.

Galbraith, J. (1958). *The Affluent Society*. London: Hamilton.

Geishecker, I., & Riedl, M. (2010). *Ordered Response Models and Non-Random Personality Traits: Monte Carlo Simulations and a Practical Guide*. Center for European, Governance, and Economic Development Research. Germany.

Haisken-DeNew, J. (2001). A hitchhiker's guide to the world's household panel data sets. *The Australian Economic Review, 34*(3), 356-366.

Hands, D. (2009). Effective tension in Robbins' economic methodology. *Economica, 76*(s1), 831–844.

Hands, D. (2010). Economics, psychology and the history of consumer choice theory. *Cambridge Journal of Economics, 34*(4), 633-648.

Harrod, R. (1958). The Possibility of Economic Satiety *Problems of United States Economic Development* (Vol. 1). New York: Committee for Economic Development.

Harsanyi, J. (1955). Cardinal welfare, individualistic ethics, and interpersonal comparisons of utility. *Journal of Political Economy, 63*(4), 309-321.

Helliwell, J. (2003). How's life? Combining individual and national variables to explain subjective well-being. *Economic Modelling, 20*(2), 331-360.

Hicks, J., & Allen, R. (1934a). A reconsideration of the theory of value. Part I. *Economica, 1*(1), 52-76.

Hicks, J., & Allen, R. (1934b). A reconsideration of the theory of value. Part II. A mathematical theory of individual demand functions. *Economica, 1*(2), 196-219.

Hill, R., Griffiths, W., & Lim, G. (2008). *Principles of Econometrics* (3rd ed.). US: John Wiley & Sons.

Hirsch, F. (1976). *Social Limits to Growth*. Cambridge, Massachusetts: Harvard University Press.

Howley, P. (2010). 'Sustainability versus liveability': An exploration of central city housing satisfaction. *International Journal of Housing Policy, 10*(2), 173-189.

Howley, P., Scott, M., & Redmond, D. (2009). Sustainability versus liveability: An investigation of neighbourhood satisfaction. *Journal of Environment Planning and Management, 52*(6), 847-864.

Inglehart, R. (1996). The diminishing utility of economic growth: From maximizing security toward maximizing subjective well-being. *Critical Review: A Journal of Politics and Society, 10*(4), 509-531.

Inglehart, R., & Klingemann, H. (2000). Genes, culture, democracy, and happiness. In E. Diener & E. Suh (Eds.), *Culture and Subjective Well-Being* (pp. 165-184). Cambridge, MA: MIT Press.

Jevons, W. (1871/1970). Theory of Political Economy (4th ed.). Harmondsworth: Penguin. (Reprinted from: 4th edition).

Kahneman, D. (1999). Objective happiness. In D. Kahneman, E. Diener & N. Schwarz (Eds.), *Well-being: The Foundations of Hedonic Psychology* (pp. 3-25). New York: Russell Sage Foundation.

Kahneman, D., Diener, E., & Schwarz, N. (Eds.). (1999). *Well-being: The Foundations of Hedonic Psychology*. New York: Russell Sage Foundation.

Kahneman, D., & Krueger, A. (2006). Developments in the measurement of subjective well-being. *Journal of Economic Perspectives, 20*(1), 3-24.

Kahneman, D., Krueger, A., Schkade, D., Schwarz, B., & Stone, A. (2004). Toward national well-being accounts. *The American Economic Review, 94*(2), 429-434.

Kahneman, D., & Sugden, R. (2005). Experienced utility and standard of policy evaluation. *Environmental and Resource Economics, 32*(1), 161-181.

Kahneman, D., & Thaler, R. (2006). Utility maximization and experienced utility. *Journal of Economic Perspectives, 20*(1), 221-234.

Kahneman, D., Wakker, P., & Sarin, R. (1997). Back to Bentham? Explorations of experienced utility. *The Quarterly Journal of Economics, 112*(2), 375-405.

Kassenboehmer, S., & Haisken-DeNew, J. (2009). You're fired! The causal negative effect of entry unemployment on life satisfaction. *The Economic Journal, 119*(536), 448-462.

Kassenboehmer, S., & Haisken-DeNew, J. (2012). Heresy or enlightenment? The well-being age U-shape effect is flat. *Economics Letters, 117*(1), 235-238.

Kopmann, A., & Rehdanz, K. (2013). A human well-being approach for assessing the value of natural land areas. *Ecological Economics, 93*(1), 20-33.

Kountouris, Y., & Remoundou, K. (2011). Valuing the welfare cost of forest fires: A life satisfaction approach. *Kyklos, 64*(4), 556-578.

Lange, O. (1942). The foundations of welfare economics. *Econometrica, 10*(3/4), 215-228.

Layard, R. (1980). Human satisfactions and public policy. *The Economic Journal, 90*(360), 737-750.

Layard, R. (2005). Rethinking public economics: The implications of rivalry and habit. In L. Bruni & P. Porta (Eds.), *Economics & Happiness: Framing the Analysis* (pp. 147-169). New York: Oxford University Press.

Levinson, A. (2012). Valuing public goods using happiness data: The case of air quality. *Journal of Public Economics, 96*(9-10), 869-880.

Little, I. (1950). *A Critique of Welfare Economics*. Oxford: Clarendon Press.

Lucas, R. (2007). Adaptation and the set-point model of subjective well-being: Does happiness change after major life events? *Current Directions in Psychological Science, 16*(2), 75-79.

Lucas, R., Clark, A., Georgellis, Y., & Diener, E. (2003). Reexamining adaptation and the set point model of happiness: Reactions to changes in marital status. *Journal of Personality and Social Psychology, 84*(3), 527-539.

Lucas, R., & Donnellan, M. (2011). Estimating the reliability of single-item life satisfaction measures: Results from four national panel studies. *Social Indicators Research, 105*(3), 323-331.

Luechinger, S. (2009). Valuing air quality using the life satisfaction approach. *The Economic Journal, 119*(536), 482-515.

Luechinger, S. (2010). Life satisfaction and transboundary air pollution. *Economics Letters, 107*(1), 4-6.

Luechinger, S., & Raschky, P. (2009). Valuing flood disasters using the life satisfaction approach. *Journal of Public Economics, 93*(3-4), 620-633.

Lykken, D., & Tellegen, A. (1996). Happiness is a stochastic phenomenon. *Psychological Science, 7*(3), 186-189.

MacKerron, G. (2012). Happiness economics from 35 000 feet. *Journal of Economic Surveys, 26*(4), 705-735.

MacKerron, G., & Mourato, S. (2009). Life satisfaction and air quality in London. *Ecological Economics, 68*(5), 1441-1453.

MacKerron, G., & Mourato, S. (2013). Happiness is greater in natural environments. *Global Environmental Change, 23*(5), 992-1000.

Maddison, D., & Rehdanz, K. (2011). The impact of climate on life satisfaction. *Ecological Economics, 70*(12), 2437-2445.

Malthus, T. R. (1798/1966). An Essay on the Principle of Population. London: Macmillan.

Marans, R., & Stimson, R. (Eds.). (2011). *Investigating Quality of Urban Life: Theory, Methods, and Empirical Research*. Dordrecht: Springer.

Margolis, R., & Myrskylä, M. (2011). A global perspective on happiness and fertility. *Population and Development Review, 37*(1), 29-56.

Marshall, A. (1920/1982). *Principles of Economics*. London: Macmillan Press.

Max-Neef, M., Elizalde, A., & Hopenhayn, M. (1991). Human Scale Development: Conceptions, application and further reflections. Retrieved 04-06-2014, from http://www.area-net.org/fileadmin/user_upload/papers/Max-neef_Human_Scale_development.pdf

McCloskey, D. (1983). The rhetoric of economics. *Journal of Economic Literature, 21*(2), 481-517.

McCloskey, D. (1989). Why I am no longer a positivist. *Review of social economy, 47*(3), 225-238.

Menz, T. (2011). Do people habituate to air pollution? Evidence from international life satisfaction data. *Ecological Economics, 71*(1), 211-219.

Menz, T., & Welsch, H. (2012). Life-cycle and cohort effects in the valuation of air quality: Evidence from subjective well-being data. *Land Economics, 88*(2), 300-325.

Metcalfe, R., Powdthavee, N., & Dolan, P. (2011). Descruction and distress: Using a quasi-experiment to show the effects of the September 11 attacks on mental well-being in the United Kingdom. *The Economic Journal, 121*(550), F81-F103.

Mill, J. (1857/1965). *Principles of Political Economy: With Some of their Applications to Social Philosophy*. New York: A. M. Kelley.

Mishan, E. (1960). A survey of welfare economics, 1939-59. *The Economic Journal, 70*(278), 197-265.

Moro, M., Brereton, F., Ferreira, S., & Clinch, J. (2008). Ranking quality of life using subjective well-being data. *Ecological Economics, 65*(3), 448-460.

Morrison, P. (2011). Local expressions of subjective well-being: The New Zealand experience. *Regional Studies, 45*(8), 1039-1058.

Mulder, K., Costanza, R., & Erickson, J. (2006). The contribution of built, human, social and natural capital to quality of life in intentional and unintentional communities. *Ecological Economics, 59*(1), 13-23.

Ng, Y. (1972). Value judgments and economists' role in policy recommendation. *The Economic Journal, 82*(327), 1014-1018.

Ng, Y. (1978). Economic growth and social welfare: The need for a complete study of happiness. *Kyklos, 31*(4), 575-587.

Ng, Y. (1997). A case for happiness, cardinalism, and interpersonal comparability. *The Economic Journal, 107*(445), 1848-1858

O'Brien, C. (2008). Sustainable happiness: How happiness studies can contribute to a more sustainable future. *Canadian Psychology, 49*(4), 289-295.

Oreopoulos, P. (2007). Do dropouts drop out too soon? Wealth, health and happiness from compulsory schooling. *Journal of Public Economics, 91*(11-12), 2213-2229.

Oswald, A. (1997). Happiness and economic performance. *The Economic Journal, 107*(445), 1815-1831.

Pasinetti, L. (2005). Paradoxes of happiness in economics. In L. Bruni & P. Porta (Eds.), *Economics & Happiness: Framing the Analysis* (pp. 336-343). New York: Oxford University Press.

Paul, S., & Guilbert, D. (2013). Income-happiness paradox in Australia: Testing the theories of adapation and social comparison. *Economic Modelling, 30*, 900-910.

Perman, R., Ma, Y., McGilvray, J., & Common, M. (2003). *Natural Resource and Environmental Economics* (3rd ed.). Harlow, England: Pearson Education Ltd.

Pigou, A. (1932). The Economics of Welfare (4th ed.). London: Macmillan.

Pischke, J. (2011). *Money and happiness: Evidence from the industry wage structure*. National Bureau of Economic Research Working Paper No. 17056. Cambridge, MA.

Pischke, J., & Schwandt, H. (2012). *A cautionary note on using industry affiliation to predict income*. National Bureau of Economic Research Working Paper No. 18384.

Powdthavee, N. (2008). Putting a price tag on friends, relatives, and neighbours: Using surveys of life satisfaction to value social relationships. *The Journal of Socio-Economics, 37*(4), 1459-1480.

Powdthavee, N. (2009). I can't smile without you: Spousal correlation in life satisfaction. *Journal of Economic Psychology, 30*(4), 675-689.

Powdthavee, N. (2010). How much does money really matter? Estimating the causal effects of income on happiness. *Empirical Economics, 39*(1), 77-92.

Powdthavee, N., Lekfuangfu, W., & Wooden, M. (2013). *The marginal income effect of education on happiness: Estimating the direct and indirect effects of compulsory schooling on well-being in Australia*. IZA Discussion Paper No. 7365. IZA.

Powdthavee, N., & van den Berg, B. (2011). Putting different price tages on the same health condition: Re-evaluating the well-being valuation approach. *Journal of Health Economics, 30*(5), 1032-1043.

Pugno, M. (2009). The Easterlin paradox and the decline of social capital: An integrated explanation. *The Journal of Socio-Economics, 38*(4), 590-600.

Pugno, M. (2014). Scitovsky's The Joyless Economy and the economics of happiness. *The European Journal of the History of Economic Thought, 21*(2), 278-303.

Rehdanz, K. (2007). *Species diversity and human well-being: A spatial econometric approach*. Working Paper No. FNU-151, Hamburg University Centre for Marine and Atmospheric Science, Hamburg.

Rehdanz, K., & Maddison, D. (2008). Local environmental quality and life-satisfaction in Germany. *Ecological Economics, 64*(4), 787-798.

Robbins, L. (1932). *An Essay on the Nature and Significance of Economic Science* (1st ed.). London: Macmillan.

Ryan, R., & Deci, E. (2001). On happiness and human potentials. *Annual Review of Psychology, 52*(1), 141-166.

Sameulson, P. (1948). Consumption theory in terms of revealed preferences. *Economica, 15*(60), 243-253.

Samuelson, P. (1938). A note on the pure theory of consumer's behaviour: An addendum. *Economica, 5*(19), 353-354.

Samuelson, P. (1938). A note on the pure theory of consumer's behaviour. *Economica, N.S. 5*(17), 61-71.

Samuelson, P. (1947). *Foundations of Economic Analysis*. Cambridge: Harvard University Press.

Samuelson, P. (1950). The problem of integrability in utility theory. *Economica, 17*(68), 355–383.

Schwarze, J., & Härpfer, M. (2007). Are people inequality averse, and do they prefer redistribution by the state? Evidence from German longitudinal data on life satisfaction. *The Journal of Socio-Economics, 36*(2), 233-249.

Scitovsky, T. (1951). The state of welfare economics. *The American Economic Review, 4*(3), 303-315.

Scitovsky, T. (1952). *Welfare and Competition; The Economics of a Fully Employed Economy*. London: Allen & Unwin.

Scitovsky, T. (1976). *The Joyless Economy: The Psychology of Human Satisfaction*. New York: Oxford University Press.

Sen, A. (1970). *Collective Choice and Social Welfare*. London: Oliver & Boyd.

Senik, C. (2009). Income distribution and subjective happiness: A survey, *OECD Social, Employment and Migration Working Papers No. 96*. Paris.

Shields, M., Price, S., & Wooden, M. (2009). Life satisfaction and the economic and social characteristics of neighbourhoods. *Journal of Population Economics, 22*(2), 421-443.

Shields, M., & Wooden, M. (2003). *Marriage, children and subjective well-being*. Paper presented at the Australian Institute of Family Studies Conference, Melbourne.

Smith, A. (1776/1994). An Inquiry into the Nature and Causes of the Wealth of Nations. In E. Cannan (Ed.). New York: Modern Library.

Smyth, R., Mishra, V., & Qian, X. (2008). The environment and well-being in urban China. *Ecological Economics, 68*(1-2), 547-555.

Smyth, R., Nielsen, I., Zhai, Q., Liu, T., Liu, Y., Tang, C., . . . Zhang, J. (2011). A study of the impact of environmental surroundings on personal well-being in urban China using a multi-item well-being indicator. *Population and Environment, 32*(4), 353-375.

Sørensen, J. (2013). Rural-urban differences in life satisfaction: Evidence from the European Union. *Regional Studies*, 1-16. doi: 10.1080/00343404.2012.753142

Spash, C., & Hanley, N. (1995). Preferences, information and biodiversity preservation. *Ecological Economics, 12*(3), 191-208.

Stevenson, B., & Wolfers, J. (2008). Economic growth and subjective well-being: Reassessing the Easterlin paradox. *Brookings Papers on Economic Activity*, *2008*(1), 1-87.

Stutzer, A., & Frey, B. (2006). Does marriage make people happy, or do happy people get married? *The Journal of Socio-Economics, 35*(2), 326–347.

Stutzer, A., & Frey, B. (2008). Stress that doesn't pay: The commuting paradox. *The Scandinavian Journal of Economics, 110*(2), 339-366.

Stutzer, A., & Frey, B. (2012). *Recent developments in the economics of happiness: A selective overview*. Discussion Paper No. 7078. The Institute for the Study of Labor (IZA). Bonn, Germany.

Tesfazghi, E., Martinez, J., & Verplanke, J. (2010). Variability of quality of life at small scales: Addis Ababa, Kirkos sub-city. *Social Indicators Research, 98*(1), 73-88.

van Praag, B. (1968). *Individual Welfare Functions and Consumer Behavior: A Theory of Rational Irrationality.* (PhD thesis), Amsterdam: North Holland Publishing Company.

van Praag, B. (1971). The welfare function of income in Belgium: An empirical investigation. *European Economic Review, 2*(3), 337-369.

van Praag, B. (1991). Ordinal and cardinal utility: An integration of the two dimensions of the welfare concept. *Journal of Econometrics, 50*(1-2), 69-89.

van Praag, B., & Baarsma, B. (2005). Using happiness surveys to value intangibles: The case of airport noise. *Economic Journal, 115*(500), 224-246.

van Praag, B., & Frijters, P. (1999). The measurement of welfare and well-being: The Leyden approach. In D. Kahneman, E. Diener & N. Schwarz (Eds.), *Well-Being: The Foundations of Hedonic Psychology* (pp. 413-433). New York: Russell Sage Foundation.

van Praag, B., Kapteyn, A., & van Herwaarden, F. (1979). The definition and measurement of social reference spaces. *The Netherlands' Journal of Sociology, 15*(1), 13-25.

Veblen, T. (1899). *The Theory of the Leisure Class*. New York: Modern Library.

Veenhoven, R. (1996). Developments in satisfaction research. *Social Indicators Research, 37*(1), 1-46.

Veenhoven, R. (2005). Return of inequality in modern society? Test by dispersion of life-satisfaction across time and nations. *Journal of Happiness Studies, 6*(457-487).

Vemuri, A., & Costanza, R. (2006). The role of human, social, built, and natural capital in explaining life satisfaction at the country level: Toward a National Well-Being Index (NWI). *Ecological Economics, 58*(1), 119-133.

Vivenza, G. (2007). Happiness, wealth and utility in ancient thought. In L. Bruni & P. Porta (Eds.), *Handbook on the Economics of Happiness* (Vol. 3-23). Cheltenham, UK: Edward Elgar.

Welsch, H. (2002). Preferences over prosperity and pollution: Environmental valuation based on happiness surveys. *Kyklos, 55*(4), 473-494.

Welsch, H. (2006). Environment and happiness: Valuation of air pollution using life satisfaction data. *Ecological Economics, 58*(4), 801-813.

Welsch, H. (2007a). Environmental welfare analysis: A life satisfaction approach. *Ecological Economics, 62*(3-4), 544-551.

Welsch, H. (2007b). Macroeconomics and life satisfaction: Revisiting the "Misery Index". *Journal of Applied Economics, 10*(2), 237-251.

Welsch, H. (2008a). The social costs of civil conflict: Evidence from surveys of happiness. *Kyklos, 61*(2), 320-340.

Welsch, H. (2008b). The welfare costs of corruption. *Applied Economics, 40*(14), 1839-1849.

Welsch, H. (2009). Implications of happiness research for environmental economics. *Ecological Economics, 68*(11), 2735-2742.

Welsch, H., & Kühling, J. (2009). Using happiness data for environmental valuation: Issues and applications. *Journal of Economic Surveys, 23*(2), 385-406.

Welsch, H., & Kühling, J. (2010). Pro-environmental behavior and rational consumer choice: Evidence from surveys of life satisfaction. *Journal of Economic Psychology, 31*(3), 405-420.

Wooden, M., & Ning, L. (2013). Panel conditioning and subjective well-being. *Social Indicators Research*, *117*(1), 235-255.

Zimmerman, A., & Easterlin, R. (2006). Happily ever after? Cohabitation, marriage, divorce, and happiness in Germany. *Population and Development Review, 32*(3), 511-528.

Chapter 3: Life satisfaction in Australia: Evidence from ten years of the HILDA survey

STATEMENT OF CONTRIBUTION TO CO-AUTHORED PUBLISHED PAPER

This chapter includes a co-authored paper. The bibliographic details of the co-authored paper, including all authors, are:

Ambrey, C., & Fleming, C. (2014). Life satisfaction in Australia: Evidence from ten years of the HILDA survey. *Social Indicators Research, 115*(2), 691-714.

My contribution to the paper involved:

Writing and compilation of manuscript, data analysis and the preparation of tables and figures.

(Signed) _____ (Date)_____

Christopher Ambrey

(Countersigned) _____ (Date)_____

Corresponding author of paper: Dr Christopher Fleming

(Countersigned) _____ (Date)_____

Supervisor: Dr Christopher Fleming

This Chapter is an exact copy of the journal article referred to above.

In order to comply with copyright Chapters 3 to 9 have not been published here.

Chapter 10: Conclusion

10. Conclusion

This thesis investigates the influence of the environment on life satisfaction in Australia. Australia, much like the rest of the world, is faced with the significant challenges presented by a growing, increasingly wealthy and urbanised population. Accompanying these trends is the degradation and loss of environmental quality and the ecosystem services on which human well-being depends (Millennium Ecosystem Assessment, 2005). Recognising the value of environmental change brought about by these globally relevant trends is integral to promoting, or at least maintaining, individual well-being and broader social welfare.

As detailed throughout the literature review (Chapter 2) this thesis is nestled neatly within: the re-evaluation of what counts as economic science; the renewed and overt re-appreciation for the subtler aspects of welfare (or happiness) which economists have long acknowledged (yet had stopped short of making a concerted effort to address); a complementary, although difficult to reconcile, dualism between the eudaimonic and hedonistic conceptions of happiness; and a broader policy context where careful and thorough attention to welfare offers real opportunities to improve allocative efficiency and achieve socially optimal outcomes. A summary of the findings of this investigation into the influence of the environment on life satisfaction is reported in the following Section 10.1.

10.1. Summary

Following a review of the developments in economic thought and the preceding body of empirical literature (Chapter 2), Chapter 3 of this thesis is devoted to examining the level, determinants and distribution of life satisfaction, as well as the prevalence and severity of dissatisfaction over the period 2001-2010 in Australia. The results indicate a steady decline in life satisfaction from 2003 onwards. The results also indicate geographic heterogeneity in the distribution of life satisfaction and highlight that a number of socio-economic and demographic factors perform a role in determining an individual's life satisfaction. These findings answer some questions about what factors determine life satisfaction in Australia. Further, the evidence tentatively suggests life satisfaction may have declined (albeit marginally) over the period, due to a

deterioration in environmental quality, although many complementary explanations might be, and have been offered.

Chapter 4 of this thesis investigates the role of scenic amenity in supporting life satisfaction in South East Queensland. Specifically, a positive and statistically significant association is observed between scenic amenity (measured on a 10-point scale) and life satisfaction, equivalent to an implicit willingness-to-pay of approximately $14,000 in household income per annum to obtain a one-unit improvement in scenic amenity. This Chapter provides evidence on the welfare effects associated with declines in scenic amenity. Given the pressures of population and economic growth facing the region of South East Queensland, all levels of government (including the local government) should consider the benefits of economic growth alongside the welfare impacts attributable to the loss or degradation of scenic amenity.

Chapter 5 of the thesis takes up the contribution of biodiversity (as measured by ecosystem diversity) to life satisfaction. On average, a respondent has an implicit willingness-to-pay of approximately $14,000 in household income per annum to obtain a one unit improvement in ecosystem diversity. The results point to a positive link between biodiversity and life satisfaction. In a similar spirit to the preceding Chapter, any further degradation and fragmentation of ecosystems should be balanced against an appreciation of the private and social, costs and benefits.

Chapter 6 of the thesis extends the scope of inquiry to include all of Australia and investigates the influence of Australia's protected areas, grouped by International Union for Conservation of Nature (IUCN) categories, on life satisfaction. These life satisfaction effects correspond to implicit willingness-to-pay values, in terms of annual household income, which range from $2,950 to $9,650 for a one per cent increase in the extent of that category of protected area. This evidence reveals a positive association between many protected areas throughout Australia and individual life satisfaction. These results provide further motivation for recognition of all social welfare effects associated with protected areas.

Chapter 7 investigates, for Australia's capital cities, the relationship between public greenspace and life satisfaction. The evidence reveals an implicit willingness-to-pay of

$1,172 in annual household income for a one per cent (143 square metres) increase in public greenspace. Further, this value is found to increase with population density. It appears that individuals in urban areas, likely due to the scarcity of both private and public greenspace, value public greenspace more highly. These findings have great relevance to urban planners and policy makers considering the social welfare implications of development, as the world's urban areas absorb all of the population growth and draw in some of the rural population over the next four decades. Similar to earlier Chapters, although more extensively, the heterogeneity of the main welfare effects of public greenspace between individuals is examined. Specifically, results indicate that the effect of public greenspace is not particularly heterogeneous; however, lone parents and the less educated benefit to a greater extent from the provision of public greenspace than the general population.

Chapter 8 turns to the subject of air pollution in South East Queensland, estimating an implicit willingness-to-pay for a reduction in air pollution (PM_{10} exceedances) of approximately $5,000. This evidence reaffirms the need to consider non-market, negative externalities, alongside traded and conventionally priced market activity.

Chapter 9 directly addresses a persistent challenge faced throughout the thesis and by researchers in this area in general; that is, estimating the causal effect of income on life satisfaction. Using the case of physical health (thus enabling the complete use of the panel data available), an alternative to the typical instrumental variable approach is advocated. Specifically, a subset of windfall income (*restricted windfall income*) is employed as a substitute for the more conventional household income monetary measure. This innovation dramatically alters implicit willingness-to-pay estimates, reducing them to one fifth of the size. Hence, the findings of this chapter have material consequences for the socially optimal allocation of scarce resources. Further, the findings strengthen the life satisfaction approach, often criticised for the implausibly large implicit willingness-to-pay estimates it can generate, providing a promising way forward.

10.2. Contribution

This thesis provides evidence on, *inter alia*, the link between the environment and life satisfaction or well-being. Further, the results indicate that this link between the

environment and life satisfaction is at times quite heterogeneous with the effects in some instances differing greatly by the quality and quantity of the environment, the characteristics of the local environment and the characteristics of the individual. Beyond providing a new contribution to the non-market valuation and economics of happiness literature, this thesis also provides valuable steps forward in terms of the practical application of the technique, while at the same time providing policy relevant evidence.

This thesis shows that the life satisfaction approach or even well-being analysis more generally, can be made operational at a range of spatial and temporal extents. The analyses celebrate the geographic dimension, bringing together spatially referenced survey data and disaggregated GIS data. In doing so, this investigation provides evidence attesting to the versatility of the approach and provides an indication of the factors that can condition the reasonableness of willingness-to-pay estimates. This final point is vitally important to the credibility of the life satisfaction approach and its use in public policy settings.

10.3. Policy implications

The policy implications of these findings present more than a perfunctory signal of acknowledgement at the end of an intrinsically interesting empirical investigation. The *Report by the Commission on the Measurement of Economic Performance and Social Progress* alongside similar developments around the world has given credence to the use of subjective measures of well-being as a yardstick of social progress. The life satisfaction approach implemented throughout this thesis brings into focus the subjective aspect of well-being and provides monetary estimates for the environment in the context of existing policy settings and growing environmental pressures.

At the outset, this thesis provides evidence on a perplexing situation of declining life satisfaction in the face of increasing GDP. Citing declines in other objective indicators of progress, environmental quality is put forward as a possible, although likely only partial, explanation for this decline. In the spirit of the Sarkozy Commission, this thesis explicitly acknowledges that well-being is more than just economic production and living standards. Specifically, this thesis attempts to empirically estimate the implications of changes in the environment for the subjective dimension of well-being.

The evidence obtained through these efforts suggests the life satisfaction effects *prima facie* are far from trivial and hence should not be ignored when making decisions concerning the environment.

In addition to the consideration of the limitations detailed in Section 10.4, the magnitude of the monetary equivalents or willingness-to-pay estimates borne out in the thesis should be interpreted bearing in mind the size and direction of potential biases in the underlying coefficient estimates and what this means for the willingness-to-pay values. Further, it should be noted that these welfare effects are net of controls for an array of other factors and, as such, these effects reflect the psychological associations with the environment which can also subsume other factors not controlled for in the regression.

This thesis represents a pragmatic step forward (given the tools available) in terms of the measuring and giving a voice to the subjective aspects of well-being. The Sarkozy Commission calls for national statistical systems to build on the efforts of individual researchers and commercial data providers to incorporate questions about various aspects of subjective well-being in their standard surveys. Easterlin (2010) optimistically likens this to the great watershed moment in history, analogous to the 1930s when the immense resources of the government took over from individual scholars the measurement of national income. In the case of Australia, recent revisions to the *Measures of Australia's Progress* (Australian Bureau of Statistics, 2013) leave much to be desired in terms of objective measures of progress, let alone subjective measures. This is despite the recent changes reportedly responding to developments around the world including the Sarkozy Commission.

The relevance of these results and the approach generally for Australia becomes plainly clear when it is observed that choices have been, and continue to be, made that involve trade-offs between the environment and economic activity. Some Australian examples include: the Commonwealth Government's request to remove 74,000 hectares from the Tasmanian Wilderness World Heritage Area so that it may be logged (Baxter, 2013); the Queensland Government's legislation to allow grazing of cattle in National Parks (Tlozek & Arthur, 2013); state and territory government's rapid development of the coal seam gas industry in the face of uncertainty about the health

risks, the implications for how the waste water and salt will be dealt with, and the consequences for groundwater (Carey, 2013); and the possible listing of the Great Barrier Reef as a World Heritage in Danger site due to poor water quality and the development of ports near the Great Barrier Reef (United Nations Educational Scientific and Cultural Organization, 2013).

One explanation for these seemingly myopic decisions may be hyperbolic discounting by individuals and decision makers. That is, individuals and decision makers discount the value of delayed consumption more in the immediate future than in the more distant future. Specifically, decisions may be *time inconsistent*, and as such can change for no other reason than the passage of time as individuals and decision makers are faced with a choice between the new present and future scenario.

Without embarking on a passionate rebuke of the fallacious positive and normative dichotomy in economics; what *is*, is not necessarily what *ought* to be. As pointed out by Gowdy, Rosser, and Roy (2013), how individuals' value trade-offs between their own present and future well-being is conceptually disjointed from the question of how social decisions about the future should be made. The adoption of a Kantian perspective, while unfamiliar to many economists, may remedy this situation.

Short-sighted behaviour requires the confrontation of the role of paternalism in government policy; otherwise, as observed by Hepburn, Duncan, & Papachristodoulou (2010) the temptation to re-evaluate the policy in future could lead to an inadvertent collapse in the stocks of a natural resource. Effective social and economic policies should emphasise cooperation, non-market values, and a shared sense of responsibility. Behaviours akin to be satisfied with fewer material possessions and recognising the need for a shared sacrifice (Gowdy, Rosser, & Roy, 2013).

10.4. Limitations of the thesis

There are a number of limitations of this thesis. First, the availability and level of detail of data (notably GIS data) limits to some degree the questions that could be explored, the geographic and temporal extent of the investigation and the controls employed. In some cases the GIS data itself is modelled (which has both advantages and disadvantages) or for instance is based on *ex ante* preferences (for example, scenic

amenity). Further, for reasons of confidentiality, the lowest level of spatial reference for individuals in the HILDA survey is the Census Collection District (CD). That is, the precise residential address of respondents is unknown. On a positive note, this spatial reference minimises the degree of measurement error, the respondent is assumed to reside in the centroid or centre point of the CD. Where the spatial resolution of the GIS data is more aggregated than the CD itself this may introduce some further measurement error leading to a downward bias in the coefficient estimates.

Second, this thesis takes an individual's self-reported life satisfaction as a proxy for utility. While this is an imperfect measure of an individual's underlying or latent utility, there is much evidence to support the objectivity and comparability of such individual responses, a point taken up in Chapter 2 and hence not discussed further here. Third, in model estimation a number of measures were taken to mitigate potential omitted variable bias and address the issue of reverse causality between income and life satisfaction. Still, similar to other studies, possible self-selection into location may bias the coefficient estimates of amenities upwards and disamenities downwards. Fourth, some control variables (such as physical health and marriage), while not the focus of the investigation may be endogenous. Fifth, the issue of measurement error for instance, with respect to income, remains under researched in the broader literature and presents a genuine opportunity for further research.

10.5. Concluding remarks

While happiness may have returned to economics, the dominant school of thought still appears to be decidedly utilitarian and hedonistic. The multidimensional nature of well-being is under appreciated; the eudaimonic perspective and Sen's broad capability approach remain under researched. While it is conceptually more straightforward to comprehend and investigate welfare from a utilitarian perspective, this approach also neglects many aspects of life that even the most ardent utilitarian would recognise are important to well-being. For this reason, future efforts, employing what some have termed well-being analysis or the life satisfaction approach, should complement their analysis with objective measures. Admittedly, this may raise some difficulties in interpretation. Similar to the Sarkozy Commission advocating eight dimensions of well-being; the risk becomes as van den Bergh (2009) suggested of GDP,

that people simplify their choice sets. With a dashboard approach, policy makers, researchers and broader society may be observed placing their own weights on what is important. Given the well-established view that GDP is not social welfare, yet it is still treated as such, a dismal projection seems to offer itself. GDP may continue to be favoured at the expense of what really matters because people have failed, or do not devote the cognitive effort, to wrestle with the complexity of the ultimate desired end.

10.6. Further research

The quest to further social and economic progress calls for concerted efforts which necessarily transcend disciplinary boundaries. This requires successful and convincing integration and operationalisation, an endeavour which may be stymied by prematurely redrawing the boundaries of economic science. Forbidding the use of some concepts because they are allegedly non-operationalisable, as the history of neoclassical economics has revealed, may have very deep and lasting consequences on the development of a discipline (Bruni & Guala, 2001).

Nevertheless, future research should overtly acknowledge and even adopt philosophical or ethical positions which diverge from the ethical positions knowingly and unknowingly championed by most economists. Further research extending the efforts of Welsch (2009) into the practical refinement of the life satisfaction approach or well-being analysis would serve to guide other researchers and practitioners. Even the dominant utilitarian perspective itself may still be improved by considering changes in aspirations that, "...no court in the world would grant compensation for..." (Ng, 1978, p.581) and resolving the debate surrounding the relationship between monetary estimates obtained using the life satisfaction approach and those garnered by conventional methods.[7]

The study of happiness in economics is not a development welcomed by all economists. Amidst the voluminous literature on the economics of happiness, the enthusiastic opposition to the presence of happiness in economics by a few seems to

[7]Throughout this thesis the view has been adopted that these two monetary estimates are complementary. However, separate from the careful consideration of the specific research design (for example, whether or not house prices are controlled for in the life satisfaction regression), the disagreement between the concepts of *ex ante* decision utility and *ex post* experienced utility makes these methods difficult (if not impossible) to conceptually reconcile.

have received little attention (cf. Bertrand & Mullainathan, 2001; Smith, 2008; Tribe, 2008). Future research should seek to address these criticisms.

References

Australian Bureau of Statistics. (2013). Measures of Australia's Progress, Retrieved 18-03-14, from http://www.abs.gov.au/ausstats/abs@.nsf/mf/1370.0.

Baxter, T. (2013). New danger for Australian World Heritage wilderness,Retrieved 23-02-14, from http://theconversation.com/new-danger-for-australian-world-heritage-wilderness-18077.

Bertrand, M., & Mullainathan, S. (2001). Do people mean what they say? Implications for subjective survey data. *The American Economic Review, 91*(2), 67-72.

Bruni, L., & Guala, F. (2001). Vilfredo Pareto and the epistemological foundations of choice theory. *History of Political Economy, 33*(1), 21-49.

Carey, M. (2013). We need to do our homework on the health risks of coal seam gas, Retrieved 02-06-13, from http://theconversation.com/we-need-to-do-our-homework-on-the-health-risks-of-coal-seam-gas-13173.

Easterlin, R. (2010). Well-being, front and center: A note on the Sarkozy report. *Population and Development Review, 36*(1), 119-124.

Gowdy, J., Rosser, J., & Roy, J. (2013). The evolution of hyperbolic discounting: Implications for truly social valuation of the future. *Journal of Economic Behavior & Organization, 90*, S94–S104.

Hepburn, C., Duncan, S., & Papachristodoulou, A. (2010). Behavioural economics, hyperbolic discounting and environmental policy. *Environmental & Resource Economics, 46*(2), 189-206.

Millennium Ecosystem Assessment. (2005). Overview of the Milliennium Ecosystem Assessment. Retrieved 29-03-2011, from http://www.maweb.org/en/About.aspx.

Ng, Y. (1978). Economic growth and social welfare: The need for a complete study of happiness. *Kyklos, 31*(4), 575-587.

Smith, V. (2008). Reflections on the literature. *Review of Environmental Economics and Policy, 2*(2), 292-308.

Tlozek, E., & Arthur, C. (2013). Qld's national parks cattle grazing laws 'disastrous', Retrieved 02-06-13, from http://www.abc.net.au/news/2013-05-22/qld-national-parks-cattle-grazing-laws-disastrous/4705082.

Tribe, K. (2008). Happiness: What's the use? *Economy and Society, 37*(3), 460-468.

United Nations Educational Scientific and Cultural Organization. (2013). Retrived 02-06-13, from http://whc.unesco.org/en/soc/1874.

Welsch, H. (2009). Implications of happiness research for environmental economics. *Ecological Economics, 68*(11), 2735-2742.

Appendix

Griffith University Animal Ethics Committee / Griffith University Human Research Ethics Committee

Project Title

Essays on the influence of the environment on life satisfaction: Evidence from Australia

Applicant

Christopher Ambrey

Completed the Griffith University Research Ethics Scope Checker on 25 January 2012. In completing the checker they indicated:

1. About or involving humans? No

On this basis the described activity is outside the scope of the University's animal ethics and human research ethics arrangements, and as such does not require University ethical review.

This is a service maintained by the Office of Research on behalf of AEC and HREC.