

# **THE HAPPINESS DISTRIBUTION:**

## **An Exploratory Analysis of Eight European Countries**

**MAHAK B. SAMBYAL**

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Department of Economics

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## Preface

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This thesis titled '*The Distribution of Happiness: An Exploratory Analysis of Eight European Countries*' is submitted in partial fulfillment of the requirements of the second year of a Masters by Research (MRes) Degree in Economics at Macquarie University. It is a culmination of research work undertaken over the past eight months, commencing February 2014, under the supervision of Associate Professor, Tony Bryant and Associate Professor, Roselyne Joyeux. This thesis has been prepared solely by the author (Mahak B. Sambyal) building on the existing literature that has been appropriately referenced.

My quest to explore happiness from an economics perspective began in early 2010. Back then, working as a Senior Forecasting Analyst with Reserve Bank of Australia, I struggled to find value in what I was doing. As an inquisitive young economist, I was passionate and determined to utilise my analytical skills to make a meaningful contribution to humanity. Having studied standard micro economics text books, I always thought happiness was a subject that was of interest to psychologists and sociologists and that it had no place in economics. However, thanks to a quick Google search of the two terms – 'economics' and 'happiness', I discovered *the Economics of Happiness* – the quantitative and theoretical study of happiness and other related concepts - coalescing economics with other social sciences including psychology and sociology. Over the next three years, I continued working in the corporate sector whilst investigating this fascinating research area during weekends. Finally in December 2012, I took the plunge to make a career change and enrolled in the MRes Economics program – a two-year pathway program to PhD at Macquarie University.

An equitable distribution of happiness is not only desired on moral grounds but it may boost social cohesion and address the broader economic problem of scarce resources through enhancing productivity. With this as a primary motivation, this thesis is dedicated to an investigation of the distribution of happiness in eight European countries using a median-based dominance approach. The thesis is an exploratory exercise and can be considered as a kind of 'feasibility study' for a bigger research project, possibly a Doctorate. The current study raises important questions, offering motivation to undertake future long-term research. The primary aim is to demonstrate to the Examination Panel that I am equipped to undertake a PhD thesis next year.

Writing this thesis has been an immensely enriching experience. The weekly interactions with my peers, sharing our frustrations and achievements along the way have led to beautiful friendships. Nonetheless, my research journey did come with its own set of challenges, including numerous failed attempts to find appropriate datasets, long-hours of weekend study, writing anxiety, lack of motivation, procrastination and the list goes on.

## **Acknowledgements**

I wish to sincerely acknowledge key individuals without whose support the completion of this thesis would not have been possible. Firstly, I would like to thank Tony Bryant and Roselyne Joyeux, for their unconditional belief, support, guidance, and endless inspirational dialogues, ideas and constructive comments. I am immensely grateful to Tony in particular for recommending the article by Dutta and Foster (2013), which forms the basis of my thesis.

Thanks to my peers, including Bowen Fu, Dilli Uprety, Larry Carleton, Matthias Oldham, Przemyslaw Chapko, Shangnian Jiang, and Qin Zhang, who constantly inspired me to stay motivated and focused. Thanks to Philippa Hedges for offering her expertise in copy editing this thesis, hopefully she has eliminated all the serious errors. However, any that may have gone unnoticed are entirely my responsibility.

A special thanks to Dr. Daisaku Ikeda for his humanistic writings and teachings that have offered the impetus to pursue my passion of undertaking this exploratory exercise. I am also grateful to my very dear friend Greg Johns, who unfailingly since early 2013, has selflessly offered his time for our fortnightly discussion meetings, encouraging me to have a paradigm shift in my thinking, and use it as a spring board to contribute to humanity.

I have deepest appreciation for my family members, particularly my parents and my parents in-law for their unconditional support. Last but not the least, a big thanks to my beloved husband, Kashish Sambyal, to whom I owe the most. Thanks for constantly believing in me and showing me the light at the end of the tunnel.

Finally, thanks to you, my readers, for making time to read this thesis. I hope you enjoy and get something out of it.

**Mahak B. Sambyal**

**October 2014**

## **Abstract**

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Since the 1970s the Economics of Happiness literature has grown rapidly. Most of its focus has been on *determinants* of happiness, including relative and absolute incomes, inequality, social capital, and macroeconomic policies. However, the question of the distribution of happiness has also received some attention. In addition to developing appropriate measures of happiness, it is argued that understanding its *distributional* aspects is important to assist in developing holistic measures of well-being. A great deal remains to be studied in this domain, particularly in understanding happiness inequality both within and across societies. Predominantly, the application of cardinal variability measures to assess ordinal happiness scores has rendered problematic the conclusions of many prior empirical studies of happiness inequality. Allison and Foster (2004) recommend using a median-centred technique based on a 'dominance approach' to evaluate the distribution of categorical data. Dutta and Foster (2013) have recently applied this method to examine the distribution of happiness in the United States (U.S.) from 1972 to 2010. The current research takes the Dutta–Foster approach to an exploration of the distribution of happiness over the past four decades (i.e. 1975-2013) in eight European countries using the rich dataset provided in the *Eurobarometer* (European Commission, 2014).

Complete and unambiguous rankings for happiness inequality and *mean happiness* are obtained using *S-dominance* and *F-dominance* criteria. Happiness inequality indices are estimated using the measures developed by Allison and Foster (2004) and Abul Naga and Yalchin (2008). Consistent with Dutta and Foster's (2013) findings for the U.S., the dominance results obtained for European countries are robust to various scale and subjective weight transformations.

Overall, in terms of average happiness, 1980s appears to be the decade with lowest mean happiness for majority of the countries in our sample, with happiness levels rising in recent decades. Moreover, for most countries, a period of rise in *mean happiness* seems to correspond with a decline in *happiness inequality*. Contrary to the *materialistic and social comparison theories of happiness*, which postulate a trade-off between the level and inequality of happiness, this finding indicates that an egalitarian policy targeted at reducing happiness disparities may in fact complement a utilitarian policy focused on enhancing mean happiness levels.

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## List of Abbreviations

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Abul Naga and Yalchin Inequality Index	NY Inequality Index
Allison and Foster Inequality Index	AF Inequality Index
European Union	EU
Gross Domestic Product	GDP
Ordinary Least Squares	OLS
Organisation for Economic Co-operation and Development	OECD
Subjective Well-being	SWB
United Kingdom	U.K.
United States of America	U.S.

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# **1. Introduction and Motivation**

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It is a truism worth repeating that all economies have to deal with the constraint of scarce resources. This observation leads, of course, to a standard definition of economics as a subject devoted to finding the best allocation of scarce resources among a myriad competing ends. Among these, economics has attempted to identify 'productive' and 'unproductive' activities. Laibman (1999) categorises wasteful activities, or those involving reproduction of unfair conditions, as *unproductive*. Thus, in this category are usually placed expenditures on police forces and other organs of state repression, along with massive militaries, aimed at initiating or defending from international conflicts. Whereas in the *productive* category are placed activities designed to enhance the productivity of scarce resources.

Another established fact, as noted Crusius and Mussweiler (2012), is that envy is ubiquitous and among the most powerful and corrosive of all human emotions. Envy is often triggered by upward social comparisons across different life domains, resulting in intense negative feelings of dissatisfaction, lack of self-worth, anger or even rage. On the other hand, viewed as a social system the state of an economy may be looked at, in the terms established by Debreu (1952), as one of 'social equilibrium'. In particular:

*'In a wide class of social systems each agent has a range of actions among which he selects one. His choice is not, however, entirely free and the actions of all the other agents determine the subset to which his selection is restricted. Once the action of every agent is given, the outcome of the social activity is known. The preferences of each agent yield his complete ordering of the outcomes and each one of them tries by choosing his action in his restricting subset to bring about the best outcome according to his own preferences.'* Debreu (1952; pp. 886–7).

The equilibrium that emerges in any social system clearly depends on the preferences of the agents in the society. Consequently, if agents' preferences are biased towards malice and envy say, by a distribution of happiness that is too uneven, it may result in socially 'bad' equilibrium. In other words, if the distribution of happiness becomes too skewed it may result in personally, nationally and internationally destructive behaviours. For instance, there is evidence to suggest that a workforce in which there is a great deal of envy and unhappiness is likely to be *unproductive* (e.g. Tai *et al.*, 2012; Cohen-Charash & Mueller, 2007). This reveals another aspect of a 'bad' social state. Thus, increasing productivity and implementing policies that aim to make people happier and focus on reducing happiness inequality, is a potential way to address the economic problem of scarce resources.

For these reasons, and others that will become clear as this thesis unfolds, this work is devoted to reviewing the *determinants* of happiness but more importantly to an exploration of the *distribution* of happiness.

## **1.1 Why Study Happiness? Gaps in the Literature**

According to Aristotle (cited in Gilbert, p.534), '*happiness is the meaning and the purpose of life, the whole aim and end of human existence*'. Consequently, the study of happiness - its causes, correlates, consequences, and distribution – is the natural subject of study for all social sciences.

Apart from philosophical grounds, there are other reasons why economists need to study broader measures of well-being including happiness. There is a strong need for a holistic approach to well-being including alternative policy measures other than the Gross Domestic Output (GDP) measure of economic growth. The GDP measure fails to ensure sustainable development with the exclusion of externalities (such as pollution) that are difficult to quantify but are however considered important (Ng, 2003). It has been

argued that happiness and life satisfaction data may be used to complement the existing public policy measures, with some proposing the development of national happiness indicators (such as that done in Bhutan) to augment countries' national income accounts (Cummins *et al.*, 2003; Kahneman *et al.*, 2004).

There are a number of happiness indices offering global happiness rankings for more than 150 nations. These include, albeit not limited to, the New Economics Foundation's (2012) *Happy Planet Index*<sup>1</sup>; the OECD's (2014) *Better Life Index*; the United Nation's world happiness rankings (Helliwell *et al.*, 2013), and the Legatum Institute's (2013) *Prosperity Index*. However, most of these measures use different methodologies and have been developed only recently. There is lack of sufficient time series data for several countries. One of the key recommendations of the widely cited *Stiglitz-Sen-Fitoussi Commission Report on the Measurement of Social and Economic Progress* was to encourage governments across the world to undertake national-level efforts to collect happiness data in a systematic manner as is reflected in the following two remarks by Stiglitz *et al.* (2010):

*'... [The] time is ripe for our measurement system to shift emphasis from measuring economic production to measuring people's well-being'* (Stiglitz *et al.*, 2010, p.12).

*'Measures of both objective and subjective well-being provide key information about people's quality of life. Statistical offices [worldwide] should incorporate questions to capture people's life evaluations, hedonic*

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<sup>1</sup> A few changes to the *Happy Planet Index* have been proposed in the literature, with the aim to make it an environmentally responsible and globally acceptable indicator. For a detailed discussion refer to Ng (2008a).

*experiences and priorities in their own survey'* (Stiglitz *et al.*, 2010, p.16).

Echoing a similar theme, Layard and Layard (2011) goes a step further, arguing that happiness studies may have potential to inform fiscal and labour market policies. This would require substantial efforts in collating national-level well-being data through large scale periodic surveys, to get a better understanding of what individuals really value, in order to develop well-informed societal priorities.

Happiness data can also be used as an effective tool to evaluate public policies, particularly in areas where *standard revealed* and *stated preference* approaches become unsuitable in assessing people's preferences. These include aspects such as health, parenting, and community life, in which psychological costs and benefits are difficult to quantify in monetary terms. Layard (2010) argues the need to develop alternative evaluative mechanisms that take into account self-reported happiness data. In a similar vein, Finkelstein *et al.* (2013)<sup>2</sup> recently argued for the use of self-reported happiness data to inform optimal health insurance policies and programs. The study specifically examined how individuals' health status affects their marginal utility of consumption in the United States (U.S.) using self-reported happiness data as a proxy for utility.

Lastly, happiness data is also likely to offer insights and better understanding of human behavioural patterns which may in turn influence individual actions that enhance well-being. For instance, drawing on the empirical findings of several studies in psychology, Dunn *et al.* (2011) outline eight consumer '*spending principles*' that have a well-being enhancing effect. The main ones include, spending on experience rather than material goods; spending on

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<sup>2</sup> This paper won the 2014 Hicks-Tinbergen Award.

others rather than oneself; making frequent small gratifying purchases instead of few big ticket items; and avoiding comparison shopping. Limited work has been undertaken in this area in economics, with few studies examining individual well-being effects of behavioural activities such as television viewing and healthy eating (e.g. Bruni & Stanca, 2008; Blanchflower *et al.*, 2013).

## **1.2 The Distribution of Happiness**

Envy, as previously pointed out, is one of the strongest human emotions. Happiness comparisons with relevant others may contribute to feelings of discontent, anger and in some instances rage resulting in destructive behaviour. There are many things which stir envy. One of the most potent seems to be the sense that someone else is happier and enjoying their lives more than you are enjoying yours. At the interpersonal level, Becker and Posner (2004) undertook the economic analysis of suicide. Their study found that disparity of happiness was one of the significant causes of such behavior. At the intra-national level, major socio-economic upheavals largely rooted in widespread resentment and discontent, including the French Revolution (1787-1800), the Russian Revolution (1917-21) and the Chinese Revolution (1911-49) are obvious examples (Skocpol, 1979). At the international level it has been argued by many that, as foretold by Keynes (1919), the reparations forced on Germany by the allies after World War I (1914-18) and the consequent disparity in the distribution of happiness between the two groups led directly to World War II (1939-45). Thus, in this context exploring the distribution of happiness across populations and its subgroups is essential.

Understanding the distribution of happiness is not only important on moral grounds but is also important for the development of holistic measures of well-being. According to 'discontent theories' of social unrest advocated

in political sciences, well-being inequality is inversely related to the level of social interconnectedness (e.g. Gurr, 1994; Brown, 1996). Moreover, happiness inequality may reflect differences in individual attitudes toward life, thus adding to the existing societal disparities potentially aggravating social conflict (Veenhoven, 2005b). Understanding the determinants of happiness inequality may have the potential to inform public policy actions directed at achieving social cohesion and societal well-being [see Ovaska & Takashima (2010) for further arguments along these lines].

Limited work has been undertaken in this domain (e.g. Kalmijn & Veenhoven, 2005; Stevenson & Wolfers, 2008b; Becchetti *et al.*, 2010), particularly in examining the distribution of happiness both across and within countries, as well as identifying non-monetary factors. Moreover, the use of standard cardinal measures of dispersion to analyse ordinal happiness scores has unfortunately rendered problematic the conclusions of many prior studies of happiness inequality. Dutta and Foster (2013) make use of appropriate methods, developed by Allison and Foster (2004) and Abul Naga and Yalchin (2008), suitable for ordinal data. The Allison-Foster method has rarely been applied to examine the distributional aspects of happiness. Dutta and Foster (2013) have recently applied this new technique to study the distribution of happiness in the U.S. for the period 1972-2010.

### **1.3 The Contribution of this Thesis**

The current research takes the approach employed by Dutta and Foster (2013) to an exploration of the distribution of happiness over the past forty years (1975-2013) in eight European countries, using the rich dataset provided in the *Eurobarometer* (European Commission, 2014). Countries include Belgium, Denmark, France, Germany, Ireland, Italy, the Netherlands, and the United Kingdom (U.K.). This thesis makes an important contribution to the existing literature both in terms of its methodology and key findings, raising important questions for future academic enquiry.

Unambiguous and complete inequality and mean happiness rankings are obtained for each country, which are robust to scale and subjective weight transformations. Overall, happiness inequality results vary across countries, with Belgium, France and Ireland recording a decline in happiness inequality since 1990s. On the other hand, happiness inequality appears to have risen in Denmark, Italy, and the U.K in recent decades. For most countries in our sample, a decline in happiness inequality seems to correspond with a rise in mean happiness, suggesting absence of policy trade-off between that twin welfare goals of ameliorating happiness inequality and enhancing mean happiness. However, further research is required to make well-informed policy recommendations. Another potential research project, possibly building on this thesis work, entails undertaking decompositional analysis and regression modelling to identify possible drivers to explaining country-specific happiness inequality trends identified as part of this study.

## **1.4 Layout and Organisation**

This thesis is organised as follows. Chapter 2 surveys the relevant theoretical literature, including important theories of well-being. Chapter 3 discusses the empirical literature in Happiness Economics, particularly focussing on the *determinants* and *distribution* of happiness. Chapter 4 outlines the empirical methodology and datasets employed to undertake the current study. In Chapter 5, key results including dominance rankings and happiness inequality measures developed for each of the eight countries are discussed. Finally, Chapter 6 provides concluding comments, reiterating the important contributions the current thesis has made to the existing literature.

## **2. Review of the Theoretical Literature**

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### **2.1 Introduction**

This Chapter is a review of the theoretical literature of the Economics of Happiness, tracing the origins of Happiness Economics, including the various interpretations of the 'Easterlin Paradox'. As a prelude to this survey a number of concepts and terms that occur regularly in the literature are also presented. Various theories of well-being are discussed, including the aspirational and distributional fairness models, which have been adopted from other disciplines including psychology and political sciences. Aspirational theories of well-being examine the impact of aspirations and societal expectations on individual well-being. Models of distributional fairness and justice focus on the distributional and equality aspects of well-being. Finally, 'hedonic' and 'eudaimonic' approaches to well-being are discussed, building on the philosophical approaches of Aristotle and Bentham.

### **2.2 Concepts and Terminology**

The term 'well-being' can have various connotations. In their detailed review of personal well-being literature for the U.K. Government, Dolan *et al.* (2006) outline five different accounts of well-being: (i) 'objective lists' or 'basic needs' approach which considers well-being in terms of the attainment of specific economic, social, physical and psychological attributes; (ii) 'flourishing' (or 'eudaimonic') accounts define well-being as the realisation of an individual's innate potential across various dimensions of life; (iii) 'preference satisfaction' accounts, in which well-being relates to having the means and the resources to achieve one's individual wants and desires; (iv) 'hedonic' or 'affective' account relates to the relative predominance of positive feelings with the presence of pleasure (or positive

affects) and absence of pain (or negative affects)<sup>3</sup>; and (v) 'evaluative' approach to well-being which is based on individuals' evaluation of their life overall, including both hedonic and general life experiences.

The economics literature has used some of these well-being concepts, including *preference satisfaction*, *evaluative* and to some degree *hedonic* accounts of well-being. Mainstream neo-classical economics heavily relies on the *preference satisfaction* approach in which utility or individual well-being is considered solely as an increasing function of income. Given that individual preferences are revealed through market behaviour, an increase in individual income implies enhanced budget set indicating greater fulfilment of one's desires/ preferences. In contrast, the Happiness Economics literature has relied mainly on the *evaluative* and (partly) *hedonic* concepts, collectively referred to as 'subjective well-being' (SWB) (Dolan *et al.*, 2006; Mackerron, 2012). A technical term used in psychology, SWB is related to an individual's personal assessment of his/her life experiences across three basic dimensions including presence of positive affect, absence of negative affect and an overall satisfaction with life in general (Ryan & Deci, 2001).

The Happiness Economics literature often uses several terms such as, 'happiness', 'well-being', 'utility' and 'life satisfaction' interchangeably (Easterlin, 2001; Holländer, 2001; Bjørnskov, 2003; Ferrer-i-Carbonell, 2005). The self-reported satisfaction responses to questionnaires are accepted as meaningful empirical proxies for individual well-being. Response scores may be either for a single question regarding overall life satisfaction or include multiple questions relating to different life domains.

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<sup>3</sup> In other words it is the net sum of happiness less pain that matters.

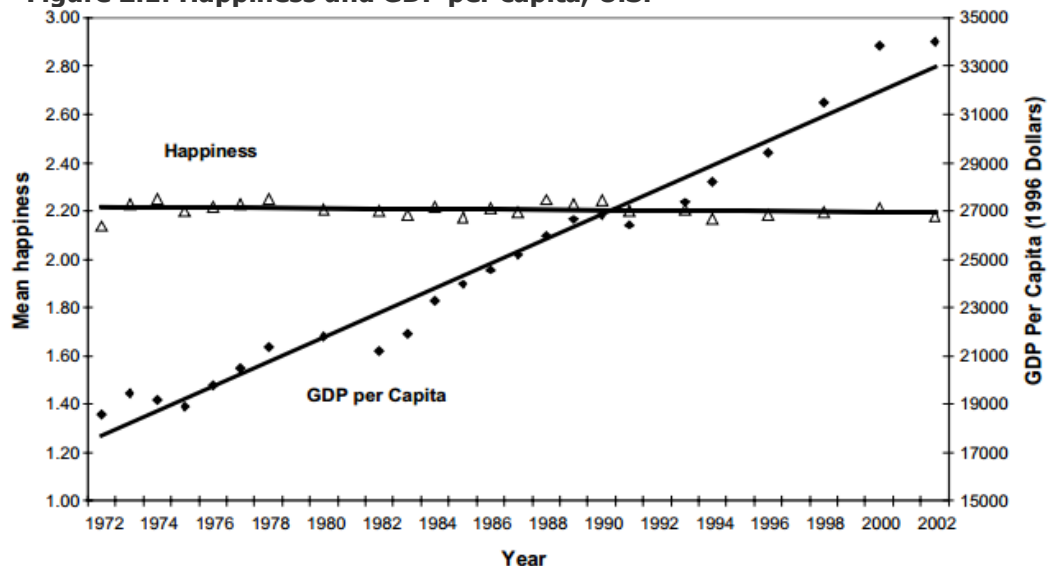
The *Eurobarometer* bi-annual survey for instance, asks its respondents 'On the whole are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead?' (European Commission, 2014). On the other hand, the *U.S. General Social Survey* asks 'Taken all together, how would you say things are these days-would you say you are very happy, pretty happy or not too happy?' (National Opinion Research Centre, 1999, p.171). Offering a detailed classification of various questions on well-being, Veenhoven (1993) argued that self-reported responses to such questions indicate an individual's cognitive evaluation of his/her life circumstances, informed through the recollection, filtration and aggregation of one's past experiences.

### **2.3 Origins, Early Literature and Recent Developments**

The Economics of Happiness is a relatively new research area, although musings on the subject may be found as far back as the early eighteenth century - in the works of Keynes (1905). The primary purpose of the field is to examine the overall well-being of individuals using self-reported happiness survey data - a tool which has been long used by psychologists. Based on 'expressed' rather than 'revealed' preferences of the participants, the happiness surveys record participants' responses to questions such as 'How satisfied/happy are you with your life?' The potential answers may vary from 0 (extremely unhappy) to 10 (very happy) (Layard, 2010). Although, *revealed preference* approach can be adapted to interdependent utility functions (e.g. Bergemann *et al.*, 2011; Leguizamon, & Ross, 2012), Happiness Economics challenges some of the traditional welfare economics framework assumptions which provide a restrictive definition of welfare. Rather than considering utility as function of income only, Happiness Economics studies a relatively broader concept of welfare and utility, including, interdependent, procedural and experienced utility functions, as well as hedonic adaptation effects (Graham, 2008; Köszegi & Rabin, 2008).

The origins of Happiness Economics date back to the early 1970s with pioneering work undertaken by Easterlin (1974). In that seminal paper the connection between income growth and happiness was explored. It was found that although in a particular year there existed a positive correlation between self-reported happiness responses and individual's income levels in the U.S., the positive relation at the macro level, between average happiness and income levels, was not apparent over time. Figure 2.1 shows the results of a similar study by Easterlin (2005a) for the U.S., 1972-2002. Similar findings have been since then updated to include other countries, including developed, and developing economies (e.g. Easterlin, 1995, 2005b; Easterlin *et al.*, 2010). These seemingly contradictory findings are jointly referred to in the literature as the *Easterlin Paradox* and is defined as follows: '*at a point in time both among and within nations, happiness varies directly with income, but over time, [average] happiness does not increase when a country's income increases*' (Easterlin *et al.*, 2010, p.22463).

**Figure 2.1: Happiness and GDP per capita, U.S.**



Source: Easterlin (2005a).

There is a lack of consensus regarding the reasons for the *Easterlin Paradox*. This has in turn generated increased interest in the topic amongst economic scholars in recent years (e.g. Clark *et al.*, 2008; Stevenson & Wolfers, 2008a; Easterlin *et al.*, 2010).

Several interpretations of the paradox have been identified in the literature. According to the psychological notion of 'set point' for individual happiness, there exists a unique preset level of happiness to which each human being always reverts despite major positive and negative life events. As noted by Graham (2008), this implies that welfare enhancing public policies are unlikely to enhance human wellbeing. However, refuting the psychologists' *set point* theory is a line of argument, developed by Easterlin (2003); Di Tella and MacCulloch (2005); Clark *et al.* (2008); Graham (2008); and Easterlin *et al.* (2010), which relates to habit formation models and interdependent preferences. These models lay emphasis on the income adaptation and other types of relative income effects on aspirations and thus well-being (these are discussed in detail in Section 2.4).

Over the past two decades, Happiness Economics literature has grown rapidly. A comprehensive review of which is offered in Dolan *et al.* (2008); Graham (2008); and MacKerron (2012). The empirical studies have examined well-being effects of various factors such as income, health, age, income inequality, employment and other macroeconomic factors (e.g. Frey & Stutzer, 2000; Di Tella *et al.*, 2001; Alesina & MacCulloch, 2004; Gardner & Oswald, 2007). The main findings shows that well-being is positively related with absolute income, negatively correlated with relative income, positively related with health and is 'U-shaped' in age. Most studies show that being employed has a well-being enhancing effect beyond the material gains associated with having paid employment. These and other correlates of happiness are discussed in detail in Section 3.3.

## **2.4 Aspirational Theories of Well-Being**

The role of aspirations in influencing subjective well-being is widely studied in psychology and has been recently adopted in economics literature. According to the 'aspiration level theory' in psychology, an individual's well-being depends on the gap between aspirations and achievements (Michalos, 1991; Inglehart, 1990, Chapter 7). Individual aspirations in turn are created and influenced by two distinct mechanisms of 'hedonic adaptations' (Helson, 1964; Brickman & Campbell, 1971) and 'social comparisons' (Olson *et al.*, 1986). Economic models corresponding to these theoretical approaches include the 'habit formation' and 'interdependent preference' models.

### **2.4.1 Habit Formation**

Economics literature on preference change models of habit formation is limited. Unlike standard economic models, *habit formation* models (e.g. Pollak, 1970; and more recently Carroll *et al.*, 2000)<sup>4</sup> assume that individuals' tastes and preferences change over time, with individuals becoming accustomed to their past level of income and consumption. As such, the increased satisfaction resulting from additional consumption is temporary with its positive effects diminishing owing to hedonic adaption effects. Thus, as Stutzer (2004, p.91) states '*satisfaction depends on change and disappears with continued consumption*'.

### **2.4.2 Interdependent Preferences**

*Interdependent preference* models (e.g. Duesenberry, 1949; Pollak, 1976; Clark & Oswald, 1998; Easterlin, 2001) highlight the importance of individual

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<sup>4</sup> Pollak (1970) developed a set of dynamic demand model incorporating the habit formation assumption. Carroll *et al.* (2000) developed a theoretical model to examine effects of habit formation on the aggregate saving-growth relation.

aspirations and societal expectations in influencing satisfaction, suggesting that well-being is partly influenced by how individuals assess their experiences compared to relevant others. These comparisons seem to be most prominent in the pecuniary domain (Easterlin, 2003). As a result, relative positional concerns in terms of income and material gains become an important factor in driving satisfaction.

Building on Veblen's (1899) concept of 'conspicuous consumption',<sup>5</sup> (i.e. luxury expenditure undertaken to display economic power and influence others), and way before Happiness Economics was recognised, Duesenberry (1949) formulated (and empirically tested) 'the relative income hypothesis', to examine the effect of altering aspirations on one's income satisfaction, and its subsequent impacts on consumption and saving rates. A formalised interdependent utility function representing Duesenberry's (1949) relative income hypothesis, as outlined in Hollander (2001), is given by the expression  $u(l, x, a(co))$ , such that  $\frac{\partial u}{\partial l} > 0$ ;  $\frac{\partial u}{\partial x} > 0$ ;  $\frac{\partial u}{\partial a} < 0$ ; and  $\frac{\partial a}{\partial co} > 0$ .

An individual's utility ( $u$ ) is a positive function of both leisure ( $l$ ), and actual consumption bundles ( $x$ ), however, a negative function of ones aspirations ( $a$ ). It is further assumed that individual aspirations are endogenous and shaped based on observed consumption levels of relevant others ( $co$ ). A reflective measure of envy, aspirations equate to the average level of commodity bundles consumed within one's relevant reference group. Finally, the utility function is assumed homogenous of degree 0 for both ( $x, a$ ), implying a proportionate increase in both ( $x, a$ ) leaves utility

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<sup>5</sup> Decades before Veblen's (1899) contribution, Rae (1834) discussed at length the issues concerning relative income.

unchanged.

Apart from Duesenberry's model, *interdependent preferences* models have remained rare in recent economics literature, with few exceptions considering cardinal or ordinal interpretations of relative rank or 'status' (e.g. Pollak, 1976; Frank, 1985; Clark & Oswald 1998). Building on Veblen's (1899) ideas regarding status, for instance, Clark and Oswald (1998) formulated a 'theory of rational emulation and deviance' to identify the nature of preferences that generate individual aspirations to conform or deviate in situations where relative position matters. Their analysis assumes that individuals frequently compare themselves with relevant others, experiencing a sense of contentment (or envy and dissatisfaction) when they attain a relatively higher (or lower) rank within their particular reference groups. The key proposition of Clark and Oswald's (1998) theory is that the curvature of the comparative element within an individual's utility function is what determines one's behaviour relative to others. While 'comparison-concave' utility functions emulate others whereas people with 'comparison-convex' utility functions are non-conformists.

#### 2.4.3 *Life Cycle Aspects*

Easterlin (2001) aimed for a unified theory of income and happiness. In particular he explored the static and dynamic life cycle effects of both absolute income and material goods aspirations<sup>6</sup> (hereafter referred to as material aspirations) on subjective well-being (SWB).

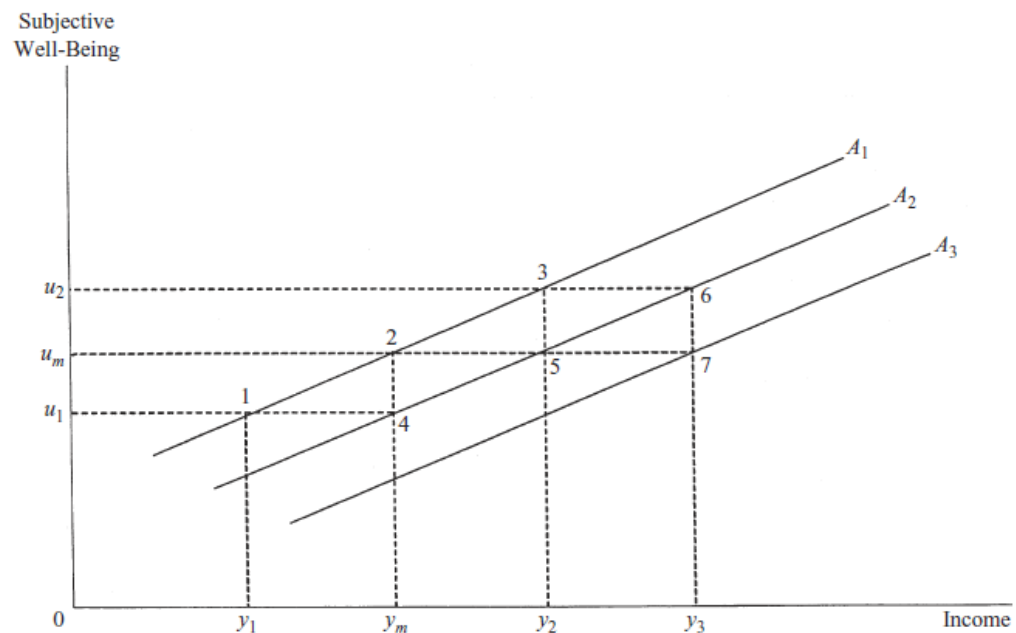
Two key assumptions underpin Easterlin's (2001) analysis. Firstly, individuals from different socio-economic backgrounds are presumed to

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<sup>6</sup> Ng and Wang (1993) have also previously developed a simplistic model, capturing the effect of aspirations on social welfare.

have similar material aspirations (represented by  $A_1$  in the figure below) at the beginning of their adult lifecycle (around 18 years of age). Secondly, SWB ( $u$ ) of a representative individual is assumed to be a positive function of one's income ( $y$ ) and a negative function of one's material aspirations at a point in time. In Figure 2.2, for a given level of aspirations ( $A_1$ ) *ceteris paribus*, if an individual's income increases from  $y_m$  to  $y_2$ , SWB will go up from  $u_m$  to  $u_2$ . This effect is captured by a movement from point 2 to 3 along the line  $A_1$ . On the other hand, if income remains unchanged (at  $y_m$ ) *ceteris paribus*, an increase in aspirations (depicted by an outward shift of  $A_1$  to  $A_2$ ) results in a decline in utility from  $u_m$  to  $u_1$ , captured by the movement from point 2 to 4.

**Figure 2.2: Well-being, Income and Aspirations: A Unified Theory**



Source: Easterlin (2001).

Based on the aforementioned assumptions, Easterlin (2001) claimed that at the beginning of adult life cycle, given similar material aspirations across different socio-economic groups, a higher level of income generates greater well-being enabling better fulfilment of one's aspirations. However, this positive association between income and well-being appears to break down

as the life cycle progresses, given that individuals' material aspirations tend to rise in proportion to the growth in one's income throughout the life cycle, thus counterbalancing the potential positive effect of income increase on well-being. The divergence in aspirations is attributed to the changing relative importance of two key determinants influencing material aspirations throughout the life cycle. These include comparisons with one's past experiences as well as social evaluations. Social comparisons with diverse socio-economic backgrounds act as a dominant factor in shaping aspirations during the beginning of adult life. In contrast in adult years, social comparisons become restricted to specific references groups within similar socio-economic statuses and personal material and wealth experiences.

The dynamic life cycle effect of changing income and material aspirations is depicted in Figure 2.2 by the movement from point 2 to 5. In this instance, although income has increased (from  $y_m$  to  $y_2$ ), the corresponding increase in aspirations (from  $A_1$  to  $A_2$ ) has a negative effect, thus resulting in no change in well-being ( $u_m$ ). In addition to changing aspirations during the life cycle, the personal evaluations of past and potential well-being are based on aspiration levels prevailing at the time when the assessments are being made (Easterlin, 2001).

Easterlin (2003) further argued that unlike the case of material aspirations which demonstrate a complete adaption effect as income changes, non-monetary life aspects such as health and marriage, display only partial adaptation effects. In other words, an improvement (or deterioration) in these aspects of life has a relatively greater impact on one's attainment (or lack) of aspired objectives, resulting in increased (or decreased) SWB. Moreover, social comparative forces are more important in shaping aspirations in the material domain, given that non-material facets of life are not readily observable by others.

## **2.5 Distributional Models of Fairness and Justice**

Another type of *interdependent preference* models found in economics literature focus on the distributional and equality aspects of well-being. According to this class of models, in addition to one's actual consumption bundles, individual utility depends on observed well-being of others, possibly evaluated across one of the factors such as utility, income or consumption. Becker (1974) and Thurow (1971) both posit that the societal average income and its relative distribution across the population spectrum are important factors influencing individual well-being. More specifically, an increase in a society's average income, with individual income unchanged, enhances (declines) the well-being of an altruistic (envious) person. On the other hand, with average societal income being constant, and contingent upon the relative position of an individual concerned, an increase in income inequality is expected to lower (enhance) the well-being of altruistic (envious) individuals.<sup>7</sup> This line of thought is also consistent with Rawls' (1971) *Theory of Justice* which proposes that individuals are innately inequality averse based on the premise that people generally display altruistic behaviour.

Finally, according to 'discontent theories of social unrest' advocated in political sciences, well-being inequality is inversely related to the level of social interconnectedness (e.g. Brown, 1996; and Gurr, 1994). Thus when well-being is assessed in terms of utility, a life satisfaction gap (as reflected

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<sup>7</sup> The well-being of envious individuals with an income below the societal income is likely to be negatively affected if income inequality increases, whereas if individuals earn an income significantly above the societal income then the increased income inequality may actually be welfare improving.

in the distribution of happiness across individuals or groups) may disrupt social cohesion (Becchetti *et al.*, 2010; Guven *et al.*, 2012).

## **2.6 Philosophical Approaches to Well-Being**

The *hedonic* and *eudaimonic* philosophical approaches to well-being have seen a burgeoning interest amongst economists in recent years. Originally conceived and developed by ancient Greek philosophers Aristippus and Aristotle, modified interpretations of these approaches have been adopted in the economics literature (e.g. Kahnman *et al.*, 1997; Kahneman & Tversky 2000; Kahneman *et al.*, 2003; Sen, 2008; Bruni *et al.*, 2008).

The *hedonic* approach centres on the transient feeling of well-being or 'experienced utility', derived from the presence of positive effect and absence of negative effect (Kahneman *et al.*, 2003). Individuals make choices in order to maximise their *experienced utility* based on retrospective assessment of past occurrences. The *eudaimonic* approach, on the other hand, defines individual well-being as living a holistic life consistent with one's inherent potential. Individual choices are driven by their assessment of what encompasses a holistic, meaningful life including both measurable and non-measurable aspects (Ryan & Deci, 2001; Bruni *et al.*, 2008). Two distinct normative approaches to well-being motivated by similar philosophical thinking, identified in the literature, include Scitovsky (1976, 1992) and Sen (1977, 1999a).

### **2.6.1 Scitovsky's Theory of Well-Being**

An innovative theory of human well-being was developed by Scitovsky (1976, 1992) motivated by an observation that economies were becoming richer but joyless. Predicting the *Easterlin paradox*, the book examined the important question of '*why unprecedented and fast-growing prosperity [in America] had left its beneficiaries unsatisfied?*'. Asserting that economic

welfare only partially captures the notion of overall human welfare, the book envisaged the recent discussions concerning the inadequacy of GDP as an indicator of nation's socio-economic advancement. Developing a broader definition of human welfare, incorporating concepts from psychology, became a key motivation underlying Scitovsky's well-being theory.

Founded on psychology literature of the mid-20<sup>th</sup> century, Scitovsky's theory of well-being examines choice behaviour of individuals, identifying motivational drivers and physiological attributes for successful choice outcomes. The theoretical enquiry rests on two distinct types of human activities generating 'comfort' and 'novelty' respectively. 'Comfort-related activities' refer to individual actions motivated by the need to remove discomfort and distress (e.g. hunger and insecurity) and usually involve incurring resource expenditure (e.g. consumer good purchases). On the other hand, 'novelty-related activities' are largely 'intrinsically motivated', i.e. undertaken largely for their own sake, with individuals acquiring a positive good, in the form of pleasure and fulfilment, when pursuing and learning them. Another important concept which forms the basis of Scitovsky's well-being theory is the notion of 'leisure skill', an endowment of individuals that allows them to enjoy originality/ novelty as an 'experience good', accumulated based on their previous knowledge and cultural experiences.

Scitovsky (1976, 1992) argued that individuals' leisure skill endowments and motivational factors drive their preferences and thus choice behaviour concerning both novelty and comfort related activities. Moreover, it is the balance between the level of novelty individuals' experience in different activities, relative to their leisure skill endowment which contributes to their overall satisfaction. If the novelty levels either exceed or are in deficit relative to leisure skill, individuals experience anxiety or boredom

respectively. In the case of such a mismatch, individuals are thus relatively more inclined towards comfort-related activities, thereby impeding leisure skill as well as well-being enhancement. Whilst Scitovsky's theory of well-being offers interesting insights regarding human well-being, the majority of the empirical literature supporting Scitovsky's theory is largely descriptive, with no comprehensive empirical analysis of the proposed well-being theory undertaken to-date.

#### 2.6.2 *Capabilities Approach to Well-Being*

The development of a capabilities approach to well-being is attributed to the seminal works of Sen (1977, 1999a), and Nussbaum (2001). The multi-dimensional capabilities framework is founded on Aristotle's *eudaimonic* approach discussed in *Nicomachean Ethics* (Rowe & Broadie, 2002).

Sen (2008, p.23) defines well-being as an '*expression of freedom to attain different kinds of alternatives between which a person can choose*'. This form of freedom he argues depends on the attainment of valuable '*functionings*' as well as required '*capabilities*' to achieve these *functionings*. *Functionings* relate to actual individual actions and experiences, encompassing both basic (such as adequate levels of nourishment and sound physical health) and complex (e.g. having self-confidence and social engagements) activities and experiences. On the other hand, *capabilities* refer to ability to generate and in turn enjoy plausible combination options of these *functionings* that enable individuals to accomplish things that they associate with a '*good life*'.

The *capabilities approach to well-being* proposes that individuals aim to acquire *functionings* and *capabilities* that enable them to exert substantive freedom, rather than simply acquire happiness or experience a transient positive feeling. The importance of such non-welfare aspects could be

argued, as suggested by Ng (1990), based on their effects on future welfare and the welfare of others.

Given the subjective nature of the individual valuations and weights assigned to different *functionings*, Sen (2008) proposed that the evaluation process be informed through a normative approach of coherent arguments grounded in careful and well-informed community discussions and public debates. As a result, the analytical approach employed to test the capabilities approach is largely descriptive with limited empirical work undertaken using SWB data (e.g. Anand *et al.*, 2005).

## **2.7 Conclusion**

The seminal work of Easterlin (1974) found an 'income-happiness paradox' in the time-series data for the U.S., which has since then been confirmed for other countries. However, a lack of consensus regarding the reasons that may explain the paradox has attracted significant research. Aspirational theories of well-being adapted from psychology literature offer several explanations, including *habit formation* and *interdependent preferences* models. These theories focus on static and dynamic effects of income adaptation as well as role of social comparisons in influencing material aspirations and thus well-being.

Other theories of well-being identified in the literature focus on the distributional and philosophical aspects of well-being. *Discontent theories of social unrest*, for instance, posit an inverse relation between well-being inequality and the level of social interconnectedness. In contrast, Scitovsky's theory of well-being and Sen's capabilities approach are founded on the philosophical approaches of Bentham and Aristotle respectively. While the former proposes that it is the balance between the level of novelty individuals' experience in different activities relative to their leisure skill

endowment that contributes to their overall satisfaction, the latter examines individual well-being in terms of an individual's *functionings* and *capabilities*.

## **3. Review of the Empirical Literature**

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### **3.1 Introduction**

In many parts of economics, empirical studies play the dual role of stimulating the development of new theories and testing extant theoretical speculations and conjectures. This is true also in the Economics of Happiness. Consequently, this Chapter is devoted to surveying the relevant empirical literature in this field. Firstly, the generic empirical approach is explained, offering motivation for its validity and reliability. This is subsequently followed by a discussion on the various *micro* and *macro* drivers of SWB that have been empirically examined in the literature, e.g. income, gender, education, health, GDP, unemployment, democracy, and other related factors. The last section discusses the empirical literature on distribution of happiness, outlining the various measures of dispersion together with their corresponding strengths and weaknesses.

### **3.2 SWB Approach and its Validity**

Most of the Economics of Happiness literature has undertaken an empirical approach to describe various aspects of human well-being, with theoretical foundations often left unspecified. The methodology primarily entails using SWB data to estimate a micro-econometric equation of the form:  $R_{it} = \beta x_{it} + \varepsilon_{it}$ , where  $R_{it}$  refers to the reported SWB of individual  $i$  in period  $t$  which usually has an upper and a lower bound;  $x$  is the vector of known variables capturing socio-demographic and economic traits of participants; and  $\varepsilon_{it}$  is the error term capturing unobserved characteristics and other errors (Sen, 2008; Graham, 2008; MacKerron, 2012).

In applying the SWB approach, depending on the analytical technique, three key assumptions have been made regarding the interpretation of reported well-being responses across various econometric models. In increasing restrictiveness, as outlined by Ferrer-i-Carbonell & Frijters (2004), these include:

*A1. Reported SWB ( $R$ ) is a positive monotonic transformation of an unobservable underlying concept of well-being of interest denoted by the term  $W$ : if  $R_{it} > R_{is}$  then  $W_{it} > W_{is}$*

*A2. Reported SWB is ordinally comparable across respondents: if  $R_i > R_j$  then  $W_i > W_j$*

*A3. Reported SWB is cardinally comparable across respondents: implying,  $(W_i - W_j) = (R_i - R_j)$*

The possibility of interpersonal happiness comparisons is debated in the literature. Most of the empirical literature assumes ordinality of reported SWB, employing ordered latent response models, such as ordered probit or ordered logit models (e.g. Di Tella *et al.*, 2003, Blanchflower & Oswald, 2004a, 2004b, 2005; Leigh & Wolfers, 2006). However, there are some economists (e.g. Ng, 1997, 2008b; Sen 1999b) who have advocated in support of some level of cardinality and interpersonal comparability of reported happiness measures. A few empirical studies have implicitly assumed cardinality and employed an Ordinary Least Squares (OLS) model for cross-country analysis (e.g. Easterlin, 1995; Easterlin *et al.*, 2010). Assuming cardinality or ordinality of SWB data however, produces relatively similar coefficients (Ferrer-i-Carbonell & Frijters, 2004; Graham, 2008).

Given the element of subjectivity in evaluating ones' own well-being, there is a certain level of skepticism involved in utilising SWB data to undertake

sound empirical analysis. Measurement concerns such as validity of self-reported well-being responses, potential biases in responses owing to question ordering and comparability of responses across participants have been sufficiently addressed in the economics literature (e.g. Veenhoven, 1993; Easterlin, 2001; Alesina *et al.*, 2004, Di Tella & MacCulloch, 2008; Graham 2008), highlighting substantial evidence from psychology.

Five key arguments have been identified to support reliability and validity of SWB data. Firstly, SWB responses are correlated with the observable physical characteristics associated with happiness (such as heart rate, blood pressure, frequency of genuine 'Duchenne' smile, and pre-frontal brain activity). Secondly, SWB responses are negatively correlated to measures of ill-being such as suicide rates. Thirdly, interpersonal comparability concerns have been addressed in Cantril's empirical study (1965, cited in Easterlin, 2001) based on 14 countries. The study suggests that in general most individuals (irrespective of their culture and country's level of socio-economic development) have similar perceptions regarding sources of happiness including material concerns, family life, and health and so on. Fourthly, availability of panel data in recent years has facilitated the use of fixed effects models which allow for correction of bias in happiness responses resulting from unobservable personality traits (Graham, 2008; Becchetti *et al.*, 2010). Finally, Oswald and Wu (2010) offer scientific evidence to support the reliability of SWB data. Investigating the life satisfaction data from the *Behavioral Risk Factor Surveillance System* for over a million U.S. citizens across 50 states from 2005-2008, the authors estimate the quality of life in each U.S. state after controlling for personal and socio-demographic factors. The results are subsequently compared with an alternative set of regression results estimated using objective data, including wages, rent, and house prices. The study found a relatively high association between the two measures of well-being for each state, indicating that SWB data has the

potential to offer meaningful information regarding overall welfare of individuals.

### **3.3 Economic Determinants of Happiness**

Happiness Economics research has largely focussed on the examination of trends in aggregate happiness levels across countries and overtime, identifying potential *micro* and *macro* drivers underpinning these trends. The empirical literature on happiness determinants has been reviewed in several studies (e.g. Dolan *et al.*, 2008; Graham, 2008; Frey & Stutzer, 2002, 2010; and more recently MacKerron, 2012). The following section discusses important empirical findings of the relevant literature.

#### **3.3.1 Micro Factors**

The vast majority of the empirical research in Happiness Economics has focused on analysing the impact of income on SWB, particularly evaluating the well-being effects of both absolute and relative incomes. Other micro determinants examined include age, gender, relationships, education employment, health and physical exercise. Key findings of the literature are summarised in Table 3.1.

##### **3.3.1.1 Income**

As noted in the comprehensive reviews undertaken by several scholars (Frey & Stutzer, 2002; Dolan *et al.*, 2008; MacKerron 2012), overall, most studies largely indicate a non-linear positive relation between absolute income and well-being, with wealthier people on average reporting relatively greater levels of happiness compared to the poor, at a point in time. The results have been fairly consistent irrespective of the different measures of absolute income employed, such as log of personal and household incomes.

Besides the standard argument that higher income will directly translate into greater fulfilment of one's wants and desires, some studies show that the

relation may in fact be only partly causal, indicating the possibility of greater well-being resulting in higher income in the future (e.g. Graham *et al.*, 2004a; Gardner & Oswald, 2007). Moreover, there is evidence in the literature for income adaptation effects, suggesting an inverse relation between individuals' past incomes and their current well-being possibly due to rising aspirations (e.g. Easterlin, 2001; Stutzer, 2004; Clark *et al.*, 2008; Di Tella *et al.*, 2010).

Relative income also matters for well-being, and is generally defined with respect to specific reference groups having similar attributes such as age, education and employment industry. Several studies (e.g. Ferrer-i- Carbonell, 2005; Luttmer, 2005; Clark *et al.*, 2008; Knight *et al.*, 2009; Guven & Sørensen, 2012) have found an inverse relation between the two, suggesting that income comparisons with respect to relevant reference groups tend to decrease welfare of individuals with relatively lower status. While the negative relation is potentially associated with positional concerns as postulated by *interdependent preference models*, Senik (2008) however finds that income comparisons with relevant others have a positive 'ambition' effect on individual well-being in the case of East European transitional economies and the U.S.

#### *3.3.1.2 Age, Gender and Relationships*

There is general consensus in the literature regarding the existence of a U-shaped relation between age and SWB, with reported life satisfaction least during middle age (e.g. Blanchflower & Oswald, 2004a, 2004b). In studies where a gender well-being effect was identified, women were found to be marginally happier than men (e.g. Alesina *et al.*, 2004).

There is strong evidence indicating that being in a steady and caring relationship (including marriage) tends to have a positive effect on one's well-being. On the contrary, ending of these partnerships (e.g. divorce or

death) has a detrimental effect, with negative flow-on effects on other family members including children (Blanchflower & Oswald, 2004a, 2004b; Helliwell, 2003).

Comprehensive literature review by Dolan *et al.* (2008) found that the well-being effects of having children are mixed with results contingent upon various factors including the financial circumstances of parents, and the number and age of children. For instance, an increase in the number of children may have an adverse impact on the well-being of single parents and poor families in particular (Frey & Stutzer, 2000; Alesina *et al.*, 2004).

### *3.3.1.3 Education and Employment*

There is a lack of consensus regarding the effects of education on individual well-being, with the size and direction of the effect contingent on factors such as education level, the relevant SWB measures used and econometric methodology. For instance, while Blanchflower and Oswald (2004b) reported a positive well-being effect associated with each additional educational level, Stutzer (2004) found the effect to be largest in the case of middle education level. There are some studies that have found either negative relation using the *General Health Questionnaire* in the British Household Panel data (e.g. Clark, 2003b) or no significant relation using fixed effects model (e.g. Meier & Stutzer, 2008).

Most studies show that being employed has a well-being enhancing effect beyond the material gains associated with having paid employment. Assuming cardinality of SWB scores, several scholars (e.g. Di Tella *et al.*, 2001; Frey & Stutzer, 2000; Stutzer, 2004) have found that, on average, working individuals report 5-15% higher happiness scores compared to the unemployed.

#### 3.3.1.4 Health and Physical Exercise

There is consistent evidence confirming the positive effects of both physical and mental health on well-being, with effect relatively larger in the latter (Dolan *et al.*, 2008; MacKerron, 2012). While the negative effects of ill-health are well documented in the literature, Oswald and Powdthavee (2008) found partial hedonic adaptation effect overtime in the case of physical disability. Using longitudinal panel data for the U.K. and employing Generalised Least Squares models, their study found that depending on nature of disability, affected individuals display adaptation between 30-50%.

Relatively few studies have examined the effects of physical exercise on SWB, and the studies to-date have largely focused on developed countries. For instance, Mochon *et al.* (2008) surveyed 224 participants in their late 30s, attending gym and yoga classes in the U.S. Their study found that that small boosts of frequent physical exercise had a cumulative positive effect on participants' well-being. Huang and Humphreys (2012) also explored the association between engaging in physical activity and self-reported happiness in the U.S. using *Behavioral Risk Factor Surveillance System* data from 2005-2009. Their study found that undertaking physical activity was positively associated with greater life satisfaction, with the effect relatively greater for men. In similar vein, Rasciute and Downward (2010) examined the well-being effects of sports participation in the U.K. Using response data from the *Taking Part Survey* (2005-2007) commissioned by the Department for Culture Media and Sport and applying bivariate probit and OLS models, the study found that sports activities including walking (whether for fitness or recreational purposes) tend to have a well-being enhancing effect. However, the well-being effect of cycling was unclear.

### 3.3.1.5 Other

There are few studies with limited evidence on the well-being effects of factors such as type of work, one's religious beliefs and activities, and other behavioural aspects including television viewing and healthy eating habits.

Using job satisfaction as a measure of happiness at work, Bille *et al.* (2013) studied whether artists are relatively happier than non-artists in Europe. Based on *European Value Survey* data and controlling for age, gender, work duration and time-invariant personality traits, the study found that individuals involved in creative professions (such as the visual and performing arts) reported higher satisfaction from their jobs compared to non-artists. Similar results were found for individual countries, including the U.K. and Switzerland. The higher job satisfaction of artists was attributed to greater autonomy and flexible-work arrangements.

Based on unbalanced panel of 93 countries, Gundlach and Opfinger (2013) found a positive correlation between happiness and religiosity – a measure that reflects the '*importance of religion in all aspects of people's lives*'. Confirming a positive income-happiness relation, their study also reported a negative relation between income and religiosity, suggesting a substitution effect between these two determinants of happiness. Bruni and Stanca (2008) examined the correlation between relational goods (i.e. the emotional aspect of genuine and sincere social relations), television viewing and SWB. Based on cross-country OLS regression using *World Value Survey* data from 1980-2001, the study found that although relational goods have statistically significant positive effect on SWB, the impact is undermined by television viewing, suggesting an inverse relation between television viewing and life satisfaction.

The impact of healthy eating habits on human well-being has been rarely examined in the Happiness Economics literature. Based on a significantly large cross-sectional sample of 80,000 respondents from the U.K and Scotland, using three different datasets and seven measures of psychological well-being, Blanchflower *et al.* (2013) found a positive relation between well-being and consumption of fruits and vegetables, with well-being peaking at seven consumption portions per day.

It is evident from the discussion above that to-date, a wide variety of determinants of SWB, at the micro level, have been studied in the literature. These are summarised in Table 3.1 below.

**Table 3.1: Micro Determinants of SWB, Summary of the Empirical Literature**

No	Article	Study Period	Country	Methodology	Micro Factors	Correlation
1	Graham <i>et al.</i> (2004a)	1995-2000	Russia	Ordered Logit with Panel Fixed Effects	• Absolute Income	• Non-linear positive relation
2	Gardner & Oswald (2007)	1998-2001	U.K.	Panel Fixed Effects		
3	Di Tella <i>et al.</i> (2010)	1984-2000	Germany	OLS Fixed Effects		
4	Stutzer (2004)	1997 - 2000	Switzerland	Weighted Least Squares & Ordered Probit	• Absolute Income • Education • Employment	• Non-linear positive relation • Largest positive effect in middle education • Positive
5	Ferrer-i-Carbonell (2005)	1992-1997	(Former) East & West Germany	Ordered Probit - Panel Fixed & Random Effects	• Relative income	• Negative
6	Luttmer (2005)	1987-1994	U.S. Localities (Public Use Micro data Areas)	Pooled OLS		
7	Knight <i>et al.</i> (2009)	2002	Rural China	OLS, Ordered Probit, & Instrumental Probit		
8	Senik (2008)	1994-2001	U.S. & 14 Western & Eastern European countries	Fixed Effects OLS	• Relative income	• Positive
9	Alesina <i>et al.</i> (2004)	1972-1997	U.S. & European Countries	Ordered logit model	• Gender	• Females marginally happier than males
10	Blanchflower & Oswald (2004a)	1988-2002	U.S.	Ordered Probit & OLS	• Age • Caring relations	• 'U' Shape • Positive
11	Blanchflower & Oswald (2004b)	1972-1988	U.K & U.S.	Ordered Probit	• Age • Caring relations • Education	• 'U' Shape • Positive • Positive effect
12	Blanchflower <i>et al.</i> (2013)	2007-2010	U.K. & Scotland	Pooled cross-section OLS	• fruit & vegetable consumption	• Positive with well-being peaking at seven portions per day
13	Helliwell (2003)	1980-1997	46 developed, developing & Eastern European nations	OLS	• Caring relations including marriage	• Positive
14	Clark (2003b)	1991-1997	U.K.	Pooled OLS & Pooled Ordered Probit & Logit Estimation	• Education	• Negative

No	Article	Study Period	Country	Methodology	Micro Factors	Correlation
15	Meier & Stutzer (2008)	1985-1999	(Former) East & West Germany	Standard OLS & OLS with Fixed Effects	• Education	• Insignificant
16	Oswald & Powdthavee (2008)	1984 -2004	U.K. & Germany	Random & Fixed Effects	• Physical health	• Partial hedonic adaptation effect of a physical disability
17	Mochon <i>et al.</i> (2008)	2008	U.S.	Comparative analysis	• Physical exercise	• Positive for sports (except cycling)
18	Huang & Humphreys (2012)	2005-2009	U.S.	Comparative Analysis		
19	Rasciute & Downward (2010)	2005-2007	U.K.	Bivariate Probit & OLS	• Physical exercise	• Positive
20	Bruni & Stanca (2008)	1980-2001	53 developed & developing countries	Pooled OLS	• Interconnectedness with others • Television viewing	• Positive • Negative
21	Di Tella <i>et al.</i> (2001)	1975-1991	12 European nations	First-stage OLS	• Employment	• Positive
22	Frey & Stutzer (2000)	1997	Switzerland	Weighted Least Squares & Ordered Probit		
23	Bille <i>et al.</i> (2013)	1999-2010	Europe (47 countries) U.K. Switzerland	Fixed Effects OLS	• Artists vs non-artists	• Artists report greater happiness with their work, than non-artists.
24	Gundlach & Opfinger (2013)	1981-2009	93 nations	OLS,& Between Estimates	• religiosity	• Positive

Notes: The column titled 'study period' only captures the lower and upper bound for each study, without capturing breaks in the data for specific countries. As such the time periods are indicative only. OLS refers to Ordinary Least Squares.

### 3.3.2 Macro Factors

A significant number of Happiness Economics studies have examined the well-being effects of key macroeconomic variables including GDP, unemployment and inflation. Key findings of important studies are discussed below with results also tabulated in Table 3.2.

#### 3.3.2.1 GDP per capita and Economic Growth

There is mixed evidence regarding the income-happiness relation as exemplified by the *Easterlin paradox*. There are some studies that refute the paradox claiming that there exists a positive relation between life satisfaction and GDP overtime. Using a dynamic model<sup>8</sup> on a large time-series data set (1958-1996) for 21 developed and developing countries, Hagerty and Veenhoven (2003) found a positive association between national income and national happiness, with a small positive long-term effect. While countries depicted a partial income adaptation effect over a two year period, there was however no relative social comparison observed across countries. Similar results were presented in the widely cited Stevenson and Wolfers' (2008a) critique, highlighting absolute income as a key driver of SWB. Using large cross-country and time series data sets for 113 rich and poor countries, and applying multiple econometric models (ordered probit, OLS and panel regressions) the authors found no evidence of an income satiation point beyond which the positive income-happiness relation appears to break. In contrast, the estimated coefficient was shown to be statistical significant and considerably robust both within and among nations at a point in time as well as over time.

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<sup>8</sup> A dynamic model developed by Van Praag and Kapteyn (1973) was used to segregate short and long-term well-being effects of social comparisons, adaptive expectations, and absolute income.

Easterlin *et al.* (2010) rejected the above and other related claims, using a rich dataset for 54 countries including developed, developing and European economies. The authors found that over the short-term (i.e. 10 years or less), average happiness and income levels moved in the same direction with happiness levels falling during economic recessions and rising during booms. This relationship however was not apparent in the long-term. Similar results have been presented by Clark *et al.* (2008) who interpreted the *Easterlin paradox* considering interdependent utility functions to capture income adaption and social comparison effects.

### 3.3.2.2 *Unemployment and Inflation*

SWB data has been used to assess well-being impacts of macroeconomic policy variables including unemployment and inflation. With few exceptions (e.g. Alesina *et al.*, 2004, Bjørnskov, 2003<sup>9</sup>), most studies found that inflation and employment have deleterious impacts on SWB, with unemployment effects relatively greater. These studies have largely focussed on countries such as the U.S., Europe. (e.g. Di Tella *et al.*, 2003; Wolfers, 2003); Latin America (Graham & Pettinato, 2001) and Organisation for Economic Co-operation and Development (OECD) countries (Di Tella & MacCulloch, 2005). The negative relation between unemployment and well-being is largely attributed to increased insecurity amongst individuals regarding weakening future economic conditions which may result in greater job losses (including their own) and potential increased crime rates (Dolan *et al.*, 2006; Frey & Stutzer, 2002).

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<sup>9</sup> Alesina *et al.* (2004) found that national unemployment rates in Europe had no impact on reported SWB. Additionally, Bjørnskov (2003) found no significant relation between inflation and life satisfaction across 32 American, European and Asian countries.

While there is general consensus that unemployment is relatively more detrimental to well-being, nevertheless there is uncertainty regarding the relative unemployment-inflation trade-off. For instance, Di Tella *et al.* (2003) report an estimated trade-off ratio of 2.9:1, whereas Wolfers (2003) and Blanchflower *et al.* (2014) report a considerably higher estimate of 5:1. Regardless, as argued by Frey and Stutzer (2002) and Blanchflower *et al.* (2014), the relative size of unemployment is greater than that proposed by the standard 'misery index' which attributes equal weight to inflation and unemployment, overestimating the effects of inflation on well-being.

### *3.3.2.3 Income and other Inequalities*

There is mixed evidence regarding the impact of income inequality on SWB, with results differing across developed and developed countries. Income inequality appears to have a positive effect on well-being in developed countries such as the U.S. and Canada (Alesina *et al.*, 2004; Tomes, 1986). However in developing countries, the results differ as suggested by Graham and Felton's (2006) study on Latin America. The authors found inequality to be an important determinant for individual well-being, having positive effects for the rich and negative effects for the poor. Contrary to this finding, using *Russian Longitudinal Monitoring Survey*, Senik (2004) found no significant effect of income equality on well-being.

The differing results regarding income inequality effects of well-being can be explained in terms of how well-being is assessed. For instance, in developed countries well-being may be indicative of future income prospects and enhanced labour mobility (Alesina *et al.*, 2004), whereas in the relatively less developed countries of Latin America with weak and inefficient labour markets and public institutions, well-being may reflect enduring disadvantage for the relatively poor (Graham & Felton, 2006).

The literature also points to mixed results when using different datasets. For instance, using the *British Household Panel Survey* data for 1991-2002, Clark (2003a) found a direct relation between income inequality and life satisfaction for Britain. However, there are other studies (e.g. Hagerty, 2000; Blanchflower & Oswald, 2004b) that show an inverse relation between income inequality and well-being in countries including the U.S, the U.K., the Netherlands, France, Denmark and Japan.

Happiness surveys have also been used to assess the welfare effects of various non-income factors such as race, gender and social status. There is some evidence suggesting that an individual's social standing, as reflected by a whole range of non-income factors, has a bearing on one's happiness (Graham and Felton, 2006).

#### *3.3.2.4 Democracy, Freedom, Trust and Social Capital*

Political systems and institutional arrangements affect well-being, with evidence suggesting that civic freedom and democratic participatory systems have a well-being enhancing effect. Using a *democracy index* to capture the voting rights variations across 26 Cantons in Switzerland (from 1992-1994), Frey and Stutzer (2000) found that participating in direct democracy (via referenda and initiatives) and having non-centralised government structures, positively contributed to SWB. Moreover, there is evidence linking individual preferences for democracy and its impact on well-being. Utilising the *Latinobarometer* data for 17 Latin American countries for the period 2000-2002, Graham and Sukhtankar (2004b) found a significant positive association between individuals' well-being and their preferences for a democracy. Graham and Pettinato (2001) arrived at similar findings for Latin America and Russia.

A related factor possibly influencing well-being is the level of trust individuals exert in the existing political and judicial systems. The few studies that have used cross-country datasets (e.g. Helliwell & Putnam, 2004; Hudson, 2006) found that greater levels of trust in public institutions was positively associated with higher level of well-being. Additionally, there is evidence suggesting that trust in other people and more broadly a country's social capital (in the form of co-operative and cohesive networks sharing similar norms and values) tends to have a significant positive effect on SWB (e.g. Helliwell, 2003; Helliwell & Putnam, 2004; Bjørnskov 2003).

#### 3.3.2.5 *Other*

There are some studies that have examined the well-being effects of other macro factors such as the welfare state (e.g. Veenhoven, 2000; Di Tella *et al.*, 2003), urbanisation (e.g. Rehdanz & Maddison, 2005; Shields & Price, 2005; Graham & Felton, 2006), climate and other environmental factors (e.g. Welsch, 2006; Rehdanz & Maddison, 2005; Shields & Price, 2005)<sup>10</sup>. While there is mixed evidence regarding the impact of the welfare state and urbanisation on individual well-being, the limited environmental-happiness literature consistently points to the detrimental effect of extreme climate and pollution on well-being.

SWB data has also been utilised to assess the effectiveness of specific public policy measures. Gruber and Mullainathan (2005) for instance, found that an imposition of cigarette tax, both in Canada and the U.S., positively contributed to the well-being of smokers. This suggests that health gains from decreasing smoking possibly outweigh tax related monetary losses.

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<sup>10</sup> For a comprehensive review of these and other related studies refer to Dolan *et al.* (2008).

**Table 3.2: Macro Determinants of SWB, Summary of the Empirical Literature**

No	Study	Study Period	Countries	Methodology	Macro Factors	Correlation
1	Easterlin (1974)	1946-1970	19 Developed & Developing countries	Descriptive statistics	• GDP	• No apparent relation overtime.
2	Easterlin (1995)	1972-1991	U.S., Japan & 9 European countries	OLS		
3	Easterlin (2005b)	1958-1994	Japan & U.S.	OLS	• GDP	• Non-linear positive
4	Hagerty & Veenhoven (2003)	1958-1996	21 high medium & low per capita countries	Fixed Effects OLS		
5	Stevenson & Wolfers (2008a)	1973-2007	113 Developed & Developing countries	Fixed Effects Ordered Probit	• GDP	• Positive (both at a point in time and overtime)
6	Easterlin <i>et al.</i> (2010)	1983-2006	<ul style="list-style-type: none"> <li>• 17 Latin American nations</li> <li>• 17 Developed countries</li> <li>• 9 Less Developed countries</li> <li>• 11 European economies</li> </ul>	OLS	• GDP	<ul style="list-style-type: none"> <li>• Positive (at a point in time and over short-run i.e. less than 10 years)</li> <li>• No apparent relation in the long-run</li> </ul>
7	Di Tella, & MacCulloch (2008)	1975-1997	OECD Countries	Ordered Probit	• GDP	• Non-linear positive relation
8	Di Tella <i>et al.</i> (2003)	1972-1994	U.S. & 12 European countries	Ordered Probit	<ul style="list-style-type: none"> <li>• Unemployment</li> <li>• Inflation</li> <li>• Welfare state</li> </ul>	<ul style="list-style-type: none"> <li>• Negative</li> <li>• Negative</li> <li>• Positive</li> </ul>
9	Di Tella <i>et al.</i> (2001)	1975-1991	12 European nations	First-stage OLS	<ul style="list-style-type: none"> <li>• Unemployment</li> <li>• inflation</li> </ul>	• Negative for both, with effects greater for unemployment
10	Wolfers (2003)	1973-1998	16 European countries	Ordered Probit & OLS		
11	Di Tella & MacCulloch (2005)	1975-1992	OECD	Fixed Effects Ordered Logit		
12	Graham & Pettinato (2001)	1997-2000	17 Latin American countries	Ordered Logit & OLS	<ul style="list-style-type: none"> <li>• Unemployment</li> <li>• Inflation</li> <li>• Democratic systems</li> </ul>	<ul style="list-style-type: none"> <li>• Negative</li> <li>• Negative</li> <li>• Positive</li> </ul>
13	Alesina <i>et al.</i> (2004)	1972-1997	U.S. & European countries	Ordered logit model	<ul style="list-style-type: none"> <li>• Unemployment</li> <li>• Income Inequality</li> </ul>	<ul style="list-style-type: none"> <li>• Insignificant</li> <li>• Marginal positive effect</li> </ul>
14	Bjørnskov (2003)	1993	32 European, American & Asian countries	OLS	<ul style="list-style-type: none"> <li>• Inflation</li> <li>• Social capital</li> </ul>	<ul style="list-style-type: none"> <li>• Insignificant</li> <li>• Positive</li> </ul>
15	Tomes (1986)	1977	Canada	OLS	• Income-inequality	• Marginal positive effect
16	Graham & Felton (2006)	1997-2004	Latin America	Ordered Logit	<ul style="list-style-type: none"> <li>• Income-inequality</li> <li>• Urbanisation</li> </ul>	<ul style="list-style-type: none"> <li>• Negative effect on poor, &amp; positive effect on rich</li> <li>• Insignificant</li> </ul>

No	Study	Study Period	Countries	Methodology	Macro Factors	Correlation
17	Senik (2004)	1994-2000	Russia	Maximum-likelihood Ordered Probit	• Income-inequality	• Insignificant
18	Clark (2003)	1991-2002	U.K.	Ordered Probit	• Income-inequality	• Positive
19	Hagerty (2000)	1972-1994	U.S. Japan & 7 European Countries including U.K., Italy Netherlands, France, Denmark	OLS	• Income-inequality	• Negative
20	Blanchflower & Oswald (2004b)	1972-1988	U.K & U.S.	Ordered Probit		
21	Frey & Stutzer (2000)	1997	Switzerland (1992-94)	Weighted Least Squares & Ordered Probit	• Democratic systems	• Positive
22	Graham & Sukhtankar (2004b)	2000-2002	Latin America	Ordered Logit & OLS	• Democratic systems	• Positive
23	Helliwell & Putnam (2004)	1980-1997	U.S., Canada & 49 other countries	OLS & Ordered Probit	• Public system trust • Social capital	• Positive • Positive
24	Hudson (2006)	2001	15 European countries	Ordered Probit	• Trust in public institutions	• Positive
25	Helliwell (2003)	1980-1997	46 developed, developing & Eastern European nations	OLS	• Social capital	• Positive
26	Veenhoven (2000)	1980-1990	41 countries	Comparative Analysis	• Welfare state	• No relation
27	Gruber & Mullainathan (2005)	1973-1998	US & Canada	Fixed Effects OLS	• Tax on cigarettes	• Positive effect on well-being of smokers
29	Rehdanz & Maddison (2005)	1972-2000	67 countries	Panel Corrected Least Squares	• Environmental factors • Urbanisation	• High-latitude countries benefit from limited climate changes, whereas low-latitude countries expected to suffer loss in well-being. • Insignificant
30	Welch (2006)	1990-1997	10 European nations	Generalised Least Squares	• Pollution	• Negative
31	Shields & Wheatley Price (2005)	1998-1999	U.K.	Random Effects Ordered Probit	• Urbanisation	• Negative

Notes: Notes: The column titled 'study period' only captures the lower and upper bound for each study, without capturing breaks in the data for specific countries. As such the time periods are indicative only. OLS refers to Ordinary Least Squares. GDP stands for Gross Domestic Product and OECD stands for Organisation for Economic Cooperation.

### **3.4 The Distribution of Happiness**

Understanding the distribution of happiness is important for the reasons outlined earlier in this thesis. It has become an important study topic in recent years, with the literature (e.g. Kalmijn & Veenhoven, 2005; Stevenson & Wolfers, 2008b; Becchetti *et al.*, 2010) denoting attention to this issue. However, much remains to be explored in this domain, particularly in examining happiness distribution trends, and identifying its non-monetary drivers (e.g. education and health). Ovaska and Takashima (2010) argue that understanding such determinants may offer valuable insights for policy making aimed at enhancing social cohesion and citizen well-being.

The use of cardinal variability measures to analyse ordinal happiness scores is problematic, motivating additional research in this area. As identified in the review by Dutta and Foster (2013), a range of the standard variability measures have been employed in the Economics of Happiness literature, including standard deviation, variance, Gini coefficients, and interquartile range. Kalmijn and Veenhoven (2005) for instance, analyse the inequality of happiness across eight Eastern European countries from 1999-2000 using nine dispersion statistics. Four robust measures are identified including standard deviation, mean absolute difference, mean pair difference and interquartile range.

In contrast, Ott (2005) applied standard deviation to a cross-sectional dataset for 78 countries in 2000. The study reports an inverse relation between average happiness level and inequality of happiness, with the effect relatively stronger in rich countries. Similarly, Veenhoven (2005a) used standard deviation to examine the distribution of life satisfaction in nine European Union (EU) nations and found that the inequality in life satisfaction declined over the period 1973-2001. On the other hand, Stevenson and

Wolfer (2008b) used variance and observed a significant drop in the national happiness inequality levels in the U.S. since the 1970s, with similar trend in the demographic sub-groups based on age, gender and education levels. In the authors' opinion, it will be important to consider these results in conjunction with rising income inequality to see how non-income factors influence the distribution of happiness.

#### *3.4.1 Problems with the Standard Cardinal Methodology*

Despite the wide use of standard cardinal measures of dispersion for categorical data, the appropriateness of such an approach is questionable, given that such measures may not be order preserving to arbitrary scale transformations. These issues are discussed in detail in Section 4.2. Using a dominance approach, Madden (2011) assessed the impact of Ireland's economic boom from 1994-2001 on both the level and the distribution of well-being across six different aspects including work, finance, housing, leisure and psychological health. The study found that financial and psychological well-being increased during the economic boom with a decline in well-being inequality across each of the six domains.

Similarly, Dutta and Foster (2013) developed ordinal inequality indices to examine the happiness inequality trends in the U.S. from 1972-2010. This seminal study found that happiness inequality in the U.S. was highest in the 1970s, declining through the 1980s and 1990s, before rising in 2000s. While sub-group inequalities by gender, race and region largely reflected national happiness inequality trends, there were sizable variations across different groups and regions. For instance, happiness inequality was greater in females, with the happiness inequality gender gap having reduced considerably since 1970s. Interestingly, the happiness inequality was lower amongst *Blacks* compared to *Whites* during the 1970s to 1990s.

### **3.5 Conclusion**

There is a general consensus in the Happiness Economics literature regarding the non-linear positive relationship between absolute income and well-being at a point in time, with wealthier people on average reporting relatively greater happiness compared to the poor. Relative income also matters for well-being, and is generally defined with respect to specific reference groups having similar attributes such as age, education and employment industry. Most empirical studies suggest that upward income comparisons with relevant reference groups tend to have an adverse effect on well-being. There is general agreement in the literature regarding the effects of age, health, employment, and relationships on well-being, with the existence of a U-shaped relation between age and SWB. Consistent with intuition, the empirical findings indicate that one's physical and mental health have well-being enhancing effect, with the effect of mental health relatively greater. Most studies show that being employed has a well-being enhancing effect beyond the material gains associated with having paid employment. Finally, being in a steady and caring relationship is positively associated with well-being.

Turning to macro determinants of SWB, there is mixed evidence regarding the effect of GDP and income inequality on SWB. Most studies consistently report that inflation and unemployment have deleterious impacts on SWB, with unemployment effects relatively greater. Political systems and institutional arrangements affect well-being, with some evidence suggesting that civic freedom and democratic systems are positively correlated with well-being.

The bulk of the empirical literature in Happiness Economics has focussed on the economic determinants of happiness. However, understanding the distributional aspects of happiness is important for the development of holistic measures of well-being. A great deal remains to be studied in this

domain, particularly in examining the distribution of happiness both across and within countries, identifying its non-monetary determinants and using appropriate measures of variability to analyse ordinal happiness data.

## **4. Methodology**

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### **4.1 Introduction**

This Chapter begins with an overview of the econometric methodology employed, offering motivation for its appropriateness and suitability in the context of the current study. A detailed discussion is provided on key concepts and theorems underpinning the empirical analysis. Finally, a discussion is offered on the specific techniques applied to undertake the happiness distribution exploration, including a detailed description of the datasets and appropriate robustness checks.

### **4.2 Overview and Motivation**

As argued previously, the application of standard cardinal variability measures to analyse categorical happiness data is considered inappropriate and several arguments (e.g. Allison & Foster, 2004; Abul Naga & Yalcin, 2008; Madden 2010; Dutta & Foster, 2013) in support of this claim are offered. Firstly, the inequality ordering derived using such measures may not be robust to various scale changes. Secondly, most cardinal dispersion measures consider inequality as a deviation from the mean, which in itself is scale dependent. Although the interquartile range as a measure of dispersion is scale independent, its appropriateness is also questionable given that it is based on partial distribution (i.e. first and third quartile) rather than the entire distribution.

To address aforementioned concerns, Allison and Foster (2004) recommend using a median-centred technique based on a 'dominance approach' to evaluate the distribution of categorical data, claiming that it is order preserving under any scale transformation. This method has rarely been applied to examine the distributional aspects of happiness. An exception is Dutta and Foster (2013) who recently used this technique to study the

distribution of happiness in the U.S., from 1972 to 2010. The current research takes the Dutta–Foster approach to explore the distribution of happiness over the past forty years in eight European countries, including Belgium, Denmark, Germany France, Ireland, Italy, the Netherlands, and the U.K. , using the rich dataset provided in the *Eurobarometer*, for the period 1975-2013.

The econometrics applied in the current analysis is explained in the following sections. Prior to explaining the empirical approach, a number of important concepts and propositions underlying the methodology will be discussed.

### **4.3 Notation**

The mathematical notation presented in this Chapter is largely consistent with that of Dutta and Foster (2013). For an arbitrary ordinal happiness distribution  $X$  with  $n$  response categories, the happiness distribution is given by:

$P_X = [P_X^1, P_X^2 \dots P_X^i, \dots P_X^j, P_X^k \dots P_X^n]$ , where  $P_X^i$  represents the number of respondents in the  $i^{th}$  category. The categories are ranked in ascending order with  $n$  representing the uppermost category and  $k$  being the 'median response category'. Dutta and Foster (2013) define the *median category* as '*the category to which the median person belongs*'. For a three-category case, which is applied to this thesis, the second category will inevitably represent the *median category*, i.e.  $k = 2$ . Also,  $f_X^i$  represents the proportion of respondents in the  $i^{th}$  category, whereas  $F_X^i$  refers to the cumulative proportion of respondents in the  $i^{th}$  category. Finally, to examine the dispersion of the distribution, the categorical response data for distribution  $X$  can be transformed using a scale  $c = [c_1, c_2 \dots c_i, \dots c_j \dots c_n]$ , where  $c_j > c_i$  for  $j > i$ .

#### 4.3.1 Measures of Dispersion

Using the above notation, the mean of distribution  $X$  for scale  $c$  is given by:

$$\mu_X(c) = \sum_{i=1}^n c_i f_X^i \quad (1)$$

As discussed previously, the mean of a distribution and hence mean-based inequality measures may not be order preserving for an arbitrary scale transformation. Given that median as a measure of central tendency is robust to scale transformations, two median-based measures are applied in the current study, consistent with Dutta and Foster's (2013) approach. These include *S-dominance* and *F-dominance*. While *S-dominance* assesses the inequality of an ordinal distribution, *F-dominance* focusses on the average level of happiness of an ordinal distribution. These concepts are discussed in more detail in the following subsections.

##### 4.3.1.1 S-Dominance

*S-dominance* approach allows for a binary comparison of the level of inequality across any two ordinal distributions say  $X$  and  $Y$ , with inequality measured as a '*spread away from the median category*'. Allison and Foster (2004, p.512) define *S-dominance* as follows:

**Definition 4.1.** When considering two distributions of happiness  $X$  and  $Y$  with same median category ( $k$ ),  $Y$  will *S-dominate*  $X$  if and only if, for all  $i = 1, 2, 3, \dots, k-1$ ,  $F_Y^i \leq F_X^i$  and for all  $i = k, \dots, n$ ,  $F_Y^i \geq F_X^i$ .

In other words, distribution  $Y$  is said to *S-dominate*  $X$  if the proportion of the population in the categories below and above the median category  $k$  for distribution  $X$  is greater than the corresponding shares for distribution  $Y$ . This means that  $X$  has a larger spread away from the median compared to  $Y$ , implying distribution  $Y$  is relatively more equitable than distribution  $X$ .

In the special case, when distributions  $X$  and  $Y$  both have  $n = 3$  categories, with median category  $k = 2$ , the above definition implies that  $S$ -dominance ranking can be obtained by simply comparing the proportion of the population above and below the median category, giving the following result:

**Proposition 4.1.**  $Y$   $S$ -dominates  $X$  if and only if  $f_X^1 > f_Y^1$  and  $f_X^3 > f_Y^3$ , where,  $f_X^i$  and  $f_Y^i$  represent the proportion of respondents in the  $i^{th}$  category for distribution  $X$  and  $Y$  respectively.

[See proof see Dutta and Foster (2013, p.398)].

For example to compare happiness distributions for two years 2000 and 2001 we use hypothetical response categories to a single happiness question – ‘Taken all together, how would you say things are these days - would you say that you are very happy, pretty happy or not too happy?’. In this three category case  $n = 3$  with lowest category (*Not Too Happy*) represented by ‘1’, median category (*Pretty Happy*) by ‘2’ and highest category (*Very Happy*) by ‘3’. In this case, if the proportion of respondents in *category 1* and *category 3* categories for year 2000 is greater than the corresponding respondent proportions for year 2001, then it implies that 2001  $S$ -dominates 2000. In other words, the distribution of happiness in 2001 is relatively more equitable than that of 2000.

#### 4.3.1.2 $F$ -Dominance

$F$ -dominance approach allows for a binary comparison of the average level of happiness across any two ordinal distributions  $X$  and  $Y$ . Dutta and Foster (2013, p.399) define it as follows:

**Definition 4.2.** When considering two distributions of happiness  $X$  and  $Y$  with same median category ( $k$ ),  $Y$   $F$ -dominates  $X$  if & only if for all  $i = 1, 2 \dots n$ ,  $F_Y^i \leq F_X^i$ .

In other words, distribution  $Y$  will *F-dominate*  $X$  if distribution  $Y$  has a lower proportion of population in the inferior categories (i.e. those below the median category) and higher proportion in the categories above the median. This implies that distribution  $Y$  has a relatively higher average level of happiness than distribution  $X$ . Thus implying that  $Y$  *F-dominates*  $X$ .

For the case when distributions  $X$  and  $Y$  both have three categories and median category  $k = 2$ , the above definition implies that *F-dominance* ranking can be obtained by simply comparing the proportion of the population above and below the median category, giving the following result:

**Proposition 4.2.**  $Y$  *F-dominates*  $X$  if and only if  $f_X^1 > f_Y^1$  and  $f_X^3 < f_Y^3$ , where  $f_X^i$  and  $f_Y^i$  represent the proportion of respondents in the  $i^{th}$  category for distributions  $X$  and  $Y$  respectively.

[See proof see Dutta and Foster (2013, p.399)].

Referring back to the previous example, these conditions suggest that if the proportion of respondents in 2000 in *category 1* is relatively greater than the corresponding respondent proportions in 2001; and the proportion of respondents in 2000 in *category 3* is relatively lower, then it implies that 2001 *F-dominates* 2000. In other words, 2001 has a relatively greater level of average happiness than 2000.

As established in the discussion above, both *S-dominance* and *F-dominance* depend on the frequency of the distribution, and are thus scale independent. This ensures that the inequality rankings obtained using the dominance method is order preserving irrespective of the scale applied. Moreover, even though these two approaches when used independently result in partial orderings, Dutta and Foster (2013 p.400) claim that when these two approaches are jointly applied to any ordinal distribution with three

categories having  $k = 2$  as the median category, a complete and unambiguous ordering of the ordinal distribution is obtained. Although for a three-category case, the frequency distribution below and above the median category is sufficient to inform the dominance ranking, the ordering can also be obtained by comparing the means of the distribution below and above the median. This proposition is summarised in Dutta and Foster (2013, p.400) as follows:

**Proposition 4.3.** *Let  $X$  and  $Y$  represent any two distributions with  $n = 3$  and same median category  $k = 2$ . Then for any scale  $c$ , the following will be true:*

1.  $\Delta\mu_{XY}^U(c) \geq 0$  and  $\Delta\mu_{XY}^L(c) \leq 0$  if and only if  $Y$  S-dominates  $X$ ;
2.  $\Delta\mu_{XY}^U(c) \leq 0$  and  $\Delta\mu_{XY}^L(c) \geq 0$  if and only if  $X$  S-dominates  $Y$ ;
3.  $\Delta\mu_{XY}^U(c) \leq 0$  and  $\Delta\mu_{XY}^L(c) \leq 0$  if and only if  $Y$  F-dominates  $X$ ;
4.  $\Delta\mu_{XY}^U(c) \geq 0$  and  $\Delta\mu_{XY}^L(c) \geq 0$  if and only if  $X$  F-dominates  $Y$ .

Where,  $\Delta\mu_{XY}^U$  and  $\Delta\mu_{XY}^L$  represent the difference in the average happiness level between the two distributions above and below the median categories respectively and are given by:

$$\Delta\mu_{XY}^U = \mu_X^U(c) - \mu_Y^U(c) \quad (2)$$

$$\Delta\mu_{XY}^L = \mu_X^L(c) - \mu_Y^L(c) \quad (3)$$

In the above equations  $\mu_X^U(c)$  and  $\mu_X^L(c)$  represent the mean happiness of distribution  $X$  above and below the median category respectively and are given by the two equations below. Note that similar definitions can also be established for distribution  $Y$ .

$$\mu_X^U(c) = 2 \left( \sum_{i=k+1}^n c_i (F_X^i - F_X^{i-1}) + c_k (F_X^k - 0.5) \right) \quad (4)$$

$$\mu_X^L(c) = 2 \left( \sum_{i=1}^{k-1} c_i (F_X^i - F_X^{i-1}) + c_k (0.5 - F_X^{k-1}) \right) \quad (5)$$

Finally, while the dominance approach provides a complete ranking for ordinal distributions, estimating the magnitude of inequality is likely to offer additional meaningful insights. Thus for the purposes of this thesis, in addition to obtaining complete dominance rankings for each of the eight European countries, there are two distinct median-based inequality indices that will also be considered. These include measures developed by Allison and Foster (2004) and Abul Naga and Yalchin (2008) and are briefly outlined below.

#### 4.3.2 Allison and Foster (AF) Inequality Index

Based on *S-dominance*, AF inequality index for any ordinal distribution  $X$ , scale  $c = [c_1, c_2 \dots c_i, \dots c_j \dots c_n]$ , and  $k$  as the median category is given by:

$$I_X^{AF}(c) = \mu_X^U(c) - \mu_X^L(c) \quad (6)$$

The AF measure is estimated as the difference between the mean happiness of the distribution above and below the median category. Although the measure is scale dependent, it allows prediction for the *S-dominance* relation between any two ordinal distributions  $X$  and  $Y$  with the same median category. According to *Proposition 4*, in Dutta and Foster (2013, p.401), if for some scale  $c$ , it is true that  $I_Y^{AF}(c) > I_X^{AF}(c)$ , then it will never be the case that  $X$  will *S-dominate*  $Y$ .

#### 4.3.3 Abul Naga and Yalchin (NY) Inequality Index

The NY inequality index builds on the AF inequality measure by applying appropriate weights to the cumulative proportion of the people in the upper and the lower half of the distribution, reflective of the subjective norms in the society. Unlike the AF inequality index, the NY inequality measure is scale independent. For any distribution  $X$  with  $n$  response categories, and  $k$  as the median category, the NY inequality index is given by:

$$I_X^{NY}(\alpha, \beta) = \frac{\sum_{i < k} (F_X^i)^\alpha - \sum_{i \geq k} (F_X^i)^\beta + (n + 1 - k)}{(k - 1)(0.5)^\alpha - (1 + (n - k)(0.5)^\beta) + (n + 1 - k)} \quad (7)$$

In the above expression,  $\alpha, \beta \geq 1$  represent society's value judgements. Note that  $\alpha > \beta \geq 1$ , suggests that the percentage of people in the upper half of the distribution is assigned relatively higher weight. On the other hand, when  $\beta > \alpha \geq 1$ , implies that the percentage of people in the lower half of the distribution is valued more.

### 4.4 Empirics

This section outlines specific techniques employed to obtain country-specific dominance rankings and develop inequality measures of happiness. Detailed description of the datasets, including the methodological steps underpinning the empirical exploration is also provided. The data for each country is collated from a single data source, thus the same methodology is applied to each of the eight European countries.

#### 4.4.1 Data

The dataset provided in the standard *Eurobarometer* (European Commission, 2014) is used to explore the distribution of happiness in eight European countries, from 1975-2013. Established by the European Commission, the standard *Eurobarometer* consists of comprehensive

surveys undertaken bi-annually since the early 1970s for over thirty European nations. Spring surveys are conducted between March-June each year, and Autumn surveys are undertaken during September-December. Given the length of time and consistency with which these surveys have been undertaken, it is a widely cited data source in the Happiness Economics literature (e.g. Blanchflower & Oswald, 2004b; Alesina *et al.* 2004; Di Tella, & MacCulloch, 2008).

Typically for each country, the survey involves conducting 1,000-1,500 face-to-face interviews. It is not a panel survey. A different population sample is surveyed each year. Appropriate sampling methods are employed to ensure that the sample is nationally representative of the population aged 15 years or above. Until 1989, a two-stage random sampling or quota sampling method was used. However, this approach has since then been replaced by a more rigorous multi-staged random sampling methodology.

The survey collects extensive data on individual well-being and overall life satisfaction, as well as other wide-ranging issues such as political and economic concerns of the survey respondents. The primary survey question that is of interest for the purposes of the current study is:

*'On the whole are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead?'* (European Commission, 2014).

*The Eurobarometer Interactive Search System* aggregates survey results. On average, for each of the eight European nations, approximately 42,000 responses to the life satisfaction questions are aggregated, providing respondent shares across the four response categories including *Very Satisfied, Fairly Satisfied, Not Very Satisfied* and *Not at all Satisfied*.

To ensure that Dutta and Foster's (2013) approach can be directly applied to the European case, the two response categories (i.e. *Not Very Satisfied* and *Not at all Satisfied*) are pooled into a single *Not Satisfied* category. This results in a three-category special case with median category  $k = 2$ . The share of respondents indicating *Don't Know* is between 1-3% and is redistributed across the three revised categories (i.e. *Very Satisfied*, *Fairly Satisfied* and *Not Satisfied*). The revised respondent proportions across these categories form the basis for the current empirical analysis and are tabulated for Spring and Autumn data, in Appendix A (pp. 136-39) and Appendix B (pp. 140-143) respectively. Employing these datasets, country-specific dominance rankings, mean happiness indices as well as AF and NY inequality measures were estimated using the *IC STATA13* software and *Microsoft Excel*.

Disruptions in the surveys have resulted in some missing observations. Spring surveys were not conducted in 1999, 2003 and 2004. Whereas, Autumn surveys were not undertaken for seven years including, 1979-81 and 1995-98. Given that Spring surveys offers a longer data series, they form the primary basis of the empirical analysis undertaken as part of the current study. However, to assess robustness of the current study findings, Autumn results have also presented in Appendix B. Also at the country level, it is worth noting that the U.K. sample includes 300 respondents from Ireland. Secondly, prior to Germany's reunification in 1990, the data was only collected for West Germany, resulting in a break in the series. As such, there is need for caution in interpreting the study findings for Germany.

#### 4.4.2 Dominance Ranking and Inequality Indices

For each country, pairwise yearly comparisons of the happiness distributions are undertaken based on *F-dominance* or *S-dominance* criteria. The results are displayed in a 36x36 matrix for spring data and a 32x32 matrix for autumn data. Each cell in the matrix represents the dominance relation between two given years. A specific column is dominance ranked with respect to the different yearly row entries. For instance an entry of letter 'S' corresponding to the column heading '1987' and row heading '1972' will imply *1987 S-dominates 1972*. Alternatively, 'F' in the same cell will indicate the *1987 F-dominates 1972*. A 'blank' cell will indicate that 1987 neither *F-dominates* nor *S-dominates* 1972. Finally, an entry shaded in grey and labelled '*n.a.*' indicates that 1987 and 1972 have identical distributions and thus cannot be ranked using the two dominance criteria.

Once the dominance relation for each year is established with respect to every other year, column and row entries are aggregated to obtain the total number of *S-dominating* and *F-dominating* relations, resulting in a complete dynamic dominance ranking. The column with the highest total *S-dominance* score, represented by, for instance ( $r$ ), will indicate that the corresponding year has a more equitable happiness distribution compared to  $r$  other years. Similarly, the column with the maximum *F-dominance* score represented by, for instance ( $t$ ), implies that the year has a relatively greater mean happiness level compared to  $t$  other years.

As discussed previously, Although the joint application of *S-dominance* and *F-dominance* to a three-category case results in complete ranking of the happiness distribution, *F-dominance* looks solely at average happiness levels and does not provide any information on the inequality ordering. Thus, it makes sense to estimate the magnitude of happiness inequality using both AF and NY measures, particularly for the years for which *S-dominance* ranking is unattainable.

The AF inequality measure (see Equation 6) is scale dependent, thus to ensure robustness of results, three distinct inequality measures are estimated using linear, convex and concave scales. Similarly for the NY inequality measure, which relies on subjective societal judgements (see Equation 7), three distinct weights are applied with relatively increasing weight given to the lower half of the distribution, i.e.  $\beta \geq \alpha$ . Finally, for completeness, yearly mean happiness estimates are estimated for linear scale  $c=(1,2,3)$ . These robustness checks are summarised in Table 4.1.

**Table 4.1: Robustness Checks**

<b><i>AF Inequality Measure</i></b>	
Linear Scale	(-2,0,2)
Convex Scale	(-2,-1,2)
Concave Scale	(-2,1,2)
<b><i>NY Inequality Measure</i></b>	
$\beta = \alpha$	(1,1)
$\beta = 2\alpha$	(1,2)
$\beta = 4\alpha$	(1,4)

Notes:  $\alpha$  and  $\beta$  represent society's value judgements. Also,  $\beta > \alpha \geq 1$  implies that the percentage of people in the lower half of the distribution are assigned a relatively higher weight.

## **4.5 Conclusion**

Standard cardinal measures of dispersion are not applicable to explore the distribution of ordinal happiness survey scores. The current study applies techniques based on a median-centered dominance approach, originally proposed by Allison and Foster (2004), to explore the distribution of happiness in eight European countries over four decades. Specifically, the current research builds on the techniques used in Dutta and Foster's (2013) study for the U.S. and applies it to the European case using comprehensive datasets provided by *Eurobarometer* (European Commission, 2014).

A complete ordering of happiness distributions for all of the years is obtained for each country using *S-dominance* and *F-dominance* criteria. Subsequently, happiness inequality indices are estimated using the measures developed by Allison and Foster (2004) and Abul Naga and Yalchin (2008). Robust inequality measures are developed using different scales and weights reflecting subjective societal value judgements.

## **5. Results and Discussion**

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### **5.1 Introduction**

This Chapter will present and discuss dominance rankings and happiness inequality measures developed for each country using Spring survey data only. Autumn survey results are presented in Appendix B. Overall, findings are largely similar for both Spring and Autumn surveys. However, in some instances these results are not comparable due to missing observations.

The country-specific Spring results are discussed in alphabetical order, starting with Belgium. For each country, the following structure is applied. Firstly, based on the dominance ranking matrix, we begin with commenting on the total *S-dominance* and *F-dominance* relations, identifying the best and worst decades and specific years in terms of happiness inequality and average happiness respectively. Overall performance of each decade in terms of dominance criteria, including trends over time, are also discussed. Wherever possible, key global and/or country-specific economic events and macroeconomic indicators are briefly touched upon. The aim is to offer plausible explanations for observed trends, which in turn could be explored as part of future research.

Although combined dominance rankings provide unambiguous ordering of years for each, there are quite a few years across different countries that have not been ordered using *S-dominance*. Thus, it is unclear how these years may have performed in terms of happiness inequality relative to other years. To address this issue and as a robustness check for the dominance rankings several inequality and mean happiness measures developed using different scales and subjective societal judgments (previously outlined in Table 4.1) are also examined.

Lastly, the average change per decade in happiness inequality and mean happiness indices, developed using linear scales, are examined. The aim is to assess whether a decrease (or increase) in happiness inequality concurs with an increase (or decrease) in mean happiness.

## **5.2 Belgium**

Belgium reported 441 *F-dominance* & 189 *S-dominance* relations (see Table 5.1). Happiness inequality appears to be the lowest in 2012, which *S-dominates* 21 other years. Other years that performed well include 1995 and 1993. Overall, the second half of 1970s to mid-1980s fared significantly poorly in terms of the distribution of happiness, with 1981 and 1984 standing out, having at least 17 other years *S-dominating* them. Happiness inequality remained high until early 1990s, improving thereafter. Except for a few years (i.e. 2005 and 2007), happiness inequality in Belgium appears to have declined drastically over the last 15 years.

The *F-dominance* results indicate that the late 1970s enjoyed relatively higher average levels of happiness compared to most years, with 1975 standing out in particular. In contrast, the 1980s was the worst decade for Belgium in terms of average happiness. In fact, 1984 seems to be the worst year both in terms of happiness inequality and average happiness. It is worth noting, that although Belgium had positive economic growth in 1984, inflation and unemployment were considerably higher than most subsequent years. Whether some of these macro factors had an impact on the level and/or distribution of happiness is an important question worth exploring (as part of future research) if well-being enhancement is a required policy goal. The average happiness improved in the first half of 1990s, with happiness rankings deteriorating in the late 1990s and early 2000s, before improving in mid-2000s.

**Table 5.1: Dominance Ranking Matrix, Belgium**

	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	00	01	02	05	06	07	08	09	10	11	12	13	F*	S*
75	n.a																																				0	0
76	F	n.a	F		F	S										S	F	S	S	S	S								S	S		S		S	S	S	4	12
77	F		n.a		F											S	F												S			S		S	S	S	3	6
78	F	S	F	n.a	F	S										S	F	S	S	S	S								S			S		S	S	S	4	13
79	S				n.a											S	S												S			S		S	S	S	0	8
80	F		F		F	n.a										S	F	S	S	S	S								S	S		S		S	S	S	4	11
81	F	S	F	F	F	S	n.a									S	S	F	S	S	S	S				S		S	S	S	S	S	S	S	S	5	19	
82	F	F	F	F	F	F		n.a	S		S		F	S	F	F	F	S	S	F	S	S				S	S	F	F	F	S	F	S	F	S	F	18	12
83	F	F	F	F	F	F			n.a		F		F	F	F	F	F	F	F	F	F					F	S	F	F	F	F	F	F	F	F	F	28	1
84	F	F	F	F	F	F		S	S	n.a	S	S	F	S	F	F	F	S	S	F	S	S		S	S	S	S	F	F	F	S	F	S	F	S	F	18	17
85	F	F	F	F	F	F				n.a			F	F	F	F	F	F	S	F	S						F	S	F	F	F	F	F	F	F	F	24	4
86	F	F	F	F	F	F		F	F		n.a		F	F	F	F	F	F	F	F	F			S	S	F	S	F	F	F	F	F	F	F	F	F	30	3
87	F	F	F	F	F	F				n.a			n.a		S	F	F	S	S	F	S	S				S		F	F	F	S	F	S	F	S	F	16	9
88	F	F	F	F	F	F							F	n.a	F	F	F	F	S	F	S	S				S	S	F	F	F	S	F	F	F	S	F	20	7
89	F	F	F	F	F	F									n.a	F	F	S	S	F	S	S				S		F	F	F	S	F	S	F	S	F	15	8
90	F															n.a												S			S		S	S	S	1	5	
91	F															S	n.a											S			S		S	S	S	1	6	
92	F		F		F											F	F	n.a			S							F			F		F	S	F	9	2	
93	F		F		F											F	F	F	n.a		F							F			F		F	F	F	12	0	
94	F		F		F											F	F	S	S	n.a	S							S	S		F		S	S	S	6	8	
95	F															F	F				n.a							F			F		F	F	F	10	0	
96	F	F	F	F	F	F										F	F	F	F	F	F	n.a						F	F	F		F	F	F	F	F	20	0
97	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	F	F		n.a	S	S	F	S	F	F	F	F	F	F	F	F	F	31	3
98	F	F	F	F	F	F	F	F		F		F	F	F	F	F	F	F	F	F	F		n.a		F	S	F	F	F	F	F	F	F	F	F	F	31	1
00	F	F	F	F	F	F	F	F		F		F	F	F	F	F	F	F	F	F	F			n.a		F	S	F	F	F	F	F	F	F	F	F	30	1
01	F	F	F	F	F	F										F	F	F	S	F	S	S				n.a		F	F	F	F	F	F	F	F	19	3	
02	F	F	F	F	F	F	F						F		F	F	F	F	F	F	F					F	n.a	F	F	F	F	F	F	F	F	26	0	
05	F	F	F	F	F	F										F	F	S	S	F	S							n.a	S	S		F		S	S	S	10	8
06	F																												n.a						F		2	0
07	F		F		F											F	F	S	S		S							S	n.a		F		S	S	S	6	7	
08	F	F	F	F	F	F										F	F	F	S	F	S	S					F	F	F	n.a	F	F	S	F	17	4		
09	F																											S				n.a		S	S	S	1	4
10	F	F	F	F	F	F										F	F	S	S	F	S						F	F	F		F	n.a	F	S	F	15	4	
11	F																											S					n.a	S	S	1	3	
12	F																												F					n.a	F	3	0	
13	F																																	n.a		1	0	
F*	34	17	26	18	27	17	11	4	4	0	5	1	10	6	10	22	27	12	7	17	8	6	0	0	1	7	0	16	20	16	8	22	11	19	11	21	441	
S*	1	2	0	0	0	3	0	1	2	0	2	1	0	2	2	7	1	12	16	4	17	9	1	3	3	6	9	1	13	6	6	8	5	12	21	13	189	

Notes: Spring surveys were not conducted in 1999, 2003 and 2004. Each cell in the matrix represents the dominance relation between two given years, represented by a specific column with respect to the various yearly row entries. S represents *S-dominance* and F represents *F-dominance* with S\* and F\* representing their respective totals. Lastly, an entry shaded in grey and labelled 'n.a.' indicates that the two years being compared have identical distributions and thus cannot be ranked using the two dominance criteria.

When examining the inequality indices for Belgium (see Table 5.2, Table 5.3, Figure 5.1 and Figure 5.2), the results are fairly consistent across various measures. Most measures show late 1970s to be the worst period in terms of having highest happiness inequality. The only exception to this is  $I^{AF}(-2,1,2)$  (i.e. AF inequality index under concave scale) which depicts 1980s to be the worst decade. Consistent with the dominance ranking results, the  $I^{AF}(-2,0,2)$  (i.e. AF inequality index under linear scale) shows that average happiness inequality in Belgium has declined from 1.944 in late 1970s to 1.587 post 2010. The results are largely in line with other inequality measures as well.

Focusing on the worst and the best years in terms of lowest happiness inequality, the results are mixed. The results indicate that while most inequality measures shows 2002 to be the best year,  $I^{AF}(-2,1,2)$  ranks 2006 as the best year with the lowest inequality index of 1.111. In terms of the worst year having the highest happiness inequality, the results are largely divided between 1984 and 1979.

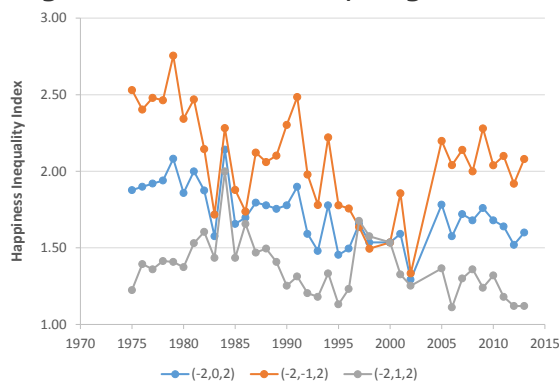
The mean happiness results (see Table 5.2 and Table 5.3) using a linear scale (i.e. 1,2,3) show that mean happiness in Belgium declined from 2.292 in late 1970s to 2.136 in 1980s. Although there has been an improvement in Belgium's mean happiness levels thereafter, the 1970s levels have not yet been restored. In terms of individual yearly performance, 1979 was the best year with highest average happiness index of 2.337, whereas 1998 seems to be the worst with an index of 1.980. These findings are supportive of the *F-dominance* rankings derived for Belgium.

**Table 5.2: Happiness Inequality Analysis, Belgium**

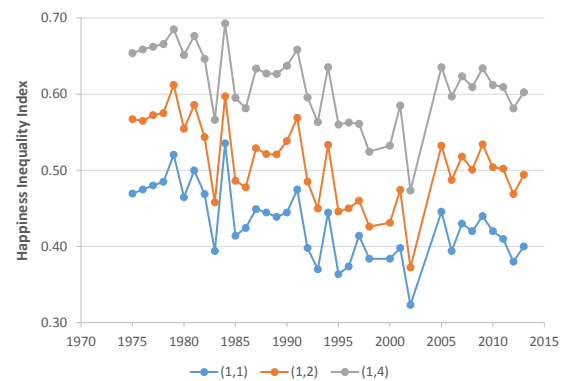
Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
<i>Index Average (Avg)</i>							
Late 1970s	1.944	2.527	1.360	0.486	0.578	0.665	2.292
1980s	1.813	2.086	1.541	0.453	0.527	0.630	2.136
1990s	1.630	1.937	1.322	0.407	0.484	0.589	2.154
2000s	1.624	1.936	1.312	0.406	0.484	0.589	2.156
Post 2010	1.587	2.033	1.140	0.397	0.488	0.598	2.223
<i>Avg Index Change</i>							
1980s	-0.130	-0.441	0.180	-0.033	-0.051	-0.035	-0.155
1990s	-0.184	-0.149	-0.218	-0.046	-0.043	-0.041	0.017
2000s	-0.006	-0.001	-0.010	-0.001	0.000	0.000	0.002
Post 2010	-0.038	0.097	-0.172	-0.009	0.004	0.009	0.067
<i>Performance Ranking</i>							
<i>By Year</i>							
Best	2002	2002	2006	2002	2002	2002	1979
Index	1.293	1.333	1.111	0.323	0.372	0.474	2.337
Worst	1984	1979	1984	1984	1979	1984	1998
Index	2.141	2.755	2.000	0.535	0.612	0.693	1.980
<i>By Decade</i>							
Best	post 2010	2000s	post 2010	post 2010	2000s	1990s	late 1970s
Worst	late 1970s	late 1970s	1980s	late 1970s	late 1970s	late 1970s	1980s

Notes: Columns 2, 3 & 4 provide results based on AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 findings are based on NY inequality measures using different subjective societal judgements. Column 8 provides findings for mean index computed using a linear scale. Best year/ decade in terms of happiness inequality refers to one that records lowest inequality index, whereas worst year/ decade is one with highest inequality index. Best year/ decade in terms of mean happiness refers to one in which mean happiness index is highest, whereas worst year/ decade refers to a period in which mean happiness is lowest.

**Figure 5.1: AF Measures, Belgium**



**Figure 5.2: NY Measures, Belgium**



Notes: Figure 5.1 presents AF happiness inequality indices under linear (-2,0,2), convex (-2,-1,2) & concave (-2,1,2) scales. Figure 5.2 presents NY inequality measures with different weights ( $\alpha$ ,  $\beta$ ) for subjective societal judgements including (1,1), (1,2) and (1,4).

**Table 5.3: Happiness Inequality & Mean Happiness Indices, Belgium**

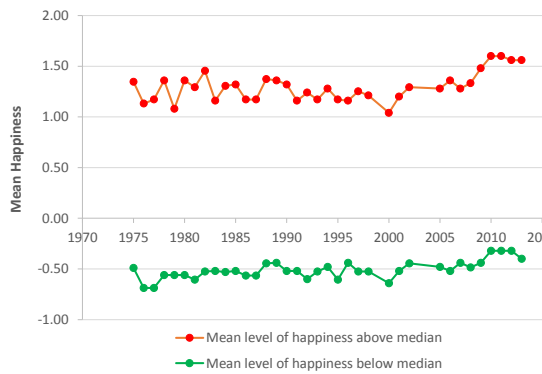
Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
1975	1.878	2.531	1.224	0.469	0.567	0.654	2.327
1976	1.899	2.404	1.394	0.475	0.565	0.659	2.253
1977	1.920	2.480	1.360	0.480	0.572	0.662	2.280
1978	1.939	2.465	1.414	0.485	0.575	0.666	2.263
1979	2.082	2.755	1.408	0.520	0.612	0.685	2.337
1980	1.859	2.343	1.374	0.465	0.555	0.651	2.242
1981	2.000	2.469	1.531	0.500	0.586	0.676	2.235
1982	1.875	2.146	1.604	0.469	0.544	0.647	2.135
1983	1.576	1.717	1.434	0.394	0.458	0.566	2.071
1984	2.141	2.283	2.000	0.535	0.597	0.693	2.071
1985	1.657	1.879	1.434	0.414	0.486	0.595	2.111
1986	1.697	1.737	1.657	0.424	0.478	0.582	2.020
1987	1.796	2.122	1.469	0.449	0.529	0.634	2.163
1988	1.778	2.061	1.495	0.444	0.521	0.627	2.141
1989	1.755	2.102	1.408	0.439	0.521	0.627	2.173
1990	1.778	2.303	1.253	0.444	0.538	0.637	2.263
1991	1.899	2.485	1.313	0.475	0.569	0.659	2.293
1992	1.532	1.980	1.204	0.398	0.485	0.596	2.194
1993	1.480	1.780	1.180	0.370	0.450	0.564	2.150
1994	1.778	2.222	1.333	0.444	0.533	0.636	2.222
1995	1.455	1.778	1.131	0.364	0.446	0.560	2.162
1996	1.495	1.758	1.232	0.374	0.450	0.563	2.131
1997	1.657	1.636	1.677	0.414	0.460	0.561	1.990
1998	1.535	1.495	1.576	0.384	0.426	0.524	1.980
2000	1.535	1.535	1.535	0.384	0.431	0.533	2.000
2001	1.532	1.857	1.327	0.398	0.474	0.585	2.133
2002	1.293	1.333	1.253	0.323	0.372	0.474	2.020
2005	1.782	2.198	1.366	0.446	0.532	0.635	2.208
2006	1.576	2.040	1.111	0.394	0.487	0.597	2.232
2007	1.720	2.140	1.300	0.430	0.518	0.623	2.210
2008	1.680	2.000	1.360	0.420	0.501	0.609	2.160
2009	1.760	2.280	1.240	0.440	0.534	0.634	2.260
2010	1.680	2.040	1.320	0.420	0.504	0.612	2.180
2011	1.640	2.100	1.180	0.410	0.502	0.610	2.230
2012	1.520	1.920	1.120	0.380	0.469	0.581	2.200
2013	1.600	2.080	1.120	0.400	0.494	0.603	2.240
Mean	1.719	2.068	1.371	0.430	0.510	0.612	2.174

Notes: Spring surveys were not conducted in 1999, 2003 and 2004. Columns 2, 3 & 4 represent AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 are the Abul Naga & Yalchin (NY) inequality measures with different subjective societal judgements. Column 8 provides mean index under a linear scale.

Figure 5.3 depicts the distribution of mean happiness above the median ( $\mu^U$ ) and the mean happiness below the median ( $\mu^L$ ), from 1975 to 2013 using a linear scale  $(-2,0,2)$ . From Proposition 4.3 (outlined in Section 4) we can infer that the gap between  $\mu^U$  and  $\mu^L$  for any given year also gives the AF inequality measure, whereas the mid-point between them indicates the mean happiness for that year. It is worth noting that decades in which Belgium has recorded a drop in happiness inequality (i.e. 1990s, 2000s, and

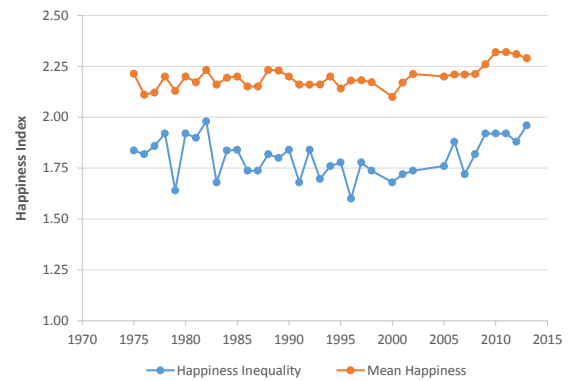
post 2010), also appear to be the ones in which mean happiness in the country went up. The only exception to this was the 1980s in which both happiness inequality and mean happiness declined.

**Figure 5.3: Mean Happiness, Belgium**



Notes: The gap between the two series give yearly AF inequality measures based on linear scale (-2,0,2). The mid-points of the two series give the yearly mean indices.

**Figure 5.4: Comparative Analysis, Belgium**



Notes: Happiness inequality is AF inequality measure based on linear scale (-2,0,2). Mean happiness is the average happiness index based on linear scale (1,2,3).

### 5.3 Denmark

Denmark reported 475 *F-dominance* and 154 *S-dominance* relations (see Table 5.4). Based on the dominance rankings, 1977 and 1991 were unequivocally the best years in terms of happiness inequality, as these years individually *S-dominate* 16 other years. On the other hand, 2013 appears to be the worst year having higher happiness inequality than 21 years preceding it. In general, excluding 1985-86 and 1993-94 when happiness inequality rose, Denmark has largely witnessed relatively lower happiness inequality during late 1970s, 1980s and 1990s. Happiness inequality however appears to have worsened in recent decades.

Analysing *F-dominance* results shows that 2009 and 2010 were the best years, experiencing average happiness levels higher than most other years. The late 1970s and 1980s, in particular the period from 1976-1979, recorded lower levels of happiness. It is worth noting that the Second Oil Crisis occurred in 1979. Additionally, the early 1980s was a period of high inflation

(exceeding 10%) and negative economic growth in Denmark. It is possible that some of these factors may have had a dampening effect on the overall well-being of Danes. Further research is required to determine specific factors to explain these observations. In general, the average happiness in Denmark has improved since 1990s. Except 2000, which recorded lower mean happiness than 26 other years, the 2000s appears to be the best decade so far in terms of having higher mean happiness than previous decades in Denmark.

**Table 5.4: Dominance Ranking Matrix, Denmark**

	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	00	01	02	05	06	07	08	09	10	11	12	13	F*	S*	
75	n.a		F				F				F	F	F	F	F	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	F	27	0	
76	F	n.a	F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	34	0	
77			n.a													F	F	F		F	F	F		F		F		F		F		F	F	F	F		14	0	
78	S	S	F	n.a	S	F	F	F	S	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	31	4	
79	F		F		n.a	F	F		F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	31	0	
80	S		S			n.a	F		S		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	27	3	
81			S				n.a						F	F	S	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	F	22	2	
82	S		S		S	S	F	n.a	S		F	F	F	F	S	F	F	F	F	F	F	F	F	F	S		F	F	F	F	F	F	F	F	F	F	F	25	7
83	S		F				F		n.a		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	28	1	
84	S		S		S	S	F	F	S	n.a	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	28	5	
85			S				S				n.a	n.a	S	S	S	S	S	F	F	F	F	F	S	F		S	S	F		F	F	F	F	F	F	F	15	10	
86			S				S				n.a	n.a	S	S	S	S	S	F	F	F	F	F	S	F		S	S	F	F	F	F	F	F	F	F	F	15	10	
87			S									n.a	S			F	S	F		F	F			F		F		F		F		F	F	F	F	13	3		
88			S										n.a			F	F	F	F	F	F	F	F	F		F		F		F		F	F	F	F	14	1		
89			S										F	F	n.a	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	22	1		
90															n.a						F	F										F	F			4	0		
91															F	n.a					F	F		F								F	F			6	0		
92															S	S	n.a				F	F		F		S						F	F			5	3		
93			S										S	S		S	S	F	n.a	F	F	F	F	F		S			F		S		F	F	F	10	7		
94															S	S	S		n.a	S	S		S		S											2	7		
95																					n.a															2	0		
96													S	S							S	n.a														2	1		
97			S									S	S		F	S	F	F	F	F	F	F	n.a	F		F		F	F	F			F	F	F	15	4		
98															S						S	S		n.a												2	3		
00	S		S			F				F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	n.a	F	F	F	F	F	F	F	F	F	F	F	26	2	
01															F	S					F	F		F		n.a										6	1		
02			S										S	S		S	F	F	F	F	F	F	S	F		S	n.a	F	F	F			F	F	F	13	7		
05															S	S	S			F	F	F		F		S		n.a								6	4		
06			S										S	S		S	S	S		F	S	F		F		S		S	n.a	S						7	11		
07															S	S	F			F	F	F	F	F		S		F		n.a						8	3		
08			S										S	S		S	S	F	S	F	F	F	S	F		S	S	F	F	S	n.a					11	10		
09																																n.a	S				0	1	
10																																	n.a				0	0	
11																S	S	S		F	S	S		S		S		S		S		F	F	n.a		3	9		
12																S	S	S		S	S	S		S		S		S		S		S	S	S	n.a		0	13	
13			S										S	S		S	S	S	S	S	S	S	S	S		S	S	S	S	S	S	S	S	S	F	n.a	1	21	
F*	2	0	5	0	1	3	9	3	2	2	9	9	11	11	8	17	13	21	15	24	26	27	11	26	6	15	11	21	16	18	13	32	32	21	22	13	475		
S*	6	1	16	0	3	2	2	0	4	0	0	0	8	9	4	14	16	6	3	2	7	5	5	4	1	13	4	4	1	6	1	2	3	2	0	0	154		

Notes: Spring surveys were not conducted in 1999, 2003 and 2004. Each cell in the matrix represents the dominance relation between two given years, represented by a specific column with respect to the various yearly row entries. S represents *S-dominance* and F represents *F-dominance* with S\* and F\* representing their respective totals. Lastly, an entry shaded in grey and labelled 'n.a.' indicates that the two years being compared have identical distributions and thus cannot be ranked using the two dominance criteria.

In considering the inequality indices for Denmark (see Table 5.5, Table 5.6, Figure 5.5, and Figure 5.6), the results are consistent, with all measures showing late 1970s as the best period in terms of having lowest happiness inequality. All estimated measures unequivocally confirm the upward trend in happiness inequality post 2010, making it the worst period with highest inequality.

When we look at distinct year performance in terms of happiness inequality, the results vary across different indices. The best year results are divided between 1976 and 1977, whereas the findings for worst years diverge between 2012 and 2013 respectively. These findings support *S-dominance* findings for Denmark discussed previously.

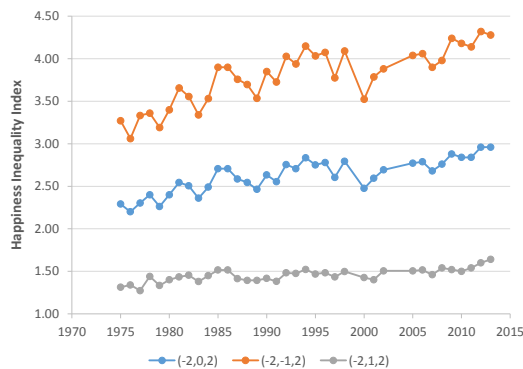
Using a linear scale, the average happiness in Denmark was the highest in 2009 having a mean index of 2.680 (see Table 5.5, Table 5.6). In contrast, 1976 is ranked as the worst year with lowest mean happiness index of 2.430 respectively. Except for a marginal decline in average happiness in 2000s, overall the mean happiness has steadily improved from 2.476 in late 1970s, peaking to 2.663 in recent years. These findings are supportive of Denmark's *F-dominance* results.

**Table 5.5: Happiness Inequality Analysis, Denmark**

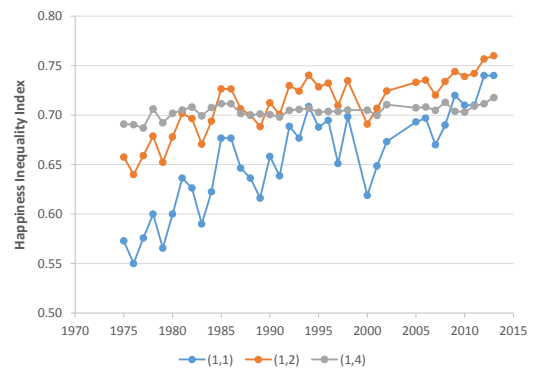
Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
<b>Index Average (Avg)</b>							
Late 1970s	2.291	3.243	1.340	0.573	0.657	0.693	2.476
1980s	2.531	3.627	1.435	0.633	0.699	0.705	2.548
1990s	2.713	3.963	1.462	0.678	0.724	0.704	2.625
2000s	2.720	3.955	1.486	0.680	0.725	0.706	2.617
Post 2010	2.920	4.247	1.593	0.730	0.753	0.713	2.663
<b>Avg Index Change</b>							
1980s	0.240	0.384	0.095	0.060	0.041	0.011	0.072
1990s	0.182	0.336	0.027	0.045	0.025	-0.001	0.077
2000s	0.008	-0.008	0.024	0.002	0.002	0.003	-0.008
Post 2010	0.200	0.292	0.107	0.050	0.028	0.007	0.046
<b>Performance Ranking</b>							
<b>By Year</b>							
Best	1976	1976	1977	1976	1976	1977	2009
Index	2.200	3.060	1.273	0.550	0.640	0.687	2.680
Worst	2012	2012	2013	2012	2013	2013	1976
Index	2.960	4.320	1.640	0.740	0.760	0.718	2.430
<b>By Decade</b>							
Best	late 1970s	late 1970s	late 1970s	late 1970s	late 1970s	late 1970s	post 2010
Worst	post 2010	post 2010	post 2010	post 2010	post 2010	post 2010	late 1970s

Notes: Columns 2, 3 & 4 provide results based on AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 findings are based on NY inequality measures using different subjective societal judgements. Column 8 provides findings for mean index computed using a linear scale. Best year/ decade in terms of happiness inequality refers to one that records lowest inequality index, whereas worst year/ decade is one with highest inequality index. Best year/ decade in terms of mean happiness refers to one in which mean happiness index is highest, whereas worst year/ decade refers to a period in which mean happiness is lowest.

**Figure 5.5: AF Measures, Denmark**



**Figure 5.6: NY Measures, Denmark**



Notes: Figure 5.5 presents AF happiness inequality indices under linear (-2,0,2), convex (-2,-1,2) & concave (-2,1,2) scales. Figure 5.6 presents NY inequality measures with different weights ( $\alpha, \beta$ ) for subjective societal judgements including (1,1), (1,2) and (1,4).

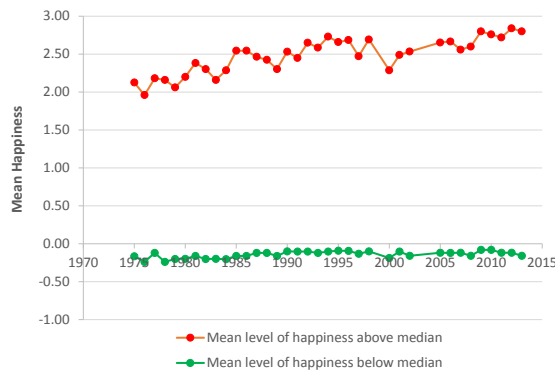
**Table 5.6: Happiness Inequality & Mean Happiness Indices, Denmark**

Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
1975	2.292	3.271	1.313	0.573	0.658	0.691	2.490
1976	2.200	3.060	1.340	0.550	0.640	0.690	2.430
1977	2.303	3.333	1.273	0.576	0.659	0.687	2.515
1978	2.400	3.360	1.440	0.600	0.679	0.706	2.480
1979	2.263	3.192	1.333	0.566	0.652	0.692	2.465
1980	2.400	3.400	1.400	0.600	0.678	0.702	2.500
1981	2.545	3.657	1.434	0.636	0.702	0.705	2.556
1982	2.505	3.556	1.455	0.626	0.696	0.708	2.525
1983	2.360	3.340	1.380	0.590	0.671	0.699	2.490
1984	2.490	3.531	1.449	0.622	0.694	0.708	2.520
1985	2.707	3.899	1.515	0.677	0.727	0.712	2.596
1986	2.707	3.899	1.515	0.677	0.727	0.712	2.596
1987	2.586	3.758	1.414	0.646	0.706	0.702	2.586
1988	2.545	3.697	1.394	0.636	0.700	0.700	2.576
1989	2.465	3.535	1.394	0.616	0.688	0.701	2.535
1990	2.633	3.849	1.417	0.658	0.712	0.701	2.608
1991	2.554	3.727	1.382	0.639	0.701	0.698	2.586
1992	2.755	4.028	1.482	0.689	0.730	0.705	2.637
1993	2.707	3.939	1.475	0.677	0.724	0.706	2.616
1994	2.835	4.149	1.522	0.709	0.740	0.707	2.657
1995	2.751	4.034	1.468	0.688	0.729	0.703	2.641
1996	2.779	4.075	1.483	0.695	0.732	0.704	2.648
1997	2.604	3.775	1.434	0.651	0.710	0.704	2.585
1998	2.794	4.090	1.497	0.698	0.735	0.705	2.648
2000	2.475	3.525	1.426	0.619	0.691	0.705	2.525
2001	2.594	3.787	1.402	0.649	0.707	0.700	2.596
2002	2.693	3.881	1.505	0.673	0.724	0.711	2.594
2005	2.772	4.040	1.505	0.693	0.733	0.707	2.634
2006	2.788	4.061	1.515	0.697	0.735	0.708	2.636
2007	2.680	3.900	1.460	0.670	0.720	0.705	2.610
2008	2.760	3.980	1.540	0.690	0.734	0.713	2.610
2009	2.880	4.240	1.520	0.720	0.744	0.704	2.680
2010	2.840	4.180	1.500	0.710	0.739	0.703	2.670
2011	2.840	4.140	1.540	0.710	0.742	0.709	2.650
2012	2.960	4.320	1.600	0.740	0.757	0.712	2.680
2013	2.960	4.280	1.640	0.740	0.760	0.718	2.660
Mean	2.623	3.791	1.454	0.656	0.710	0.704	2.584

Notes: Spring surveys were not conducted in 1999, 2003 and 2004. Columns 2, 3 & 4 represent AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 are the NY inequality measures with different subjective societal judgements. Column 8 provides mean index under a linear scale.

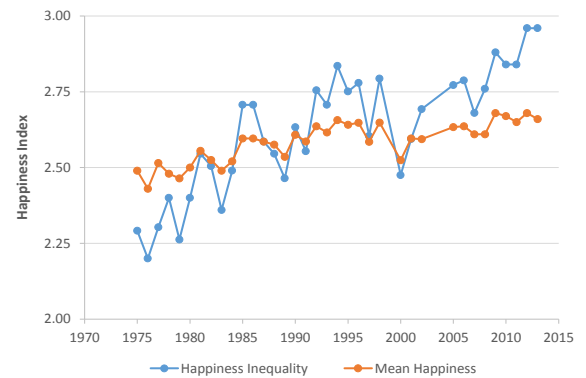
Finally, Denmark, unlike Belgium, mean happiness and happiness inequality appears to move in the same upward direction in the 1980s, 1990s, and post 2010 ( Figure 5.7 and Figure 5.8).

**Figure 5.7: Mean Happiness, Denmark**



Notes: The gap between the two series give yearly AF inequality measures based on linear scale (-2,0,2). The mid-points of the two series give the yearly mean indices.

**Figure 5.8: Comparative Analysis, Denmark**



Notes: Happiness inequality is AF inequality measure based on linear scale (-2,0,2). Mean happiness is the average happiness index based on linear scale (1,2,3).

## 5.4 France

In the case of France, a total of 511 *F-dominance* and 116 *S-dominance* relations have been identified (see Table 5.7). Examining *S-dominance* results for France shows that 1983 followed by 2000 and 2013 were the best years recording lower happiness inequality compared to at least 10 other years. In general, the late 1970s and early 1980s seem to account for the worst years in terms of happiness inequality. In contrast, it appears that 1996-2006 decade recorded lowest happiness inequality compared to other decades. Interestingly, while inflation in France was significantly high in 1980s averaging around 12.5%, the period from 1996 to 2006 had low inflation averaging 1.7%. On the other hand, unemployment and economic growth rates were largely similar during the two time periods. It is possible that low inflation in 1996-2006 in France may have had a positive effect of lowering happiness inequality, however it is an area that needs further exploration.

Happiness inequality worsened during the second half of 2000s in France, with 2008 having higher inequality than 8 other years. This may be partially associated with economic factors including the Global Financial Crisis in 2008 and the ongoing Eurozone Debt Crisis which began in late 2009. However, once again, to be able to comment with any certainty requires additional investigation. Lastly, the trend appears to have reversed in recent years, with 2013 recording lower happiness inequality relative to 10 preceding years.

When examining *F-dominance* results for France, 2000s seems to be the best decade in terms of mean happiness. Most years in 2000s, particularly 2009-13 saw higher average happiness compared to previous years. On the other hand, late 1970s and 1990s fared badly with most years recording lower mean happiness compared to all other years. It is worth pointing out that 1977-80 was the worst period for France with lowest mean happiness compared to most years.

**Table 5.7: Dominance Ranking Matrix, France**

	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	00	01	02	05	06	07	08	09	10	11	12	13	F*	S*
75	n.a							S			S	S	S	S	F	S	S								S	S	S	F	F	F	S	F	F	F	F	S	8	12
76	F	n.a						F	S		S	S	S		F	F	F	F		n.a	S	S	S		S	F	S	F	F	F	F	F	F	F	F	F	16	9
77	F	F	n.a	F	S	S	F	F	S	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	32	3
78	F	F		n.a				F	S	S	F	F	F	F	F	F	F	n.a			F	S	S	F	F	F	F	F	F	F	F	F	F	F	F	F	25	4
79	F	F		F	n.a	S	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	33	1
80	F	F		F		n.a	F	F	F	F	F	F	F	F	F	F	F	F			F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	32	0
81	F	F		S			n.a	F	S	S	F	F	F	F	F	F	F	S			F	S	S	F	F	F	F	F	F	F	F	F	F	F	F	F	25	6
82							n.a								F	F	S								S	S	F	F	F		F	F	F	F	S	9	4	
83	F						F	n.a			F	F	F	F	F	F	F								F	F	F	F	F	F	F	F	F	F	F	F	21	0
84	F	F					F	S	n.a		F	F	F	F	F	F	F				F	F	S	S	F	F	F	F	F	F	F	F	F	F	F	F	25	3
85							F				n.a	n.a		F	F	F	F								S	F	F	F	F	F	F	F	F	F	F	F	17	1
86							F				n.a	n.a		F	F	F	F								S	F	F	F	F	F	F	F	F	F	F	F	17	1
87							F						n.a		F	F	F								S	F	S	F	F	F	F	F	F	F	F	F	15	2
88							F							n.a		F	F	F							S	F	S	F	F	F		F	F	F	F	S	12	3
89															n.a		F	n.a								S		F	F	F		F	F	F	S	7	2	
90																n.a		F	n.a							S	S	F	F	F		F	F	F	F	S	8	3
91																F	F	n.a								S	S	F	F	F		F	F	F	F	S	9	3
92	F	F				n.a		F	S	S	F	F	F	F	F	F	F		n.a		F	F	S	S	F	F	F	F	F	F	F	F	F	F	F	F	25	4
93	F	F				S		S	S	F	S	S		S	F	F	F	S	n.a		F	S	S	S	S	S	F	F	F	F	F	F	F	F	F	F	20	13
94	F	n.a						F	S		S	S	S		F	F	F			n.a	S	S	S			S	F	S	F	F	F	F	F	F	F	F	16	9
95	F							F	S		S	S		F	F	F	F				n.a	S				S	F	F	F	F	F	F	F	F	F	F	18	5
96	F							F	S		F	F	F	F	F	F	F					n.a				S	F	F	F	F	F	F	F	F	F	F	21	1
97	F							F	S		F	F	F	F	F	F	F						n.a			F	F	F	F	F	F	F	F	F	F	F	23	1
98	F	F						F	S		F	F	F	F	F	F	F				F	F	S	S	n.a	F	F	F	F	F	F	F	F	F	F	F	24	3
00								F								F	F	F						n.a	F	F	F	F	F		F	F	F	F	F	F	14	0
01																										n.a		F	F	F		F	F	F	F	S	7	1
02															F											F	n.a	F	F	F		F	F	F	F	F	10	0
05																												n.a	S			F					2	1
06																													n.a								0	0
07																												F	F	n.a	F	F	F	F	F	S	6	1
08								S							S	F	S	S							S	S	S	F	F	F	n.a	F	F	F	F	S	8	8
09																												S				n.a				S	0	2
10																											S	S			S	n.a	F	S	S	1	5	
11																											S	S			S		n.a		S	0	4	
12																												S					n.a			0	1	
13																												F	F			F	F	F	n.a		5	0
F*	15	9	0	3	0	0	3	20	2	3	11	11	15	18	26	22	20	3	2	9	9	4	3	7	11	21	16	30	30	28	18	31	29	31	31	20	511	
S*	0	0	0	2	1	3	1	2	12	4	5	5	3	2	0	2	3	2	0	0	3	9	8	1	10	6	9	2	5	0	1	2	0	0	3	10	116	

Notes: Spring surveys were not conducted in 1999, 2003 and 2004. Each cell in the matrix represents the dominance relation between two given years, represented by a specific column with respect to the various yearly row entries. S represents *S-dominance* and F represents *F-dominance* with S\* and F\* representing their respective totals. Lastly, an entry shaded in grey and labelled 'n.a.' indicates that the two years being compared have identical distributions and thus cannot be ranked using the two dominance criteria.

The inequality measures for France show mixed results (see Table 5.8, Table 5.9, Figure 5.9 and Figure 5.10). Most measures regard 1970s to be the worst period in terms of having an inequitable happiness distribution. However there are a few exceptions, including  $I^{AF}(-2, -1, 2)$  (i.e. AF inequality index under convex scale) and  $I^{NY}(1, 4)$  (i.e. NY inequality index with weights 1 & 4), which point toward post 2010. Similar disparities are observed regarding the decade having the lowest happiness inequality with measures divided between the 1980s and post 2010.

Assessing the yearly performance in France in terms of the distribution of happiness, we get divergent findings across various inequality measures. While 2013 is found to have the lowest happiness inequality under  $I^{AF}(-2, 0, 2)$ ,  $I^{NY}(1, 1)$  (i.e. NY inequality index with weights 1 & 1), other indices point toward 1983 or 2006. Similarly, the results regarding the year with highest happiness inequality in France are divided between 1993 and 2010, reinforcing *S-dominance* findings discussed previously.

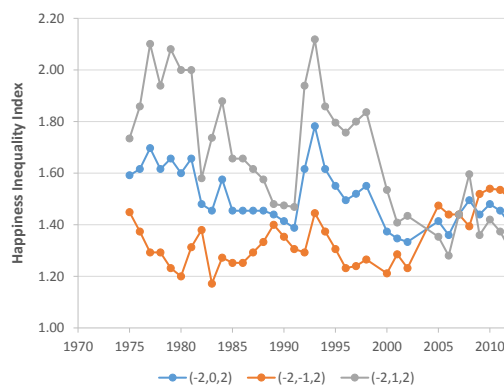
The mean happiness results (see Table 5.8, Table 5.9) suggest that average happiness in France increased from 1.846 in 1970s to 1.892 in the 1980s, following a marginal decrease in the 1990s averaging 1.882 and rising thereafter. Year 2012 appears to be the best period in terms of having highest mean happiness with an index of 2.050. In contrast, 1979 seems to be worst year with the lowest mean index of 1.788. These findings support *F-dominance* results for France.

**Table 5.8: Happiness Inequality Analysis, France**

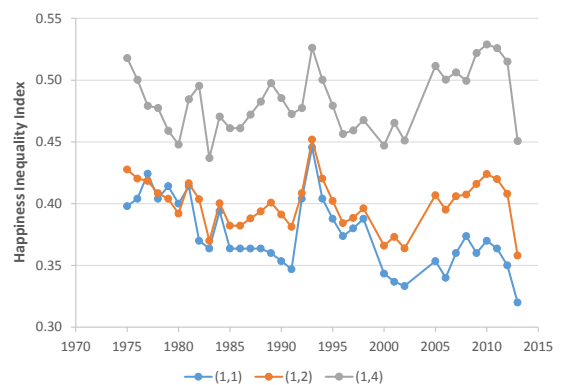
Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
<b>Index Average (Avg)</b>							
Late 1970s	1.636	1.328	1.943	0.409	0.416	0.487	1.846
1980s	1.503	1.287	1.718	0.376	0.393	0.471	1.892
1990s	1.548	1.313	1.783	0.387	0.403	0.481	1.882
2000s	1.409	1.393	1.425	0.352	0.395	0.493	1.992
Post 2010	1.378	1.425	1.331	0.345	0.395	0.497	2.023
<b>Avg Index Change</b>							
1980s	-0.133	-0.041	-0.225	-0.033	-0.023	-0.016	0.046
1990s	0.046	0.026	0.065	0.011	0.010	0.010	-0.010
2000s	-0.139	0.080	-0.358	-0.035	-0.007	0.012	0.110
Post 2010	-0.031	0.032	-0.094	-0.008	-0.000	0.005	0.031
<b>Performance Ranking</b>							
<b>By Year</b>							
Best	2013	1983	2006	2013	2013	1983	2012
Index	1.280	1.172	1.280	0.320	0.358	0.437	2.050
Worst	1993	2010	1993	1993	1993	2010	1979
Index	1.782	1.540	2.119	0.446	0.452	0.529	1.788
<b>By Decade</b>							
Best	post 2010	1980s	post 2010	post 2010	1980s	1980s	post 2010
Index	1.378	1.287	1.331	0.345	0.393	0.471	2.023
Worst	late 1970s	post 2010	late 1970s	late 1970s	late 1970s	post 2010	late 1970s
Index	1.636	1.425	1.943	0.409	0.416	0.497	1.846

Notes: Columns 2, 3 & 4 provides results based on AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 findings are based NY inequality measures using different subjective societal judgements. Column 8 provides findings for mean index computed using a linear scale. Best year/ decade in terms of happiness inequality refers to one that records lowest inequality index, whereas worst year/ decade is one with highest inequality index. Best year/ decade in terms of mean happiness refers to one in which mean happiness index is highest, whereas worst year/ decade refers to a period in which mean happiness is lowest.

**Figure 5.9: AF Measures, France**



**Figure 5.10: NY Measures, France**



Notes: Figure 5.9 presents AF happiness inequality indices under linear (-2,0,2), convex (-2,-1,2) & concave (-2,1,2) scales. Figure 5.10 presents NY inequality measures with different weights ( $\alpha$ ,  $\beta$ ) for subjective societal judgements including (1,1), (1,2) and (1,4).

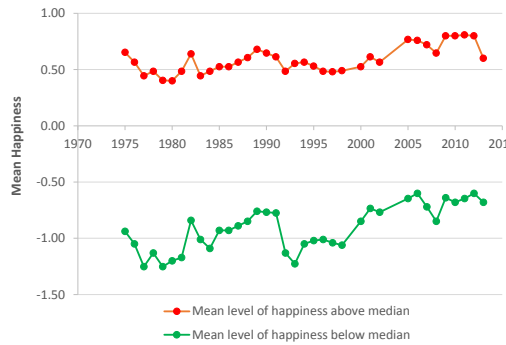
**Table 5.9: Happiness Inequality & Mean Happiness Indices, France**

Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
1975	1.592	1.449	1.735	0.398	0.428	0.518	1.929
1976	1.616	1.374	1.859	0.404	0.420	0.500	1.879
1977	1.697	1.293	2.101	0.424	0.418	0.479	1.798
1978	1.616	1.293	1.939	0.404	0.408	0.478	1.838
1979	1.657	1.232	2.081	0.414	0.404	0.459	1.788
1980	1.600	1.200	2.000	0.400	0.392	0.448	1.800
1981	1.657	1.313	2.000	0.414	0.417	0.485	1.828
1982	1.480	1.380	1.580	0.370	0.404	0.495	1.950
1983	1.455	1.172	1.737	0.364	0.370	0.437	1.859
1984	1.576	1.273	1.879	0.394	0.400	0.470	1.848
1985	1.455	1.253	1.657	0.364	0.382	0.461	1.899
1986	1.455	1.253	1.657	0.364	0.382	0.461	1.899
1987	1.455	1.293	1.616	0.364	0.388	0.472	1.919
1988	1.455	1.333	1.576	0.364	0.394	0.483	1.939
1989	1.440	1.400	1.480	0.360	0.401	0.498	1.980
1990	1.414	1.354	1.475	0.354	0.391	0.485	1.970
1991	1.388	1.306	1.469	0.347	0.381	0.473	1.959
1992	1.616	1.293	1.939	0.404	0.408	0.478	1.838
1993	1.782	1.446	2.119	0.446	0.452	0.526	1.832
1994	1.616	1.374	1.859	0.404	0.420	0.500	1.879
1995	1.551	1.306	1.796	0.388	0.402	0.479	1.878
1996	1.495	1.232	1.758	0.374	0.384	0.456	1.869
1997	1.520	1.240	1.800	0.380	0.388	0.459	1.860
1998	1.551	1.265	1.837	0.388	0.396	0.468	1.857
2000	1.374	1.212	1.535	0.343	0.366	0.447	1.919
2001	1.347	1.286	1.408	0.337	0.373	0.465	1.969
2002	1.333	1.232	1.434	0.333	0.364	0.451	1.949
2005	1.414	1.475	1.354	0.354	0.407	0.511	2.030
2006	1.360	1.440	1.280	0.340	0.395	0.501	2.040
2007	1.440	1.440	1.440	0.360	0.406	0.506	2.000
2008	1.495	1.394	1.596	0.374	0.407	0.500	1.949
2009	1.440	1.520	1.360	0.360	0.416	0.522	2.040
2010	1.480	1.540	1.420	0.370	0.424	0.529	2.030
2011	1.455	1.535	1.374	0.364	0.420	0.526	2.040
2012	1.400	1.500	1.300	0.350	0.408	0.515	2.050
2013	1.280	1.240	1.320	0.320	0.358	0.451	1.980
Mean	1.499	1.337	1.660	0.375	0.399	0.483	1.919

Notes: Spring surveys were not conducted in 1999, 2003 and 2004. Columns 2, 3 & 4 represent AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 are the NY inequality measures with different subjective societal judgements. Column 8 provides mean index under a linear scale.

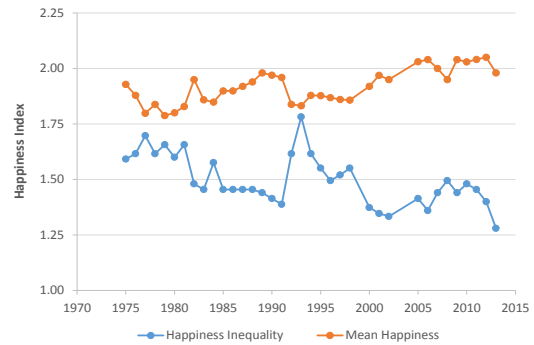
Finally, in the case of France, on average for each decade without exception a decline (an increase) in happiness inequality coincides with an increase (a decline) in mean happiness (see Figure 5.11 and Figure 5.12).

**Figure 5.11: Mean Happiness, France**



Notes: The gap between the two series give yearly AF inequality measures based on linear scale (-2,0,2). The mid-points of the two series give the yearly mean indices.

**Figure 5.12: Comparative Analysis, France**



Notes: Happiness inequality is AF inequality measure based on linear scale (-2,0,2). Mean happiness is the average happiness index based on linear scale (1,2,3).

## 5.5 Germany

In total, Germany had 505 *F-dominance* and 120 *S-dominance* relations (see Table 5.10). The rankings for *S-dominance* show 1989 to be the best year, recording lower happiness inequality compared to 20 other years. This could be partially associated with the euphoric experience of the populace during the lead up to Germany's reunification in 1990. Other years that also fared well in terms of recording lower happiness inequality include 1980 and 2001.

Overall, Germany did better in the 1980s, having a more equitable distribution of happiness than other decades. In general however, Germany's *S-dominance* rankings do not exhibit any discernible trends, with 1976-77, 1993 and 2009 having greater happiness inequality than at least 10 other years. During 1993 and 2009, Germany recorded negative annual economic growth of 1% and 5.1% respectively, with the latter possibly associated with the flow-on effects from the Global Financial Crisis in 2008. On the other hand, the employment and inflations rates during these years were largely in line with long term averages. It is possible that some of

these macro factors may have had an impact on the distribution of happiness. Further research is required to make that judgment.

*F-dominance* results for Germany suggests 1992-2002 to be the worst decade in terms of having lower happiness mean. However, mean happiness appears to have considerably improved in the recent decade, with 2012 and 2013 recording higher average happiness than 32 preceding years. Other years that have reported similar performance in the past include 1990, 1986 and 1979. Once again the higher happiness levels in 1990 may be attributable to Germany's reunification. Further research is required to make any conclusive comments.

**Table 5.10: Dominance Ranking Matrix, Germany**

	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	00	01	02	05	06	07	08	09	10	11	12	13	F*	S*
75	n.a		F	F	F	F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F				F	F	F	F	F	F	F	F	F	F	F	30	0
76	S	n.a	S	F	F	S		F	S	F	F	F	F	F	F	F	F	F	F	S	F	S				S	S	F	S	F	S	F	F	F	F	F	21	10
77			n.a	F	F	S		F		F	F	F	F	F	F	F	F	F	F	S	F				S		F		F	F	F	F	F	F	F	21	3	
78				n.a	F	S		S		S	F	F	S	F	S	F	F	S	F	S	S	S				S		S		F		F	F	F	F	F	13	10
79					n.a							F			S	F																	F	F	F	5	1	
80					F	n.a						F	F	F	F	F																	F	F	F	9	0	
81	S	F	F	F	F	F	n.a	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F				S	F	F	F	F	F	F	F	F	F	30	2	
82					F	S		n.a		n.a		F	F	F	S	F	F													F			F	F	F	10	2	
83				F	F	S		F	n.a	F	F	F	F	F	F	F	F	F	F	S	F	n.a				S	S	F	S		F	F	F	F	F	23	5	
84					F	S		n.a		n.a		F	F	F	S	F	F												F			F	F	F	10	2		
85					F	S		S		S	n.a	F	S	S	S	F	S												S		F	S	F	F	7	9		
86												n.a			S	F																n.a	F	F	3	1		
87					F							F	n.a	F	S	F																F	F	F	7	1		
88					F							F		n.a	S	F																F	F	F	6	1		
89															n.a																					0	0	
90															S	n.a																	S	S	0	3		
91					F	S						F	S	S	S	F	n.a													F		F	F	F	7	4		
92					F	S		F		F	F	F	F	F	S	F	F	n.a		S	n.a					S			F		F	F	F	F	15	4		
93					F	S		S		S	F	F	S	F	S	F	F	S	n.a	S	S					S		S		F		F	S	F	F	11	11	
94					F	F		F		F	F	F	F	F	F	F	F				n.a					S			F		F	F	F	F	17	1		
95					F	S		F		F	F	F	F	F	S	F	F	n.a			n.a					S			F		F	F	F	F	15	4		
96				F	F	S		F	n.a	F	F	F	F	F	F	F	F	F	F	S	F	n.a				S	S	F	S	F	F	F	F	F	23	5		
97	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	n.a	F	F	F	F	F	F	F	F	F	F	F	35	0		
98	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	n.a			F	F	F	F	F	F	F	F	F	33	0		
00	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	n.a	F	F	F	F	F	F	F	F	F	F	34	0		
01					F	F		F		F	F	F	F	F	F	F									n.a				F		F	F	F	F	17	0		
02				F	F	F		F		F	F	F	F	F	F	F	F	F	F	F	F				S	n.a	F	n.a	F		F	F	F	F	24	1		
05					F	S		S		S	F	F	S	F	S	F	F	S		S	S					S				F		F	F	F	12	9		
06				F	F	F		F		F	F	F	F	F	F	F	F	F	F	F	F				S	n.a	F	n.a	F		F	F	F	F	24	1		
07					F	S						F	S	S	S	F													n.a			F	F	F	6	4		
08				F	F	S		F		F	F	F	F	F	F	F	F	F	S	F					S	S	F	S	F	n.a	F	F	F	F	22	5		
09					S	S		S		S		S	S	S	S	F	S											F	S		n.a	S	S	F	3	12		
10					F	S		S				F	S	F	S	F	F												F		n.a	F	F	F	9	5		
11											n.a				S	F																n.a	F	F	3	1		
12															S																		n.a		0	1		
13															S																		S	n.a	0	2		
F*	3	4	10	12	28	9	3	16	5	16	19	19	24	15	32	22	12	13	7	12	5	0	2	1	4	5	12	5	23	7	20	18	29	32	32	505		
S*	2	0	1	0	1	17	0	6	1	6	0	1	8	4	20	0	2	3	0	10	3	1	0	0	0	14	4	2	4	2	1	0	3	1	2	1	120	

Notes: Spring surveys were not conducted in 1999, 2003 and 2004. Each cell in the matrix represents the dominance relation between two given years, represented by a specific column with respect to the various yearly row entries. S represents *S-dominance* and F represents *F-dominance* with S\* and F\* representing their respective totals. Lastly, an entry shaded in grey and labelled 'n.a.' indicates that the two years being compared have identical distributions and thus cannot be ranked using the two dominance criteria.

Evaluating inequality measures for Germany (see Table 5.11, Table 5.12, Figure 5.13, and Figure 5.14) are largely consistent with minor variations. For instance, most measures consider post 2010 to be the worst period having highest happiness inequality. The only exception to this is  $I^{AF}(-2,1,2)$ , which depicts 1990s to be the decade with highest happiness inequality averaging around 1.447. The decade having the most equitable happiness distribution, are largely divided between 1980s and 2000s. Overall,  $I^{AF}(-2,0,2)$  indicates that happiness inequality in Germany has dropped from 1.483 in the 1990s to 1.472 in 2000s. Similar trends were found based on all the other measures.

When Germany's happiness inequality estimates for distinct years are examined, the results diverge. While  $I^{NY}(1,1)$ ;  $I^{AF}(-2,0,2)$  and  $I^{AF}(-2,1,2)$  show 1989 to be the best year in terms of having the most equitable distribution, others point to 1975. On the other hand, while  $I^{AF}(-2,1,2)$  finds 1997 to have the highest inequality, other measures are divided between 1990 and 2009.

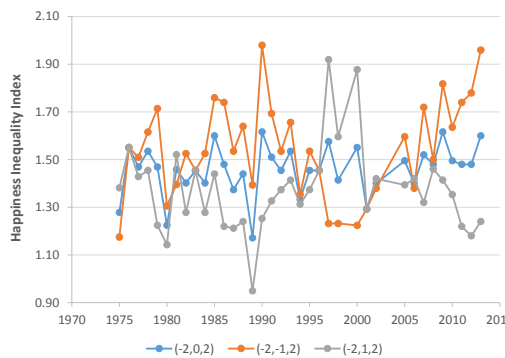
The mean happiness results developed using a linear scale (see Table 5.11 and Table 5.12) indicate that although average happiness in Germany improved in 1980s, the average levels deteriorated in 1990s and 2000s, before picking up in recent years. Overall, the findings reflect 1990 to be the year with highest mean happiness index of 2.182, whereas 1997 had the lowest mean happiness index of 1.828. These results validate *F-dominance* findings for Germany.

**Table 5.11: Happiness Inequality Analysis, Germany**

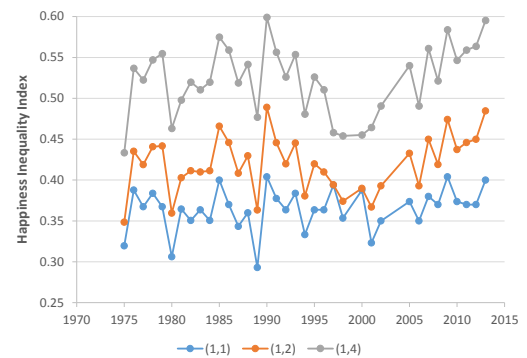
Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
<b>Index Average (Avg)</b>							
Late 1970s	1.461	1.513	1.408	0.365	0.417	0.519	2.026
1980s	1.401	1.528	1.274	0.350	0.411	0.518	2.064
1990s	1.483	1.519	1.447	0.371	0.420	0.518	2.018
2000s	1.472	1.505	1.439	0.368	0.417	0.517	2.017
Post 2010	1.520	1.827	1.213	0.380	0.460	0.573	2.153
<b>Avg Index Change</b>							
1980s	-0.060	0.014	-0.134	-0.015	-0.006	-0.001	0.037
1990s	0.082	-0.008	0.173	0.021	0.009	0.000	-0.045
2000s	-0.011	-0.014	-0.008	-0.003	-0.002	-0.001	-0.002
Post 2010	0.048	0.321	-0.226	0.012	0.043	0.056	0.137
<b>Performance Ranking</b>							
<b>By Year</b>							
Best	1989	1975	1989	1989	1975	1975	1990
Index	1.172	1.175	0.949	0.293	0.349	0.434	2.182
Worst	2009	1990	1997	2009	1990	1990	1997
Index	1.616	1.980	1.919	0.404	0.489	0.599	1.828
<b>By Decade</b>							
Best	1980s	2000s	post 2010	1980s	1980s	2000s	2000s
Worst	post 2010	post 2010	1990s	post 2010	post 2010	post 2010	post 2010

Notes: Columns 2, 3 & 4 provides results based on AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 findings are based on NY inequality measures using different subjective societal judgements. Column 8 provides findings for mean index computed using a linear scale. Best year/ decade in terms of happiness inequality refers to one that records lowest inequality index, whereas worst year/ decade is one with highest inequality index. Best year/ decade in terms of mean happiness refers to one in which mean happiness index is highest, whereas worst year/ decade refers to a period in which mean happiness is lowest.

**Figure 5.13: AF Measures, Germany**



**Figure 5.14: NY Measures, Germany**



Notes: Figure 5.13 presents AF happiness inequality indices under linear (-2,0,2), convex (-2,-1,2) & concave (-2,1,2) scales. Figure 5.14 presents NY inequality measures with different weights ( $\alpha$ ,  $\beta$ ) for subjective societal judgements including (1,1), (1,2) and (1,4).

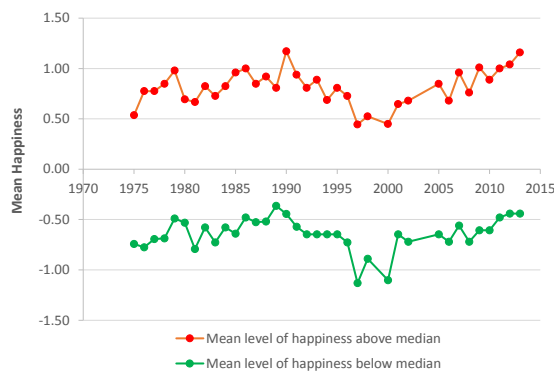
**Table 5.12: Happiness Inequality & Mean Happiness Indices, Germany**

Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
1975	1.278	1.175	1.381	0.320	0.349	0.434	1.948
1976	1.551	1.551	1.551	0.388	0.435	0.537	2.000
1977	1.469	1.510	1.429	0.367	0.419	0.523	2.020
1978	1.535	1.616	1.455	0.384	0.441	0.547	2.040
1979	1.469	1.714	1.224	0.367	0.442	0.555	2.122
1980	1.224	1.306	1.143	0.306	0.360	0.463	2.041
1981	1.458	1.396	1.521	0.365	0.403	0.498	1.969
1982	1.402	1.526	1.278	0.351	0.411	0.520	2.062
1983	1.455	1.455	1.455	0.364	0.410	0.510	2.000
1984	1.402	1.526	1.278	0.351	0.411	0.520	2.062
1985	1.600	1.760	1.440	0.400	0.466	0.575	2.080
1986	1.480	1.740	1.220	0.370	0.446	0.559	2.130
1987	1.374	1.535	1.212	0.343	0.408	0.519	2.081
1988	1.440	1.640	1.240	0.360	0.430	0.542	2.100
1989	1.172	1.394	0.949	0.293	0.363	0.477	2.111
1990	1.616	1.980	1.253	0.404	0.489	0.599	2.182
1991	1.510	1.694	1.327	0.378	0.446	0.556	2.092
1992	1.455	1.535	1.374	0.364	0.420	0.526	2.040
1993	1.535	1.657	1.414	0.384	0.445	0.554	2.061
1994	1.333	1.354	1.313	0.333	0.380	0.481	2.010
1995	1.455	1.535	1.374	0.364	0.420	0.526	2.040
1996	1.455	1.455	1.455	0.364	0.410	0.510	2.000
1997	1.576	1.232	1.919	0.394	0.394	0.458	1.828
1998	1.414	1.232	1.596	0.354	0.374	0.454	1.909
2000	1.551	1.224	1.878	0.388	0.390	0.455	1.837
2001	1.293	1.293	1.293	0.323	0.367	0.464	2.000
2002	1.400	1.380	1.420	0.350	0.393	0.491	1.990
2005	1.495	1.596	1.394	0.374	0.433	0.540	2.051
2006	1.400	1.380	1.420	0.350	0.393	0.491	1.990
2007	1.520	1.720	1.320	0.380	0.450	0.561	2.100
2008	1.480	1.500	1.460	0.370	0.419	0.521	2.010
2009	1.616	1.818	1.414	0.404	0.474	0.584	2.101
2010	1.495	1.636	1.354	0.374	0.437	0.546	2.071
2011	1.480	1.740	1.220	0.370	0.446	0.559	2.130
2012	1.480	1.780	1.180	0.370	0.450	0.564	2.150
2013	1.600	1.960	1.240	0.400	0.485	0.595	2.180
Mean	1.457	1.543	1.372	0.364	0.420	0.523	2.043

Notes: Spring surveys were not conducted in 1999, 2003 and 2004. Columns 2, 3 & 4 represent AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 are the NY inequality measures with different subjective societal judgements. Column 8 provides mean index under a linear scale.

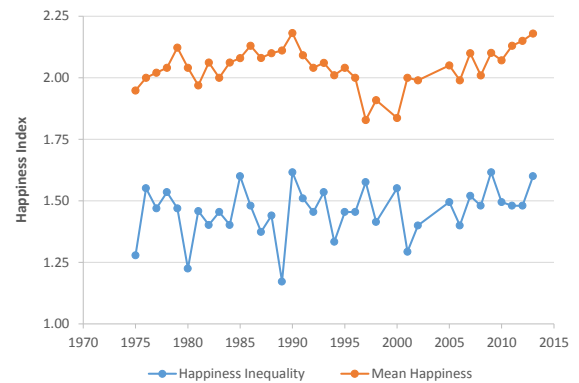
Finally, the results for Germany further suggest that a reduction (increase) in happiness inequality was accompanied by an increase (decrease) in average happiness in the 1980s and 1990s; however the trends seem to have reversed in the last decade and a half, with level and inequality of happiness moving in the same direction (see Figure 5.15 and Figure 5.16).

**Figure 5.15: Mean Happiness, Germany**



Notes: The gap between the two series give yearly AF inequality measures based on linear scale (-2,0,2). The mid-points of the two series give the yearly mean indices.

**Figure 5.16: Comparative Analysis, Germany**



Notes: Happiness inequality is AF inequality measure based on linear scale (-2,0,2). Mean happiness is the average happiness index based on linear scale (1,2,3).

## 5.6 Ireland

Overall, Ireland recorded 408 *F-dominance* and 222 *S-dominance* relations (see Table 5.13). The scale independent dominance rankings indicate 1998 to be the best year in terms of recording lower happiness inequality relative to 21 other years. Other years that also performed well include 1995-96. Happiness inequality remained high during the late 1970s and early 1980s, primarily following a downward trend thereafter. The main exceptions were 1991 and 1992, which represent worst years, *S-dominated* by at least 17 other years. Thus in general, Ireland seems to have done better during the 1990s and 2000s in terms of having lower happiness inequality compared to previous decades.

If we examine *F-dominance* rankings for Ireland, 1997 appears to be the best year, with mean happiness greater than most other years. Other years that also did exceptionally well in terms of higher average happiness include 1978, 1990, 2001, 2006, 2008, having mean happiness levels greater than at least 20 other years. The strong performance for 2008 in terms of *F-dominance* suggests that the negative economic growth in Ireland during

the Global Financial Crisis in 2008 did not dampen the overall well-being of Irish people. Alternatively, another possibility could be that it may be the case that the Irish government had appropriate counteractive policy measures in place. These are important questions worth enquiring as part of future research.

Overall, 1980s seems to be the worst decade in terms of lower average happiness, with the second half standing out. Consistent with *S-dominance* results, 1990s and 2000s seem to do better in terms of *F-dominance* relative to preceding decades. However, average happiness levels appear to have dropped again in recent years, with 2013 recording lower mean happiness than 32 other years.

**Table 5.13: Dominance Ranking Matrix, Ireland**

	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	00	01	02	05	06	07	08	09	10	11	12	13	F*	S*
75	n.a	S		F												F					S	S	F	S	S	F	S	F	F	S	F	F	F	S		9	8	
76		n.a		F												F					S	S	F	S	F	F	S	F	F	F	F	F	F		11	4		
77	S	S	n.a	F												F					S	S	F	S	S	S	S	S	S	S	S	F	S	S		4	14	
78				n.a																	S	F	S		S	S			S	S						1	7	
79	S	S	F	F	n.a	S		F								F	F	F	S	S	S	S	F	S	S	F	S	S	F	S	S	F	F	S	S		11	15
80	F	S	F	F		n.a		F								F	F				S	S	F	S	F	F	S	F	F	F	F	F	F	F	S		16	6
81	F	S	F	F	F	S	n.a	F								F	F	F	S	F	S	S	F	S	F	F	S	F	F	F	F	F	F	F	S		19	8
82	S	S	S	S				n.a								F	F				S	S	F	S	S	S	S	S	S	S	S	S	S	S		3	17	
83	F	S	F	F	F	S	S	F	n.a	F		S				F	F	F	S	S	S	S	F	S	S	F	S	F	F	F	F	F	F	S		17	13	
84	S	S	F	F	F	S	S	F		n.a						F	F	F	S	S	S	S	F	S	S	F	S	S	F	S	F	F	F	S	S		13	15
85	F	F	F	F	F	F	F	F	F	F	n.a	F			S	F	F	F	F	F	F	F	F	F	F	F	S	F	F	F	F	F	F	F	S		29	4
86	F	F	F	F	F	F	F	F		F		n.a				F	F	F	S	F	F	F	F	F	F	F	S	F	F	F	F	F	F	F	S		26	3
87	F	F	F	F	F	F	F	F	F	F	F	F	n.a		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S		33	1
88	F	F	F	F	F	F	F	F	F	F	F	F	S	n.a	S	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S		31	4
89	F	F	F	F	F	F	F	F	F	F	F				n.a	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S		30	1
90				S												n.a					S	F				S	S	S	S	S	S	S			1	9		
91	S	S	S	S												S	n.a				S	S	F	S	S	S	S	S	S	S	S	S	S	S		1	18	
92	S	S	S	F		S		F								F	F	n.a			S	S	F	S	S	S	S	S	S	S	S	S	F	S	S		6	17
93	F	F	F	F		F		F								F	F	F	n.a		F	F	F	F	F	F	S	F	F	F	F	F	F	F	S		22	2
94	F	S	F	F		S		F								F	F	F	S	n.a	S	S	F	S	S	F	S	F	F	F	F	F	F	S	S		15	10
95				F												F					n.a	F	F	S		F	S	F	F	F	F					9	2	
96																					n.a	F	S		F	S			F	F	F					5	2	
97																						n.a							S	S	S					0	3	
98																							F	n.a		F	S		F	F	F					5	1	
00				F												F					S	S	F	S	n.a	F	S	F	F	F	F					8	4	
01																							F			n.a			S	S	S					1	3	
02																							F				n.a		F	F	F					5	0	
05				F																	S	F	S		F	S		F	S	n.a	F	S	F			5	4	
06																														n.a						0	0	
07																												F	n.a							1	0	
08																													F	S	n.a					1	1	
09				F												F					S	S	F	S	S	S	S	S	S	S	n.a	S			3	11		
10				F												F					S	S	F	S	S	S	S	S	S	S		n.a			3	10		
11			S	F												F					S	S	F	S	F	F	S	F	F	F	F	F	F	n.a		11	5	
12	F	F	F	F				F								F	F				F	F	F	F	F	F	F	F	F	F	F	F	F	n.a		21	0	
13	F	F	F	F	F	F	F	F	F	F		F				F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	n.a		32	0
F*	12	8	14	24	9	7	6	15	5	7	2	5	0	0	2	24	16	12	5	7	8	9	32	8	12	23	5	17	25	19	22	19	17	10	2	0	408	
S*	6	12	3	3	0	6	2	0	0	0	0	1	1	0	2	1	0	0	6	3	16	19	0	21	11	8	25	9	10	15	11	2	5	9	12	3	222	

Notes: Spring surveys were not conducted in 1999, 2003 and 2004. Each cell in the matrix represents the dominance relation between two given years, represented by a specific column with respect to the various yearly row entries. S represents *S-dominance* and F represents *F-dominance* with S\* and F\* representing their respective totals. Lastly, an entry shaded in grey and labelled 'n.a.' indicates that the two years being compared have identical distributions and thus cannot be ranked using the two dominance criteria.

Inequality estimates for Ireland (see Table 5.14, Table 5.15, Figure 5.17, and Figure 5.18) largely offers steady results, with most measures indicating post 2010 as the best period with lowest happiness inequality. In terms of the decade with the most inequitable distribution, the measures are divided between 1970s and 1980s. For instance,  $I^{AF}(-2, -1, 2)$  and  $I^{NY}(1, 2)$  (i.e. NY inequality index with weights 1 & 2) point to 1970s, whereas the other indices rank 1980s as having the worst happiness inequality. These findings confirm *S-dominance* results for Ireland. Overall,  $I^{AF}(-2, 0, 2)$  estimates show a declining trend in happiness inequality in Ireland post 1980s. Although average happiness inequality rose from 1.976 in the late 1970s to 2.010 in the 1980s, the levels have dropped considerably post 2010 averaging around 1.779. Other inequality measures also depict similar trends.

Assessing the distribution of happiness across individual years gives mixed results. When it comes to identifying the best year in terms of having lowest happiness the measures are divided between 2002 and 2013 respectively. On the other hand, while  $I^{AF}(-2, 1, 2)$  measure indicates 1988 to have the most unequitable happiness distribution, other measures diverge between 1982 and 1991.

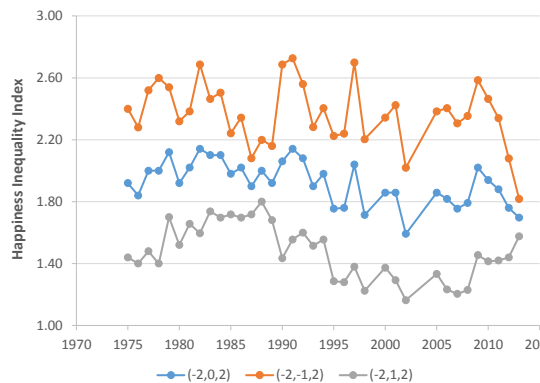
Turning to the average happiness index estimates using a linear scale (see Table 5.14, and Table 5.15) suggests that mean happiness in Ireland dropped from 2.246 in late 1970s to 2.164 in 1980s, improving thereafter averaging 2.266 in 2000s. With the recent decline in Ireland's mean happiness post 2010 the average happiness levels at 2.150 seems to be lowest, making it the worst period for Ireland in terms of mean happiness.

**Table 5.14: Happiness Inequality Analysis, Ireland**

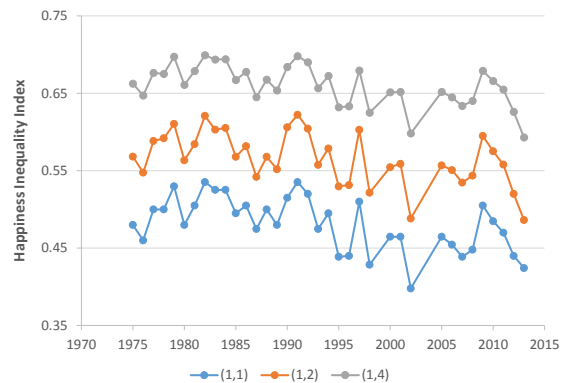
Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
<b>Index Average (Avg)</b>							
Late 1970s	1.976	2.468	1.484	0.494	0.581	0.672	2.246
1980s	2.010	2.339	1.682	0.503	0.579	0.674	2.164
1990s	1.937	2.448	1.426	0.484	0.573	0.663	2.256
2000s	1.832	2.365	1.300	0.458	0.551	0.646	2.266
Post 2010	1.779	2.079	1.479	0.445	0.521	0.625	2.150
<b>Avg Index Change</b>							
1980s	0.034	-0.129	0.198	0.009	-0.002	0.002	-0.082
1990s	-0.074	0.109	-0.256	-0.018	-0.006	-0.010	0.091
2000s	-0.104	-0.083	-0.126	-0.026	-0.022	-0.017	0.011
Post 2010	-0.053	-0.286	0.179	-0.013	-0.029	-0.022	-0.116
<b>Performance Ranking</b>							
<b>By Year</b>							
Best	2002	2013	2002	2002	2013	2013	1997
Index	1.592	1.818	1.163	0.398	0.486	0.593	2.330
Worst	1982	1991	1988	1982	1991	1982	2013
Index	2.141	2.727	1.800	0.535	0.622	0.699	2.061
<b>By Decade</b>							
Best	post 2010	post 2010	2000s	post 2010	post 2010	post 2010	2000s
Worst	1980s	late 1970s	1980s	1980s	late 1970s	1980s	post 2010

Notes: Columns 2, 3 & 4 provides results based on AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 findings are based on NY inequality measures using different subjective societal judgements. Column 8 provides findings for mean index computed using a linear scale. Best year/ decade in terms of happiness inequality refers to one that records lowest inequality index, whereas worst year/ decade is one with highest inequality index. Best year/ decade in terms of mean happiness refers to one in which mean happiness index is highest, whereas worst year/ decade refers to a period in which mean happiness is lowest.

**Figure 5.17: AF Measures, Ireland**



**Figure 5.18: NY Measures, Ireland**



Notes: Figure 5.17 presents AF happiness inequality indices under linear (-2,0,2), convex (-2,-1,2) & concave (-2,1,2) scales. Figure 5.18 presents NY inequality measures with different weights ( $\alpha$ ,  $\beta$ ) for subjective societal judgements including (1,1), (1,2) and (1,4).

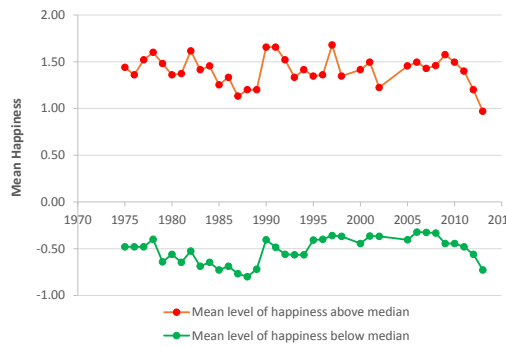
**Table 5.15: Happiness Inequality & Mean Happiness Indices, Ireland**

Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
1975	1.920	2.400	1.440	0.480	0.568	0.662	2.240
1976	1.840	2.280	1.400	0.460	0.548	0.647	2.220
1977	2.000	2.520	1.480	0.500	0.588	0.676	2.260
1978	2.000	2.600	1.400	0.500	0.592	0.675	2.300
1979	2.120	2.540	1.700	0.530	0.610	0.697	2.210
1980	1.920	2.320	1.520	0.480	0.564	0.661	2.200
1981	2.020	2.384	1.657	0.505	0.584	0.679	2.182
1982	2.141	2.687	1.596	0.535	0.621	0.699	2.273
1983	2.101	2.465	1.737	0.525	0.603	0.694	2.182
1984	2.101	2.505	1.697	0.525	0.605	0.694	2.202
1985	1.980	2.242	1.717	0.495	0.568	0.667	2.131
1986	2.020	2.343	1.697	0.505	0.582	0.678	2.162
1987	1.899	2.081	1.717	0.475	0.542	0.645	2.091
1988	2.000	2.200	1.800	0.500	0.568	0.668	2.100
1989	1.920	2.160	1.680	0.480	0.552	0.654	2.120
1990	2.061	2.687	1.434	0.515	0.606	0.684	2.313
1991	2.141	2.727	1.556	0.535	0.622	0.698	2.293
1992	2.080	2.560	1.600	0.520	0.604	0.690	2.240
1993	1.899	2.283	1.515	0.475	0.558	0.657	2.192
1994	1.980	2.404	1.556	0.495	0.579	0.673	2.212
1995	1.755	2.224	1.286	0.439	0.530	0.632	2.235
1996	1.760	2.240	1.280	0.440	0.532	0.633	2.240
1997	2.040	2.700	1.380	0.510	0.603	0.680	2.330
1998	1.714	2.204	1.224	0.429	0.522	0.625	2.245
2000	1.859	2.343	1.374	0.465	0.555	0.651	2.242
2001	1.859	2.424	1.293	0.465	0.559	0.652	2.283
2002	1.532	2.020	1.163	0.398	0.488	0.598	2.214
2005	1.859	2.384	1.333	0.465	0.557	0.652	2.263
2006	1.818	2.404	1.232	0.455	0.551	0.645	2.293
2007	1.755	2.306	1.204	0.439	0.535	0.634	2.276
2008	1.792	2.354	1.229	0.448	0.544	0.640	2.281
2009	2.020	2.586	1.455	0.505	0.595	0.679	2.283
2010	1.939	2.465	1.414	0.485	0.575	0.666	2.263
2011	1.880	2.340	1.420	0.470	0.558	0.655	2.230
2012	1.760	2.080	1.440	0.440	0.520	0.626	2.160
2013	1.637	1.818	1.576	0.424	0.486	0.593	2.061
Mean	1.923	2.369	1.478	0.481	0.566	0.660	2.223

Notes: Spring surveys were not conducted in 1999, 2003 and 2004. Columns 2, 3 & 4 represent AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 are the NY inequality measures with different subjective societal judgements. Column 8 provides mean index under a linear scale.

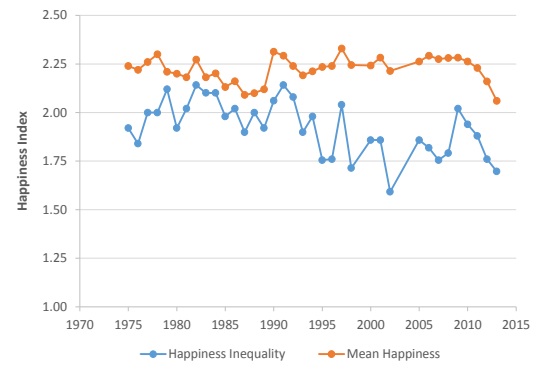
Lastly, similar to France, the results for Ireland (see Figure 5.19 and Figure 5.20) are indicative that across decades, a decline (an increase) in happiness inequality concurred with an increase (a decline) in mean happiness.

**Figure 5.19: Mean Happiness, Ireland**



Notes: The gap between the two series give yearly AF inequality measures based on linear scale (-2,0,2). The mid-points of the two series give the yearly mean indices.

**Figure 5.20: Comparative Analysis, Ireland**



Notes: Happiness inequality is AF inequality measure based on linear scale (-2,0,2). Mean happiness is the average happiness index based on linear scale (1,2,3).

## 5.7 Italy

Italy had a total of 479 *F-dominance* and 148 *S-dominance* relations (see Table 5.16) The *S-dominance* results for Italy show, 2010 to be unequivocally the best year with the lowest happiness inequality compared to 16 other years. On the other hand, the 1980s seems to be the worst decade in terms of *S-dominance*. During this decade, 1985 stands out as having higher happiness inequality than 18 other years. Happiness equality in Italy has improved since 1990s, with 2000s by far the best decade.

Scrutinising the *F-dominance* rankings for Italy, 1991 is the best year recording greater average happiness relative to all other years. Other years that seem to have done fairly well in terms of *F-dominance* include 2001, 2002 and 1993 with all these years *F-dominating* at least 28 other years. Average happiness appears to have increased in Italy during the 1990s, before deteriorating again in 2000s, thus making 1990s best decade in terms of higher mean happiness. In contrast, the late 1970s (particularly 1975 and 1976) and early 1980s account for the worst period for Italy in terms of having lower mean happiness than most subsequent years. It is worth noting that while the 1990s was a period of high economic growth and low

inflation in Italy, early 1980s was a period of significantly high inflation (averaging 20%) and marginal or negative economic growth. It is possible that economic growth and low inflation may have had a well-being enhancing effect in Italy in the 1990s. Further research is certainly indicated.

**Table 5.16: Dominance Ranking Matrix, Italy**

	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	00	01	02	05	06	07	08	09	10	11	12	13	F*	S*				
75	n.a			F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S	F	S	F		S	28	3				
76	F	n.a		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S	F	S	F		S	S	31	4			
77	S		n.a		F	n.a		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S		F	F	F	F	F	S	S	S	F		S	S	26	7		
78				n.a		S	F	F	F	S	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S		F	F	S	F	F	S	S	S				S	21	8		
79	S		n.a		F	n.a		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S		F	F	F	F	F	S	S	S	F		S	S	26	7		
80					n.a		F	F	F	n.a	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S		F	F	S	F	F	S	S	S				S	21	6		
81						n.a		F	S		F	S	F	S	F	F	F	F	F	S	F	S	S	S	S	S		F	F	S	F	S			S	S			S	12	13	
82							n.a					S	n.a	S	F	F	F	F	F	S	F	S	S	S	S		F	F	S	F	S			S	S				S	9	10	
83								F	n.a		F	S	F	F	F	F	F	F	F	F	F	F	F	F	S		F	F	S	F	F			S	S				S	18	6	
84						n.a	F	F	F	n.a	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S		F	F	S	F	F	S	S	S				S	21	6	
85								S			n.a	S	S	S	F	F	F	S	S	S	S	S	S	S	S	S		F	F	S	S	S		S	S	S				S	5	18
86									n.a			n.a		F	F	F	F	F	F	F	F	F	F	F			F	F	S	F	F			S	S				S	15	3	
87								n.a				S	n.a	S	F	F	F	F	F	S	F	S	S	S	S			F	F	S	F	S			S	S				S	9	10
88										n.a				F	F	F	F	F	F	F	F	F	F				F	F		F	S				S				S	11	2	
89											n.a	S		F	S	S	S	S	S	S	S	S				S	S		S										S	1	9	
90												n.a		F	S	S	S	S	S	S	S					S	S		S										S	1	7	
91													n.a																										0	0		
92														F	n.a	S		S	S								F	F											3	3		
93														F		n.a																							1	0		
94															F	F	F	F	n.a	F	S						F	F		F									8	1		
95																F				n.a	S						F	F											4	1		
96																	F				n.a							F											3	0		
97													S	F	F	F	F	F	F	F	S	n.a	F			F	F	S	F	S								S	11	5		
98													S	F	F	F	F	F	S	F	S		n.a			F	F		F	S									S	9	5	
00						F					F	F	F	F	F	F	F	F	F	F	F	F	F	F	n.a		F	F	F	F	F		F	S	F				21	1		
01																F	S									n.a		S											1	3		
02																F		S										n.a											1	1		
05															F	F	F	F	F	F	F	F				F	F	F	n.a	F	F					S			14	1		
06																											F	F			n.a								5	2		
07															F	F	F	F	F	F	F	F				F	F			F	n.a								11	1		
08							F	F	F		F	F	F	F	F	F	F	F	F	F	F	F	F	F		F	F	F	F	F		n.a	F	F	F				26	0		
09								F			F	F	F	F	F	F	F	F	F	F	F	F	F	F		F	F	F	F	F			n.a	S	F				20	1		
10															F	F	F	F	F	F	F	F	F	F		F	F	F	F	F			n.a	F					17	0		
11																F	F	F	F	F	F	F	F			F	F		F					n.a					11	0		
12	F				F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S	F	S	F	n.a	S		29	3		
13																																							29	1		
F*	2	0	1	6	1	6	10	14	10	6	12	12	14	16	25	26	35	26	28	20	25	19	15	17	5	29	30	10	25	16	0	6	2	10	0	0	479					
S*	2	0	0	0	0	1	0	1	1	1	0	5	1	6	0	1	0	3	6	6	5	13	4	4	8	2	3	10	3	7	9	8	16	14	3	5		148				

Notes: Spring surveys were not conducted in 1999, 2003 and 2004. Each cell in the matrix represents the dominance relation between two given years, represented by a specific column with respect to the various yearly row entries. S represents *S-dominance* and F represents *F-dominance* with S\* and F\* representing their respective totals. Lastly, an entry shaded in grey and labelled 'n.a.' indicates that the two years being compared have identical distributions and thus cannot be ranked using the two dominance criteria.

The inequality measures estimated for Italy show diverging results (see Table 5.17, Table 5.18, Figure 5.21, and Figure 5.22). Indices, including  $I^{AF}(-2,0,2)$ ,  $I^{AF}(-2,1,2)$  and  $I^{NY}(1,1)$ , show 1990s to be the best decade in Italy in terms of having the most equitable distribution of happiness. However, other measures indicate toward 2000s, supporting Italy's *S-dominance* results previously discussed. Similarly, for the period having highest inequality, the measures are divided between 1970s and 1980s.

All measures unequivocally confirm the drop in happiness inequality during 1990s. However, there are mixed findings regarding the performance across other decades. For instance,  $I^{AF}(-2,0,2)$ ,  $I^{AF}(-2,1,2)$  and  $I^{NY}(1,1)$  show that average inequality increased in 2000s, whereas other measures offer contradictory findings suggesting a drop. When we examine distinct yearly performance in terms of happiness inequality, the findings diverge across different inequality measures. While the best year results are divided between 1976 and 1985, the results for year with highest inequality diverge between 1996 and 2010. These findings largely support *S-dominance* findings for Italy.

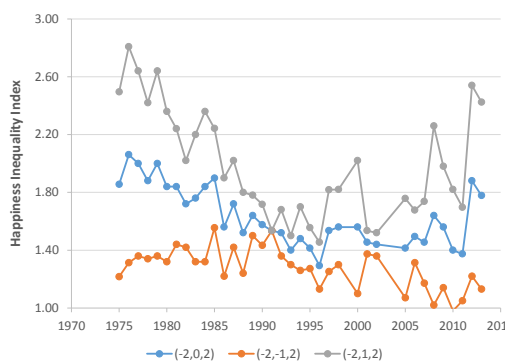
Using a linear scale, the average happiness was the greatest in 1991 having mean index of 2.000 (see Table 5.17 and Table 5.18). On the other hand, 1976 was identified as the worst year having lowest mean happiness of 1.626. In general, mean happiness levels in Italy improved from 1.679 in late 1970s to 1.918 in 1990s, dropping thereafter. Thus, 1990s was the best decade in terms of highest average happiness, reinforcing *F-dominance* results for Italy.

**Table 5.17: Happiness Inequality Analysis, Italy**

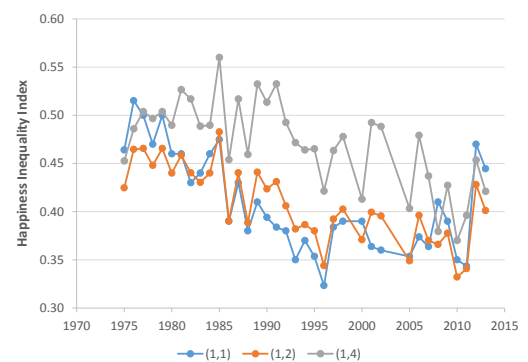
Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
<b>Index Average (Avg)</b>							
Late 1970s	1.959	1.318	2.601	0.490	0.454	0.489	1.679
1980s	1.734	1.376	2.092	0.433	0.435	0.503	1.821
1990s	1.479	1.316	1.642	0.370	0.394	0.478	1.918
2000s	1.491	1.170	1.812	0.373	0.373	0.432	1.840
Post 2010	1.677	1.134	2.220	0.419	0.390	0.424	1.728
<b>Avg Index Change</b>							
1980s	-0.225	0.058	-0.508	-0.056	-0.019	0.015	0.141
1990s	-0.255	-0.059	-0.450	-0.064	-0.041	-0.025	0.098
2000s	0.012	-0.146	0.170	0.003	-0.021	-0.046	-0.079
Post 2010	0.186	-0.036	0.409	0.047	0.017	-0.009	-0.111
<b>Performance Ranking</b>							
<b>By Year</b>							
Best	1996	2010	1996	1996	2010	2010	1991
Index	1.293	0.980	1.455	0.323	0.332	0.370	2.000
Worst	1976	1985	1976	1976	1985	1985	1976
Index	2.061	1.556	2.808	0.515	0.483	0.560	1.626
<b>By Decade</b>							
Best	1990s	post 2010	1990s	1990s	2000s	post 2010	1990s
Worst	late 1970s	1980s	late 1970s	late 1970s	late 1970s	1980s	late 1970s

Notes: Columns 2, 3 & 4 provides results based on AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 findings are based on NY inequality measures using different subjective societal judgements. Column 8 provides findings for mean index computed using a linear scale. Best year/ decade in terms of happiness inequality refers to one that records lowest inequality index, whereas worst year/ decade is one with highest inequality index. Best year/ decade in terms of mean happiness refers to one in which mean happiness index is highest, whereas worst year/ decade refers to a period in which mean happiness is lowest.

**Figure 5.21: AF Measures, Italy**



**Figure 5.22: NY Measures, Italy**



Notes: Figure 5.21 presents AF happiness inequality indices under linear (-2,0,2), convex (-2,-1,2) & concave (-2,1,2) scales. Figure 5.22 presents NY inequality measures with different weights ( $\alpha$ ,  $\beta$ ) for subjective societal judgements including (1,1), (1,2) and (1,4).

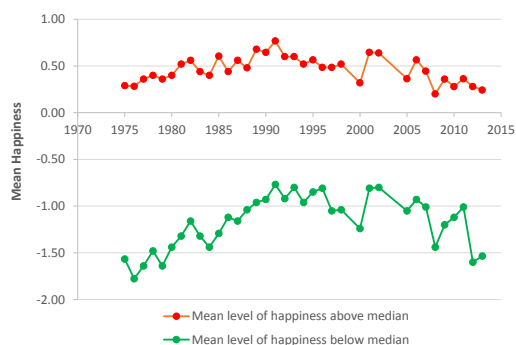
**Table 5.18: Happiness Inequality & Mean Happiness Indices, Italy**

Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
1975	1.856	1.216	2.495	0.464	0.425	0.453	1.680
1976	2.061	1.313	2.808	0.515	0.465	0.486	1.626
1977	2.000	1.360	2.640	0.500	0.466	0.504	1.680
1978	1.880	1.340	2.420	0.470	0.448	0.497	1.730
1979	2.000	1.360	2.640	0.500	0.466	0.504	1.680
1980	1.840	1.320	2.360	0.460	0.440	0.490	1.740
1981	1.840	1.440	2.240	0.460	0.458	0.527	1.800
1982	1.720	1.420	2.020	0.430	0.440	0.517	1.850
1983	1.760	1.320	2.200	0.440	0.430	0.489	1.780
1984	1.840	1.320	2.360	0.460	0.440	0.490	1.740
1985	1.899	1.556	2.242	0.475	0.483	0.560	1.828
1986	1.560	1.220	1.900	0.390	0.390	0.454	1.830
1987	1.720	1.420	2.020	0.430	0.440	0.517	1.850
1988	1.520	1.240	1.800	0.380	0.388	0.459	1.860
1989	1.640	1.500	1.780	0.410	0.441	0.532	1.930
1990	1.576	1.434	1.717	0.394	0.424	0.514	1.929
1991	1.535	1.535	1.535	0.384	0.431	0.533	2.000
1992	1.520	1.360	1.680	0.380	0.406	0.493	1.920
1993	1.400	1.300	1.500	0.350	0.382	0.472	1.950
1994	1.480	1.260	1.700	0.370	0.386	0.464	1.890
1995	1.414	1.273	1.556	0.354	0.380	0.465	1.929
1996	1.293	1.131	1.455	0.323	0.344	0.421	1.919
1997	1.535	1.253	1.818	0.384	0.392	0.463	1.859
1998	1.560	1.300	1.820	0.390	0.402	0.478	1.870
2000	1.560	1.100	2.020	0.390	0.371	0.413	1.770
2001	1.455	1.374	1.535	0.364	0.399	0.493	1.960
2002	1.440	1.360	1.520	0.360	0.396	0.488	1.960
2005	1.414	1.071	1.758	0.354	0.349	0.403	1.828
2006	1.495	1.313	1.677	0.374	0.396	0.479	1.909
2007	1.455	1.172	1.737	0.364	0.370	0.437	1.859
2008	1.640	1.020	2.260	0.410	0.366	0.379	1.690
2009	1.560	1.140	1.980	0.390	0.378	0.427	1.790
2010	1.400	0.980	1.820	0.350	0.332	0.370	1.790
2011	1.374	1.051	1.697	0.343	0.341	0.396	1.838
2012	1.880	1.220	2.540	0.470	0.428	0.454	1.670
2013	1.778	1.131	2.424	0.444	0.401	0.421	1.677
Mean	1.636	1.281	1.991	0.409	0.408	0.471	1.823

Notes: Spring surveys were not conducted in 1999, 2003 and 2004. Columns 2, 3 & 4 represent AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 are the NY inequality measures with different subjective societal judgements. Column 8 provides mean index under a linear scale.

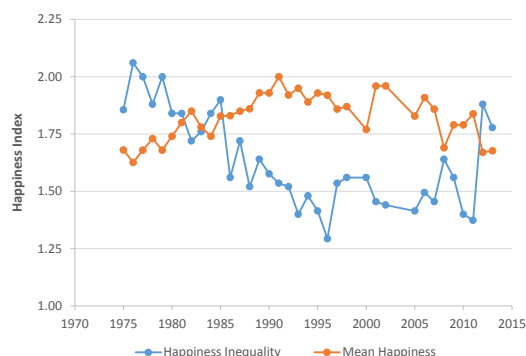
Lastly, similar to France and Ireland, a decline (an increase) in happiness inequality in Italy across decades is accompanied by an increase (a decline) in mean happiness (Figure 5.23 and Figure 5.24).

**Figure 5.23: Mean Happiness, Italy**



Notes: The gap between the two series give yearly AF inequality measures based on linear scale (-2,0,2). The mid-points of the two series give the yearly mean indices (1,2,3).

**Figure 5.24: Comparative Analysis, Italy**



Notes: Happiness inequality is AF inequality measure based on linear scale (-2,0,2). Mean happiness is the average happiness index based on linear scale (1,2,3).

## 5.8 The Netherlands

On the whole, the Netherlands had 456 *F-dominance* and 170 *S-dominance* relations (see Table 5.19). In terms of *S-dominance* rankings, 2006 performed well closely followed by 1998. 2006 had lower happiness inequality compared to 20 other years. In contrast, 1992, followed by 1990 and 2012, fared badly with at least 15 other years *S-dominating* them. Although, there is no discernible trend in the happiness distribution results for the Netherlands, on average 1980s appears to be the best decade in terms of having lower happiness inequality.

The rankings based on *F-dominance* show interesting results. The best years for the Netherlands recording higher mean happiness compared to most preceding years include 2007-09 and 2011. This potentially indicates that financial events, such as the 2008 Global Financial Crisis and the ongoing Eurozone Debt Crisis that began in late 2009, have not had a dampening effect on the Netherlands' average happiness, possible owing to appropriate

government policies. Again, it is worth reiterating that more research is required to assess the impacts of such events on well-being. In general, excluding a few years (i.e. 1979-80 and 1989-95) the average happiness in the Netherlands remained low until the early 2000s, with 2000 standing out as it is *F-dominated* by 33 other years. In fact, the new millennium appears to be by far the best decade for the Netherlands in terms of *F-dominance* rankings, recording greater average happiness relative to all previous decades.

**Table 5.19: Dominance Ranking Matrix, Netherlands**

	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	00	01	02	05	06	07	08	09	10	11	12	13	F*	S*
75	n.a		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S	F	F	F	F	F	F	F	F	F	F	F	33	1
76	S	n.a	S	F	F	F	F	F	S	F	S	S	S	F	F	F	F	F	F	F	F	F	F	F	S	F	F	F	F	F	F	F	F	F	F	F	28	7
77			n.a		F	F		F					F	F	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	F	27	0	
78				n.a	F	F		S				S		S	F	F	F	F	F	F	F	F	F	S		F	S	F	S	F	F	F	F	F	F	F	20	6
79				n.a																				S				S	F	F	F		F			4	1	
80				S	n.a											F								S				n.a	S	F	F	F		F		n.a	5	3
81			S	F	F	F	n.a	S	S	F		S	S	F	F	F	F	F	F	F	F	F	F	S		F	F	F	F	F	F	F	F	F	F	F	25	6
82					F	F		n.a				S			F		F							F				F	F	F	F	F	F		F	13	1	
83			S	F	F	F		F	n.a					F	F	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	29	1	
84			S	F	F	F		S		n.a		S	S	F	F	F	F	F	F	F	F	F	F	S		F	F	F	S	F	F	F	F	F	F	F	23	6
85			S	F	F	F	F	F	S	F	n.a		F	F	F	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	F	30	2
86				F	F						n.a				F		F							F				F	F	F	F	F	F		F	13	0	
87			S	F	F	F		F			S	n.a	F	F	F	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	26	2	
88				F	F			S			S		n.a					F	F	F	F	F	S			F		F	S	F	F	F	F	F	F	17	4	
89					S	S					S			n.a		F							S				S	S	F	F	F	S	F		S	5	7	
90				S	S		S				S		S	F	n.a	F			S	S	S	S		S		S		S	S	F	F	F	S	F	F	S	7	15
91				S													n.a												S	F	F	F		F		4	2	
92				S	S		S				S			S	S	S	F	n.a	S	S	S	S		S		S		S	S	F	F	F	S	F	F	S	6	17
93				S	S		S				S				F		F		n.a			S		S				S	S	F	F	F	F		S	7	9	
94				S	S		S				S				F		F		F	n.a							F	S	S	F	F	F	F	F		S	9	9
95				S	S		S				S				F		F		S	S	n.a						F	S	S	F	F	F	S	F		S	7	12
96				S	F		S				S						F					n.a						F	S	F	F	F	F	F		F	10	5
97				S	F		S				S			S	F	F	F	F	F	F	F	S	n.a				F	S	F	F	F	F	F	F	F	F	17	7
98					F												F						n.a						F	F	F	F		F		7	0	
00			F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	n.a		F	F	F	F	F	F	F	F	F	F	33	0
01				S	S		S				S				F		F		S			S		S		n.a		S	S	F	F	F	S	F		S	6	11
02				F	F		S				S				F	F	F	F	F	F	F	F	F	S		F	n.a	F	S	F	F	F	F	F	F	F	21	4
05				S		n.a											F												n.a	S	F	F	F			n.a	5	3
06																													n.a	F	F	F		F		4	0	
07																														n.a						0	0	
08																														S	n.a				n.a	0	1	
09																														S	S	n.a			S	0	3	
10					S	S										F								S				S	S	F	F	F	n.a	F		S	5	6
11																														S	n.a			n.a		0	1	
12					S	S		S				S			S		F		S	S	S	S		S		S		S	S	F	F	F	S	F	n.a	S	5	15
13					S	n.a											F							S				n.a	S	F	F	F		F			5	3
F*	0	0	2	9	15	16	4	7	2	6	2	5	4	10	21	12	29	12	14	13	13	12	11	9	0	15	9	16	11	32	32	32	18	32	15	16	456	
S*	1	0	6	0	15	9	0	14	3	0	1	17	3	4	2	1	0	0	5	4	3	8	0	19	2	3	1	9	20	3	1	0	6	1	0	9	170	

Notes: Spring surveys were not conducted in 1999, 2003 and 2004. Each cell in the matrix represents the dominance relation between two given years, represented by a specific column with respect to the various yearly row entries. S represents *S-dominance* and F represents *F-dominance* with S\* and F\* representing their respective totals. Lastly, an entry shaded in grey and labelled 'n.a.' indicates that the two years being compared have identical distributions and thus cannot be ranked using the two dominance criteria.

Evaluating inequality estimates for the Netherlands, the results vary across different measures (see Table 5.20, Table 5.21, Figure 5.25, and Figure 5.26). For instance, most measures indicate post 2010 to be the worst period having highest happiness inequality. The only exception to this is  $I^{AF}(-2,1,2)$ , which points to 1990s with highest happiness inequality averaging around 1.299. Similarly, except  $I^{AF}(-2,-1,2)$  which indicates 2000s to be the decade with lowest inequality, all other measures indicate toward 1970s. Overall,  $I^{AF}(-2,0,2)$  show that happiness inequality in the Netherlands increased in 1980s and 1990s, before dropping to 2.066 in 2000s. However, happiness inequality in the Netherlands appears to have worsened again post 2010. The trends are largely coherent across other inequality estimates.

The happiness inequality estimates for distinct years reveal mixed results. When it comes to the year with highest happiness inequality,  $I^{AF}(-2,-1,2)$  and  $I^{AF}(-2,1,2)$  are divided between 2009 and 1976 respectively, with all other measures suggesting 1992 instead. On the other hand, except  $I^{AF}(-2,1,2)$ , all other indices rank 2000 as the best year in term of lowest inequality.

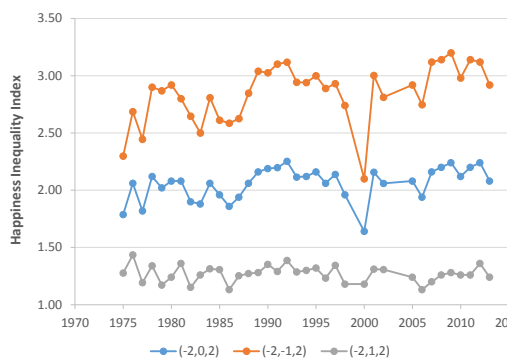
The mean happiness results (see Table 5.20, and Table 5.21) show that average happiness in the Netherlands improved in 1980s and 1990s, deteriorating in 2000s, and picking up again in recent years. On the whole, 2007 recorded the highest mean happiness averaging 2.480, with 2000 having the lowest index of 2.230. These findings are consistent with the Netherlands' F-dominance rankings.

**Table 5.20: Happiness Inequality Analysis, Netherlands**

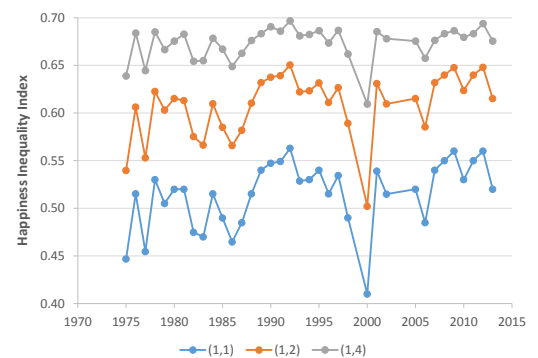
Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
<i>Index Average (Avg)</i>							
Late 1970s	1.961	2.640	1.283	0.490	0.585	0.664	2.339
1980s	1.998	2.739	1.257	0.499	0.595	0.668	2.371
1990s	2.132	2.965	1.299	0.533	0.626	0.683	2.417
2000s	2.066	2.891	1.241	0.517	0.610	0.670	2.413
Post 2010	2.173	3.060	1.287	0.543	0.634	0.684	2.443
<i>Avg Index Change</i>							
1980s	0.036	0.099	-0.026	0.009	0.011	0.005	0.031
1990s	0.135	0.227	0.042	0.034	0.030	0.014	0.046
2000s	-0.066	-0.074	-0.058	-0.017	-0.016	-0.013	-0.004
Post 2010	0.107	0.169	0.046	0.027	0.025	0.014	0.031
<i>Performance Ranking</i>							
<i>By Year</i>							
Best	2000	2000	1986	2000	2000	2000	2007
Index	1.640	2.100	1.131	0.410	0.502	0.610	2.480
Worst	1992	2009	1976	1992	1992	1992	2000
Index	2.252	3.200	1.434	0.563	0.650	0.697	2.230
<i>By Decade</i>							
Best	late 1970s	late 1970s	2000s	late 1970s	late 1970s	late 1970s	post 2010
Worst	post 2010	post 2010	1990s	post 2010	post 2010	post 2010	late 1970s

Notes: Columns 2, 3 & 4 provides results based on AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 findings are based on NY inequality measures using different subjective societal judgements. Column 8 provides findings for mean index computed using a linear scale. Best year/ decade in terms of happiness inequality refers to one that records lowest inequality index, whereas worst year/ decade is one with highest inequality index. Best year/ decade in terms of mean happiness refers to one in which mean happiness index is highest, whereas worst year/ decade refers to a period in which mean happiness is lowest.

**Figure 5.25: AF Measures, Netherlands**



**Figure 5.26: NY Measures, Netherlands**



**Notes:**

Figure 5.25 presents AF happiness inequality indices under linear (-2,0,2), convex (-2,-1,2) & concave (-2,1,2) scales. Figure 5.26 presents NY inequality measures with different weights ( $\alpha, \beta$ ) for subjective societal judgements including (1,1), (1,2) and (1,4).

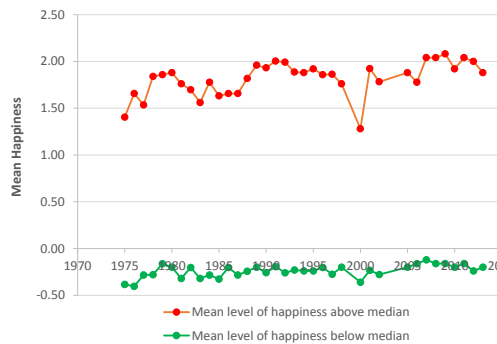
**Table 5.21: Happiness Inequality & Mean Happiness Indices, Netherlands**

Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
1975	1.787	2.298	1.277	0.447	0.540	0.639	2.255
1976	2.061	2.687	1.434	0.515	0.606	0.684	2.313
1977	1.818	2.444	1.192	0.455	0.553	0.645	2.313
1978	2.120	2.900	1.340	0.530	0.623	0.685	2.390
1979	2.020	2.869	1.172	0.505	0.603	0.667	2.424
1980	2.080	2.920	1.240	0.520	0.615	0.676	2.420
1981	2.080	2.800	1.360	0.520	0.613	0.683	2.360
1982	1.899	2.646	1.152	0.475	0.575	0.654	2.374
1983	1.880	2.500	1.260	0.470	0.566	0.655	2.310
1984	2.061	2.808	1.313	0.515	0.610	0.679	2.374
1985	1.959	2.612	1.306	0.490	0.585	0.667	2.327
1986	1.859	2.586	1.131	0.465	0.566	0.649	2.364
1987	1.939	2.626	1.253	0.485	0.582	0.663	2.343
1988	2.061	2.848	1.273	0.515	0.610	0.676	2.394
1989	2.160	3.040	1.280	0.540	0.632	0.683	2.440
1990	2.189	3.026	1.352	0.547	0.638	0.691	2.419
1991	2.196	3.102	1.291	0.549	0.639	0.686	2.453
1992	2.252	3.118	1.386	0.563	0.650	0.697	2.433
1993	2.114	2.943	1.286	0.529	0.622	0.681	2.414
1994	2.120	2.940	1.300	0.530	0.623	0.683	2.410
1995	2.160	3.000	1.320	0.540	0.632	0.687	2.420
1996	2.061	2.889	1.232	0.515	0.611	0.674	2.414
1997	2.138	2.931	1.344	0.534	0.627	0.687	2.397
1998	1.960	2.740	1.180	0.490	0.589	0.662	2.390
2000	1.640	2.100	1.180	0.410	0.502	0.610	2.230
2001	2.156	3.002	1.311	0.539	0.631	0.686	2.423
2002	2.059	2.812	1.307	0.515	0.610	0.678	2.376
2005	2.080	2.920	1.240	0.520	0.615	0.676	2.420
2006	1.939	2.747	1.131	0.485	0.585	0.657	2.404
2007	2.160	3.120	1.200	0.540	0.632	0.676	2.480
2008	2.200	3.140	1.260	0.550	0.640	0.683	2.470
2009	2.240	3.200	1.280	0.560	0.648	0.687	2.480
2010	2.120	2.980	1.260	0.530	0.624	0.680	2.430
2011	2.200	3.140	1.260	0.550	0.640	0.683	2.470
2012	2.240	3.120	1.360	0.560	0.648	0.694	2.440
2013	2.080	2.920	1.240	0.520	0.615	0.676	2.420
Mean	2.058	2.847	1.269	0.515	0.608	0.673	2.394

Notes: Spring surveys were not conducted in 1999, 2003 and 2004. Columns 2, 3 & 4 represent AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 are the NY inequality measures with different subjective societal judgements. Column 8 provides mean index under a linear scale.

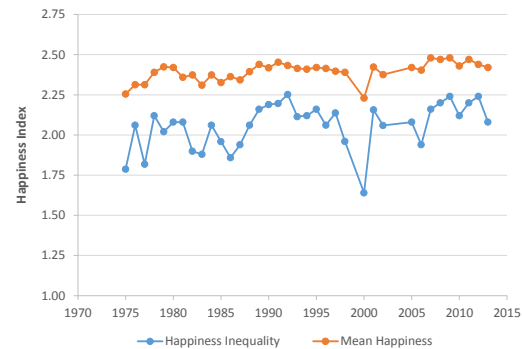
Finally, in line with Denmark, both mean happiness and happiness inequality in the Netherlands has risen across all decades except the 2000s (see Figure 5.27, and Figure 5.28).

**Figure 5.27: Mean Happiness, Netherlands**



Notes: The gap between the two series give yearly AF inequality measures based on linear scale (-2,0,2). The mid-points of the two series give the yearly mean indices.

**Figure 5.28: Comparative Analysis, Netherlands**



Notes: Happiness inequality is AF inequality measure based on linear scale (-2,0,2). Mean happiness is the average happiness index based on linear scale (1,2,3).

## 5.9 The U.K. (including Northern Ireland)

The U.K. recorded 425 *F-dominance* and 199 *S-dominance* relations (see Table 5.22). Based on the *S-dominance* results, 1996 is unambiguously the best year for the U.K. in terms of having lower happiness inequality than most other years. In general, happiness inequality in the U.K. seems to have declined post mid-1980s. The 1978-82 period was the worst in terms of having a rather unequitable happiness distribution relative to at least 18 other years. A number of events occurred during this period, including the Second Oil Crisis and Margaret Thatcher's appointment as the U.K.'s Prime Minister, in 1979. Also, inflation in early 1980s was significantly high averaging 14.5%, coupled with negative economic growth. Some or all of these factors may have had a dampening effect on the U.K.'s happiness distribution. In order to make any conclusive comments further research is required in this domain.

In terms of *F-dominance* results for the U.K., the period from 2009-13 has outperformed all preceding years, recording higher average happiness than at least 32 other years. *F-dominance* findings suggest that 2000s represents the best period in the U.K. in terms of greater mean happiness. The worst years for the U.K. include 1976 and 2000, both of which recorded lower happiness levels relative to most other years.

**Table 5.22: Dominance Ranking Matrix, U.K.**

	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	00	01	02	05	06	07	08	09	10	11	12	13	F*	S*
75	n.a													F	F					S		S					S	S		S	S	F	F	F	F	F	7	6
76	F	n.a		F	S	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S	F	F	F	F	F	F	F	F	F	F	F	32	2
77	F	S	n.a	F	S	F	F	F	S	F	F	S	S	F	F	F	S	F	S	F	S	S	F	F	S	F	F	F	F	F	F	F	F	F	F	F	25	10
78	S			n.a	S	n.a		F	S	S	S			F	S	S	S		S	S	S	S	S		S	S	S	S	S	S	F	F	F	F	F	F	7	19
79	F				n.a			F	F	F	F			F	F	F	F		F	F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	25	0
80	S			n.a	S	n.a		F	S	S	S			F	S	S	S		S	S		S	S	S		S	S	S	S	S	S	F	F	F	F	F	7	19
81	F			F	S	F	n.a	F	S	F	F	S	S	F	F	F	S	S	S	S	S	S	S		S	S	S	S	F	S	F	F					16	16
82	S						n.a	S		S				S	S	S	S		S	S		S	S	S		S	S	S	S	S	S	F	F	F	F	F	5	18
83	F							n.a						F	F		n.a		F		S						F	F		F	F	F	F	F	F	F	13	1
84	F							F	S	n.a	F			F	F	F	S		S	S		S	S	S		S	S	S	F	S	F	F	F	F	F	F	13	11
85	F							S		n.a				F	F	n.a	S		S		S					S	S	S		S	F	F	F	F	F	F	9	8
86	F			F	S	F		F	S	F	F	n.a	n.a	F	F	F	S		S	F		S	F	F		F	F	F	F	F	F	F	F	F	F	F	23	5
87	F			F	S	F		F	S	F	F	n.a	n.a	F	F	F	S		S	F		S	F	F		F	F	F	F	F	F	F	F	F	F	F	23	5
88														n.a	S						S						S			S			F	F	F	F	5	4
89															n.a						S								S				F	F	F	F	4	2
90	F							S		n.a				F	F	n.a	S		S		S					S	S	S		S	F	F	F	F	F	F	9	8
91	F								n.a					F	F		n.a		F		S					S		F	F		F	F	F	F	F	F	13	1
92	F			F	S	F		F	S	F	F	S	S	F	F	F	S	n.a	S	F		S	F	S		S	F	F	F	F	F	F	F	F	F	F	21	9
93	F							S			F			F	F	F	S		n.a	F		S				S	F	F	F	F	F	F	F	F	F	F	17	3
94														F	F					n.a		S					F	n.a		S			F	F	F	F	8	2
95	F			F	S	F		F	S	F	F	S	S	F	F	F	S	F	S	F	n.a	S	F	F		F	F	F	F	F	F	F	F	F	F	F	24	7
96																				n.a														F	F	F	4	0
97	F							S		F				F	F	F	S		S	F		S	n.a	S		S	F	F	F	F	F	F	F	F	F	F	16	6
98	F							S		F				F	F	F	S		S	F		S		n.a		S	F	F	F	F	F	F	F	F	F	F	16	5
00	F			F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	n.a	F	F	F	F	F	F	F	F	F	F	F	33	0
01	F							S						F	F		S			F		S				n.a	F	F		F	F	F	F	F	F	F	13	3
02																					S						n.a		n.a		S		F	F	F	F	6	2
05														F	F					n.a		S					F	n.a		S			F	F	F	F	8	2
06	S							S		S				F	S	S	S		S		S					S	S	S	S	n.a	S	S	F	F	F	F	6	13
07																					S									n.a			F	F	F	F	4	1
08														F	F					S		S					S	S		S	n.a	F	F	F	F	7	5	
09															S						S									S		n.a	F	F	F	F	4	3
10																																	n.a	n.a	S		0	1
11																																	n.a	n.a	S		0	1
12																																		n.a		0	0	
13																																	F	F	S	n.a	2	1
F*	18	0	0	8	1	8	3	12	3	9	13	2	2	25	23	13	3	4	3	14	2	3	8	7	0	8	16	14	13	14	18	28	33	33	32	32	425	
S*	4	1	0	0	9	0	0	0	17	2	4	4	4	1	6	4	17	1	12	10	2	28	5	7	2	11	11	10	3	16	5	0	0	0	3	0	199	

Notes: Spring surveys were not conducted in 1999, 2003 and 2004. Each cell in the matrix represents the dominance relation between two given years, represented by a specific column with respect to the various yearly row entries. S represents *S-dominance* and F represents *F-dominance* with S\* and F\* representing their respective totals. Lastly, an entry shaded in grey and labelled 'n.a.' indicates that the two years being compared have identical distributions and thus cannot be ranked using the two dominance criteria.

Most inequality indices for the U.K. (see Table 5.23, Table 5.24, Figure 5.29, and Figure 5.30) show post 2010 to be the worst period with highest happiness inequality. Except  $I^{AF}(-2,1,2)$ , all other measures rank 1990s as the decade with lowest happiness inequality. Overall,  $I^{AF}(-2,0,2)$  shows that average happiness inequality increased from 1.815 in late 1970s to 1.825 in 1980s, declining in 1990s and increasing thereafter. Similar trends are found across all other inequality measures except  $I^{AF}(-2,1,2)$ , which shows a steady decline in inequality since 1970s.

Concentrating on the worst and the best years in terms of happiness inequality, the results diverge. While most measures show 1996 to be the best year,  $I^{AF}(-2,1,2)$  points to 2000 instead. Moreover, the inequality indices are largely divided across 1977, 1982, 2010, and 2013, when it comes to the worst year having highest happiness inequality. These findings are somewhat reflected in the *S-dominance* rankings for the U.K. discussed previously.

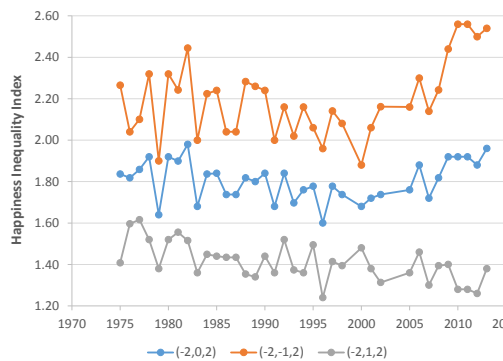
The mean happiness results (see Table 5.23, and Table 5.24) for the U.K. suggest that except for a decline in average happiness in the 1990s, mean happiness levels appear to have improved thereafter, peaking post 2010. In terms of distinct yearly performance, 2010 appears to be the best year with highest average happiness index of 2.320, whereas 2000 is found to be the worst year with mean happiness index of 2.100. These results corroborate *F-dominance* results for the U.K.

**Table 5.23: Happiness Inequality Analysis, U.K.**

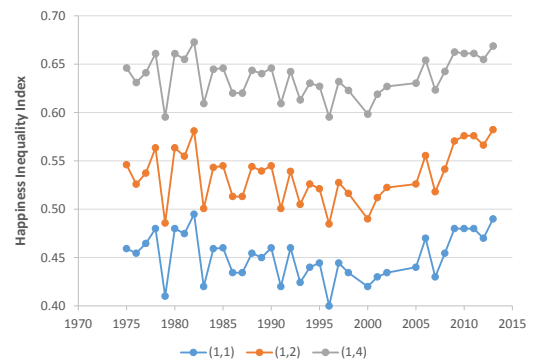
Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
<b>Index Average (Avg)</b>							
Late 1970s	1.815	2.125	1.504	0.454	0.532	0.635	2.155
1980s	1.825	2.209	1.440	0.456	0.540	0.641	2.192
1990s	1.746	2.091	1.400	0.436	0.518	0.624	2.173
2000s	1.795	2.216	1.374	0.449	0.535	0.635	2.210
Post 2010	1.920	2.533	1.307	0.480	0.575	0.662	2.307
<b>Avg Index Change</b>							
1980s	0.010	0.084	-0.064	0.003	0.008	0.006	0.037
1990s	-0.079	-0.118	-0.041	-0.020	-0.021	-0.017	-0.019
2000s	0.050	0.125	-0.026	0.012	0.016	0.011	0.038
Post 2010	0.125	0.317	-0.067	0.031	0.040	0.026	0.096
<b>Performance Ranking</b>							
<b>By Year</b>							
Best	1996	2000	1996	1996	1996	1996	2010
Index	1.600	1.880	1.240	0.400	0.485	0.595	2.320
Worst	1982	2010	1977	1982	2013	1982	2000
Index	1.980	2.560	1.616	0.495	0.582	0.673	2.100
<b>By Decade</b>							
Best	1990s	1990s	post 2010	1990s	1990s	1990s	post 2010
Worst	post 2010	post 2010	late 1970s	post 2010	post 2010	post 2010	late 1970s

Notes: Columns 2, 3 & 4 provides results based on AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 findings are based on NY inequality measures using different subjective societal judgements. Column 8 provides findings for mean index computed using a linear scale. Best year/ decade in terms of happiness inequality refers to one that records lowest inequality index, whereas worst year/ decade is one with highest inequality index. Best year/ decade in terms of mean happiness refers to one in which mean happiness index is highest, whereas worst year/ decade refers to a period in which mean happiness is lowest.

**Figure 5.29: AF Measures, U.K.**



**Figure 5.30: NY Measures, U.K.**



Notes: Figure 5.29 presents AF happiness inequality indices under linear (-2,0,2), convex (-2,-1,2) & concave (-2,1,2) scales. Figure 5.30 presents NY inequality measures with different weights ( $\alpha$ ,  $\beta$ ) for subjective societal judgements including (1,1), (1,2) and (1,4).

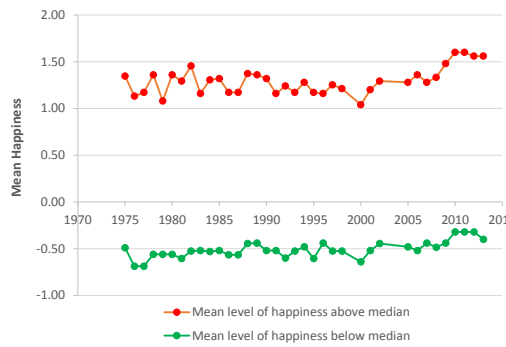
**Table 5.24: Happiness Inequality & Mean Happiness Indices, U.K.**

Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
1975	1.837	2.265	1.408	0.459	0.546	0.646	2.214
1976	1.818	2.040	1.596	0.455	0.526	0.631	2.111
1977	1.859	2.101	1.616	0.465	0.537	0.641	2.121
1978	1.920	2.320	1.520	0.480	0.564	0.661	2.200
1979	1.640	1.900	1.380	0.410	0.486	0.595	2.130
1980	1.920	2.320	1.520	0.480	0.564	0.661	2.200
1981	1.899	2.242	1.556	0.475	0.555	0.655	2.172
1982	1.980	2.444	1.515	0.495	0.581	0.673	2.232
1983	1.680	2.000	1.360	0.420	0.501	0.609	2.160
1984	1.837	2.224	1.449	0.459	0.543	0.645	2.194
1985	1.840	2.240	1.440	0.460	0.545	0.646	2.200
1986	1.737	2.040	1.434	0.434	0.513	0.620	2.152
1987	1.737	2.040	1.434	0.434	0.513	0.620	2.152
1988	1.818	2.283	1.354	0.455	0.544	0.644	2.232
1989	1.800	2.260	1.340	0.450	0.540	0.640	2.230
1990	1.840	2.240	1.440	0.460	0.545	0.646	2.200
1991	1.680	2.000	1.360	0.420	0.501	0.609	2.160
1992	1.840	2.160	1.520	0.460	0.539	0.642	2.160
1993	1.697	2.020	1.374	0.424	0.505	0.613	2.162
1994	1.760	2.160	1.360	0.440	0.526	0.630	2.200
1995	1.778	2.061	1.495	0.444	0.521	0.627	2.141
1996	1.600	1.960	1.240	0.400	0.485	0.595	2.180
1997	1.778	2.141	1.414	0.444	0.528	0.632	2.182
1998	1.737	2.081	1.394	0.434	0.516	0.623	2.172
2000	1.680	1.880	1.480	0.420	0.490	0.598	2.100
2001	1.720	2.060	1.380	0.430	0.512	0.619	2.170
2002	1.737	2.162	1.313	0.434	0.522	0.627	2.212
2005	1.760	2.160	1.360	0.440	0.526	0.630	2.200
2006	1.880	2.300	1.460	0.470	0.556	0.654	2.210
2007	1.720	2.140	1.300	0.430	0.518	0.623	2.210
2008	1.818	2.242	1.394	0.455	0.541	0.643	2.212
2009	1.920	2.440	1.400	0.480	0.570	0.663	2.260
2010	1.920	2.560	1.280	0.480	0.576	0.661	2.320
2011	1.920	2.560	1.280	0.480	0.576	0.661	2.320
2012	1.880	2.500	1.260	0.470	0.566	0.655	2.310
2013	1.960	2.540	1.380	0.490	0.582	0.669	2.290
Mean	1.804	2.197	1.411	0.451	0.535	0.636	2.196

Notes: Spring surveys were not conducted in 1999, 2003 and 2004. Columns 2, 3 & 4 represent AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 are the NY inequality measures with different subjective societal judgements. Column 8 provides mean index under a linear scale.

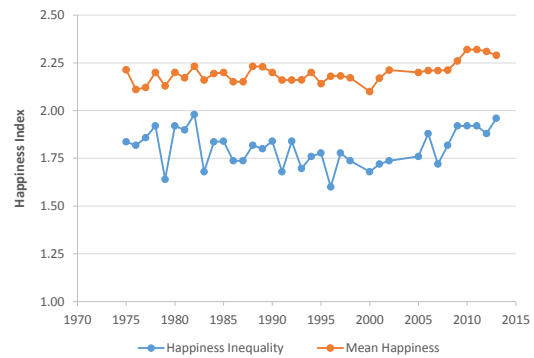
Lastly, mean happiness and happiness inequality in the U.K. appear to move in the same direction, increasing in all decades except the 1990s (see Figure 5.31 and Figure 5.32).

**Figure 5.31: Mean Happiness, U.K.**



Notes: The gap between the two series give yearly AF inequality measures based on linear scale (-2,0,2). The mid-points of the two series give the yearly mean indices.

**Figure 5.32: Comparative Analysis, U.K.**



Notes: Happiness inequality is AF inequality measure based on linear scale (-2,0,2). Mean happiness is the average happiness index based on linear scale (1,2,3).

## 5.10 Discussion and Implications

A median-based dominance approach is applied to explore the distribution of happiness in eight European countries. Unambiguous and complete inequality and mean happiness rankings are obtained for each country using *S-dominance* and *F-dominance* criteria. Consistent with Dutta and Foster's (2013) findings, the country-specific dominance results obtained as part of the current study are in most instances order preserving under various scale transformations. The mean happiness indices as well as AF and NY inequality measures, developed using different scales and weights, largely corroborate the dominance results for each of the eight countries.

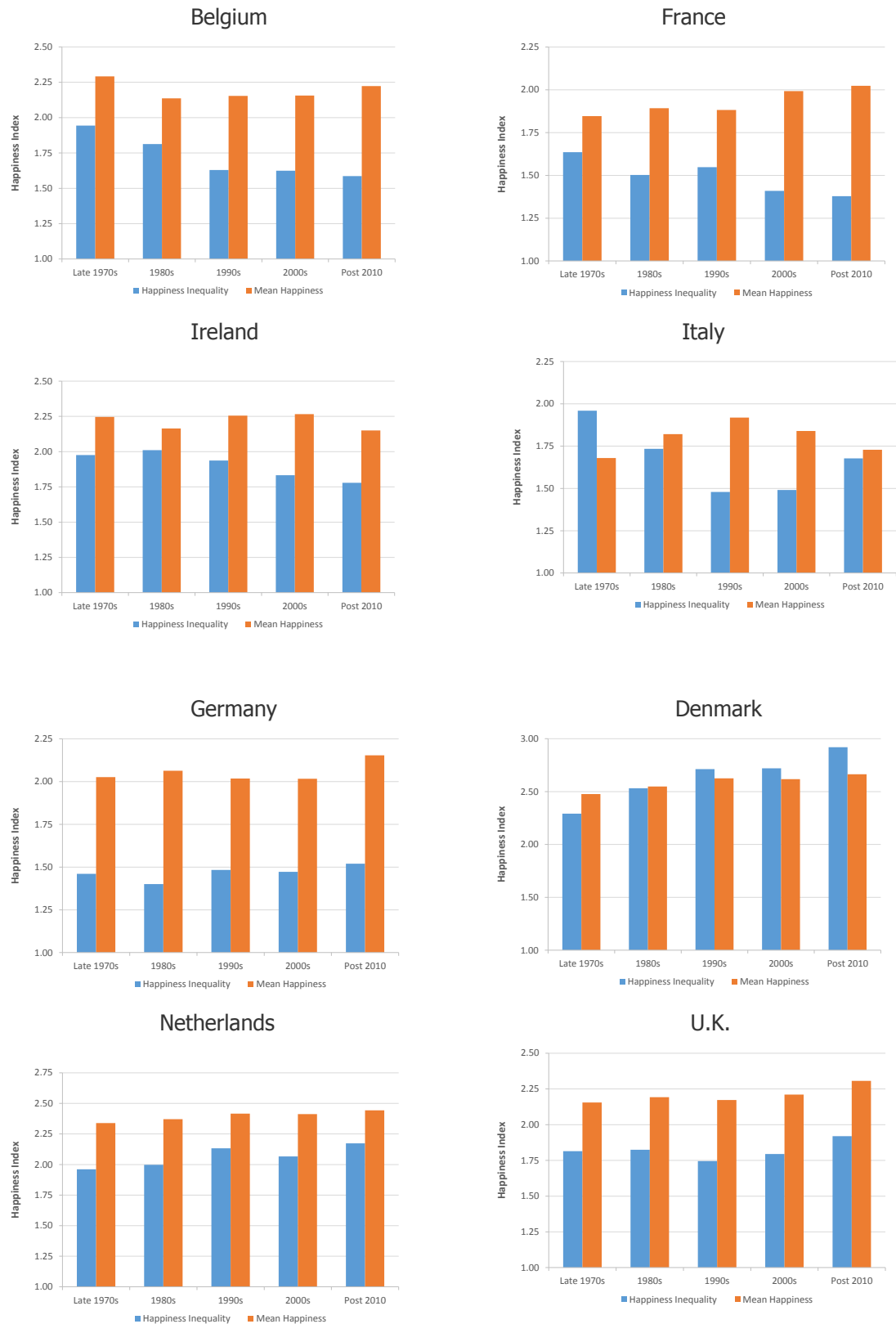
Happiness trends vary across countries. In terms of average happiness, 1980s appears to record lowest mean happiness in most European countries, with mean happiness rising in recent decades. The distribution of happiness on the other hand, has become equitable in Belgium, France and Ireland after 1990s. However, in countries including Denmark, Italy, and the U.K., happiness inequality has worsened post 1990s. The results for Ireland are supported by Madden's (2011) study, which is based on a dominance

approach, and found that overall well-being inequality in Ireland declined from 1994-2001.

The findings of the current study also raise important questions which may have implications for future research and policy making. For instance, the issue of rising happiness inequality in Denmark, Italy, and the U.K., if left unaddressed may contribute to feelings of envy and discontentment, particularly amongst the unhappiest segments of the population, eventually damaging the social fabric of interconnectedness both within and across societies. Identifying drivers for rising inequality within, with the current study as a potential starting point, may offer meaningful insights for policy making aimed at enhancing social cohesion and societal well-being.

The notion of a trade-off between level and inequality of happiness is rooted in theories including the *materialistic and social comparison models of happiness* [see Ott (2005) for a review of these and other related literature]. However, the current study findings (see the panel of charts below) contradict what is postulated in the literature. In general, for most countries in our sample (i.e. Belgium, France, Ireland, Italy and to some extent Germany), a reduction (or increase) in happiness inequality in a particular decade concurs with an increase (or decrease) in mean happiness enhancement during the same period. This suggests that an egalitarian policy targeted at reducing happiness disparities may complement a utilitarian policy focused on enhancing mean happiness levels. Having said that, further research is required to make well-informed recommendations.

### **Panel of Charts: Happiness Inequality vs Mean Happiness**



Notes: Happiness inequality and mean happiness measures represented by blue and orange bars are average index values for each decade.

Finally, a few words of caution when interpreting the results of this thesis. Firstly, there are quite a few years across different countries which have not been ordered in terms of *S-dominance*. For such years, although happiness inequality indices have been estimated using various scales, such measures do not offer unambiguous rankings. Disruptions in Spring and Autumn surveys during different years has resulted in several missing observations, with survey results not directly comparable. Also, for ease of consistency, the study finding regarding an inverse relation between happiness inequality and mean happiness is based on comparative analysis of inequality and mean indices developed using linear scales only.

Finally, it is worth reiterating that the current study is an exploratory exercise and so it is not possible to make conclusive comments on potential drivers of observed happiness trends. Nonetheless, it raises important future research questions worth exploring. A key future project, building on this thesis work, would aim to identify drivers of happiness inequality trends observed across these eight the European countries. This can be undertaken at two levels including comprehensive decompositional assessment and regression analysis. Decomposing overall inequalities based on demographic factors such as race and gender is likely to offer meaningful insights including share of aggregate inequality attributable to different groups. Regression analysis, on the other hand, could determine whether macroeconomic drivers such as inflation, unemployment and economic growth, can explain some of the aggregate happiness inequality trends observed in these countries. Preliminary examination of country-specific economic datasets suggests that in countries such as Denmark, France, Germany, Italy, and the U.K., periods of low mean happiness and/or high happiness inequality often coincided with periods of high inflation and negative economic growth and *vice versa*.

## **6. Conclusion**

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Happiness is one of the most sort after human emotional states. Upward social comparisons across various aspects of life can stir envy and have a dampening effect on one's well-being. Envy may manifest as discontent, resentment, anger or even rage in some instances, resulting in destructive and unproductive behaviours. From an economics perspective, exploring the distribution of happiness across populations and its subgroups is essential. Understanding the distribution of happiness is not only important from an ethical point of view but is also important for the development of holistic measures of personal and social of well-being. Implementing policies that not only make people happier but also aim at reducing disparity in happiness levels, may have the potential to enhance social cohesion and address broader economic problem of scarce resources through enhancing productivity.

A great deal remains to be studied in this field, particularly at the methodological level. Standard cardinal variability measures need to be replaced with robust techniques, including the median-based dominance approach, to analyse ordinal happiness data. This thesis has applied the dominance techniques used in Dutta and Foster (2013) to the case of eight European countries. Unambiguous and complete inequality and mean happiness rankings were obtained using *S-dominance* and *F-dominance* criteria. In line with Dutta and Foster's (2013) findings for the U.S., dominance results obtained were robust to various scale transformations.

The primary empirical finding of the present study is twofold. Firstly, that while happiness inequality appears to have declined in Belgium, France and Ireland's post 1990s, the opposite trend has been observed in the U.K., Denmark, and Italy. In these countries, inequality has worsened markedly

in recent decades. Rising happiness inequality may cause in feelings of envy, anger and resentment, particularly amongst the least happy segments of the society, resulting in social upheaval, and in some instances resort to fundamentalism of all sorts and even to violence. Identifying factors influencing happiness inequality and undertaking compositional analysis by subgroups (such as gender, race and region) may offer valuable insights to influence future policies aimed at building socially cohesive communities. Secondly, on average and for most countries in our sample, a period of decline in happiness inequality was found to coincide with an increase in mean happiness levels. This contradicts with *materialistic and social comparison theories of happiness* which postulate a trade-off between the level and inequality of happiness. It further highlights the possibility of jointly addressing welfare issues of lowering happiness inequality and enhancing mean happiness levels without policy trade-offs.

## References

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- Abul Naga, R. H., and Yalcin, T. (2008). Inequality measurement for ordered response health data. *Journal of Health Economics*, 27(6), 1614-1625.
- Alesina, A., Di Tella, R., and MacCulloch, R. (2004). Inequality and happiness: are Europeans and Americans different? *Journal of Public Economics*, 88(9), 2009-2042.
- Allison, R. A., and Foster, J. E. (2004). Measuring health inequality using qualitative data. *Journal of Health Economics*, 23(3), 505-524.
- Anand, P., Hunter, G., and Smith, R. (2005). Capabilities and well-being: evidence based on the Sen–Nussbaum approach to welfare. *Social Indicators Research*, 74(1), 9-55.
- Becchetti, L., Massari, R., and Naticchioni, P. (2010). Why has happiness inequality increased? Suggestions for promoting social cohesion. *Economia*.
- Becker, G. (1974). A theory of social interactions: National Bureau of Economic Research Cambridge, Mass., USA.
- Becker, G. S., & Posner, R. A. (2004). Suicide: An economic approach. *University of Chicago*.
- Bergemann, D., Morris, S., & Takahashi, S. (2011). Interdependent preferences and strategic distinguishability. *Princeton University Economic Theory Research Paper*, (008-2011).
- Bille, T., Fjællegaard, C. B., Frey, B. S., and Steiner, L. (2013). Happiness in the arts-International evidence on artists' job satisfaction. *Economics Letters*, 121(1), 15-18

- Bjørnskov, C. (2003). The happy few: Cross-country evidence on social capital and life satisfaction. *Kyklos*, 56(1), 3–16.
- Blanchflower, D. G., and Oswald, A. J. (2004a). Money, sex and happiness: An empirical study. *The Scandinavian Journal of Economics*, 106(3), 393-415.
- Blanchflower, D. G., and Oswald, A. J. (2004b). Well-being over time in Britain and the USA. *Journal of Public Economics*, 88(7), 1359--1386.
- Blanchflower, D. G., and Oswald, A. J. (2005). Happiness and the Human development index: the paradox of Australia. *Australian Economic Review*, 38(3), 307-318.
- Blanchflower, D. G., Oswald, A. J., and Stewart-Brown, S. (2013). Is psychological well-being linked to the consumption of fruit and vegetables? *Social Indicators Research*, 114(3), 785-801.
- Blanchflower, D. G., Bell, D.N.F., Montagnoli, A., Moro, M. (2014). The happiness tradeoff between unemployment and inflation. *Journal of Money, Credit and Banking*, forthcoming. Retrieved April 26, 2015, from [http://www.dartmouth.edu/~blnchflr/papers/jcmb\\_version\\_inflation\\_unemployment\\_%20BBMM.pdf](http://www.dartmouth.edu/~blnchflr/papers/jcmb_version_inflation_unemployment_%20BBMM.pdf)
- Brickman, P., and Campbell, D. T. (1971). Hedonic relativism and planning the good society. *Adaptation-level theory*, 287-305.
- Brown, M. E. (1996). The causes and regional dimensions of internal conflict. *CSIA STUDIES IN INTERNATIONAL SECURITY*, 571-602.
- Bruni, L., Comim, F., and Pugno, M. (2008). Introduction. In L. Bruni, F. Comim and M. Pugno (Eds), *Capabilities and Happiness*: Oxford University Press.

- Bruni, L., and Stanca, L. (2008). Watching alone: Relational goods, television and happiness. *Journal of Economic Behavior and Organization*, 65(3), 506-528.
- Carroll, C. D., Overland, J., and Weil, D. N. (2000). Saving and growth with habit formation. *American Economic Review*, 341-355.
- Clark, A. E., and Oswald, A. J. (1998). Comparison-concave utility and following behaviour in social and economic settings. *Journal of Public Economics*, 70(1), 133-155.
- Clark, A. E. (2003a). Inequality-Aversion and Income Mobility: A Direct Test, Delta Working Papers.
- Clark, A. E. (2003b). Unemployment as a social norm: Psychological evidence from panel data. *Journal of Labor Economics*, 21(2), 323-351.
- Clark, A. E., Frijters, P., and Shields, M. A. (2008). Relative income, happiness, and utility: An explanation for the Easterlin paradox and other puzzles. *Journal of Economic Literature*, 95-144.
- Cohen-Charash, Y., & Mueller, J. S. (2007). Does perceived unfairness exacerbate or mitigate interpersonal counterproductive work behaviors related to envy?. *Journal of Applied Psychology*, 92(3), 666.
- Crusius, J., & Mussweiler, T. (2012). When people want what others have: The impulsive side of envious desire. *Emotion*, 12(1), 142.
- Cummins, R. A., Eckersley, R., Pallant, J., Van Vugt, J., & Misajon, R. (2003). Developing a national index of subjective wellbeing: The Australian Unity Wellbeing Index. *Social indicators research*, 64(2), 159-190.
- Debreu, G. (1952). A social equilibrium existence theorem. *Proceedings of the National Academy of Sciences of the United States of America*, 38(10), 886.

- Di Tella, R., MacCulloch, R. J., and Oswald, A. J. (2001). Preferences over inflation and unemployment: Evidence from surveys of happiness. *American Economic Review*, 91(1), 335-341.
- Di Tella, R., MacCulloch, R. J., and Oswald, A. J. (2003). The macroeconomics of happiness. *Review of Economics and Statistics*, 85(4), 809-827.
- Di Tella, R., and MacCulloch, R. (2005). Partisan social happiness. *The Review of Economic Studies*, 72(2), 367-393.
- Di Tella, R., and MacCulloch, R. (2008). Gross national happiness as an answer to the Easterlin Paradox? *Journal of Development Economics*, 86(1), 22-42.
- Di Tella, R., Haisken-De New, J., and MacCulloch, R. (2010). Happiness adaptation to income and to status in an individual panel. *Journal of Economic Behavior and Organization*, 76(3), 834-852.
- Dolan, P., Peasgood, T., and White, M. (2006). Review of research on the influences on personal well-being and application to policy making. *London, DEFRA*.
- Dolan, P., Peasgood, T., and 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. S. (1949) *Income, Savings, and the Theory of Consumer Behaviour*: Harvard Univ. Press, Cambridge, MA.
- Dunn, E. W., Gilbert, D. T., and Wilson, T. D. (2011). If money doesn't make you happy, then you probably aren't spending it right. *Journal of Consumer Psychology*, 21(2), 115-125.
- Dutta, I., and Foster, J. (2013). Inequality of Happiness in the US: 1972–2010. *Review of Income and Wealth*, 59(3), 393-415.

- Easterlin, R. A. (1974). Does economic growth improve the human lot? Some empirical evidence. *Nations and households in economic growth*, 89.
- Easterlin, R. A. (1995). Will raising the incomes of all increase the happiness of all? *Journal of Economic Behavior and Organization*, 27(1), 35-47.
- Easterlin, R. A. (2001). Income and happiness: Towards a unified theory. *The economic journal*, 111(473), 465-484.
- Easterlin, R. A. (2003). Explaining happiness. *Proceedings of the National Academy of Sciences*, 100(19), 11176-11183.
- Easterlin, R. A. (2005a). Feeding the illusion of growth and happiness: A reply to Hagerty and Veenhoven. *Social indicators research*, 74(3), 429-443.
- Easterlin, R. A. (2005b). Diminishing marginal utility of income? Caveat emptor. *Social Indicators Research*, 70(3), 243-255.
- Easterlin, R. A., McVey, L. A., Switek, M., Sawangfa, O., and Zweig, J. S. (2010). The happiness-income paradox revisited. *Proceedings of the National Academy of Sciences*, 107(52), 22463-22468.
- European Commision (2014). *Eurobarometer Interactive Search System*. Retrieved April 16, 2014, from [http://ec.europa.eu/public\\_opinion/cf/showchart\\_column.cfm?keyID=1andnationID=11,andstartdate=1998.05andenddate=1998.05](http://ec.europa.eu/public_opinion/cf/showchart_column.cfm?keyID=1andnationID=11,andstartdate=1998.05andenddate=1998.05)
- Ferrer-i-Carbonell, A., and 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. (2005). Income and well-being: an empirical analysis of the comparison income effect. *Journal of Public Economics*, 89(5), 997-1019.

- Finkelstein, A., Luttmer, E. F., and Notowidigdo, M. J. (2013). What good is wealth without health? The effect of health on the marginal utility of consumption. *Journal of the European Economic Association*, 11(s1), 221-258.
- Frank, R. H. (1985). The demand for unobservable and other non-positional goods. *The American Economic Review*, 101-116.
- Frey, B. S., and Stutzer, A. (2000). Happiness, economy and institutions. *The Economic Journal*, 110(466), 918-938.
- Frey, B. S., and Stutzer, A. (2002). What can economists learn from happiness research? *Journal of Economic Literature*, 40(2), 402-435.
- Frey, B. S., and Stutzer, A. (2010). *Happiness and economics: How the economy and institutions affect human well-being*: Princeton University Press.
- Gardner, J., and Oswald, A. J. (2007). Money and mental wellbeing: A longitudinal study of medium-sized lottery wins. *Journal of Health Economics*, 26(1), 49-60.
- Gilbert, P. (2010). Seeking inspiration: the rediscovery of the spiritual dimension in health and social care in England. *Mental Health, Religion & Culture*, 13(6), 533-546.
- Graham, C., and Pettinato, S. (2001). Happiness, markets, and democracy: Latin America in comparative perspective. *Journal of Happiness Studies*, 2(3), 237-268.
- Graham, C., Eggers, A., and Sukhtankar, S. (2004a). Does happiness pay?: An exploration based on panel data from Russia. *Journal of Economic Behavior and Organization*, 55(3), 319-342

- Graham, C., and Sukhtankar, S. (2004b). Does economic crisis reduce support for markets and democracy in Latin America? Some evidence from surveys of public opinion and well-being. *Journal of Latin American Studies*, 36(2), 349-377.
- Graham, C., Eggers, A., and Sukhtankar, S. (2004b). Does happiness pay?: An exploration based on panel data from Russia. *Journal of Economic Behavior and Organization*, 55(3), 319-342
- Graham, C., and Felton, A. (2006). Inequality and happiness: Insights from Latin America. *Journal of Economic Inequality*, 4(1), 107-122.
- Graham, C. (2008). Happiness, economics of. In. S. N. Durlauf and L. E. Blume.(Eds.), *The New Palgrave Dictionary of Economics Online, Second Edition*: Palgrave Macmillan.
- Gruber, J. H., and Mullainathan, S. (2005). Do cigarette taxes make smokers happier. *Advances in Economic Analysis and Policy*, 5(1).
- Gundlach, E., and Opfinger, M. (2013). Religiosity as a Determinant of Happiness. *Review of Development Economics*, 17(3), 523-539.
- Gurr, T. R. (1994). Peoples against states: Ethnopolitical conflict and the changing world system: 1994 presidential address. *International Studies Quarterly*, 347-377.
- Guven, C., & Sørensen, B. E. (2012). Subjective well-being: keeping up with the perception of the Joneses. *Social indicators research*, 109(3), 439-469.
- Guven, C., Senik, C., and Stichnoth, H. (2012). You can't be happier than your wife. Happiness gaps and divorce. *Journal of Economic Behavior and Organization*, 82(1), 110-130.

- Hagerty, M. R. (2000). Social comparisons of income in one's community: evidence from national surveys of income and happiness. *Journal of Personality and social Psychology*, 78(4), 764.
- Hagerty, M. R., and Veenhoven, R. (2003). Wealth and happiness revisited—growing national income does go with greater happiness. *Social indicators research*, 64(1), 1-27.
- Helliwell, J. F., Layard, R., & Sachs, J. (Eds.). (2013). *World happiness report 2013*. Sustainable Development Solutions Network.
- Helliwell, J. F. (2003). How's life? Combining individual and national variables to explain subjective well-being. *Economic Modelling*, 20(2), 331-360.
- Helliwell, J. F., and Putnam, R. D. (2004). The social context of well-being. *Philosophical transactions-royal society of London series B biological sciences*, 1435-1446.
- Helson, H. (1964). *Adaptation-Level Theory*: Oxford, England: Harper and Row.
- Holländer, H. (2001). On the validity of utility statements: standard theory versus Duesenberry's. *Journal of Economic Behavior and Organization*, 45(3), 227-249.
- Huang, H., & Humphreys, B. R. (2012). Sports participation and happiness: Evidence from US microdata. *Journal of Economic Psychology*, 33(4), 776-793.
- Hudson, J. (2006). Institutional Trust and Subjective Well-Being across the EU. *Kyklos*, 59(1), 43-62.
- Inglehart, R. (1990). *Culture shift in advanced industrial society*: Princeton University Press.

- Kahneman, D., Wakker, P. P., and Sarin, R. (1997). Back to Bentham? Explorations of experienced utility. *The Quarterly Journal of Economics*, 112(2), 375-406.
- Kahneman, D., and Tversky, A. (2000). *Choices, values, and frames*: Cambridge University Press. Google book.
- Kahneman, D., Diener, E., and Schwarz, N. (2003). *Well-being: Foundations of hedonic psychology*: Russell Sage Foundation.
- Kahneman, D., Krueger, A. B., Schkade, D., Schwarz, N., and Stone, A. (2004). Toward national well-being accounts. *American Economic Review*, 429-434.
- Kalmijn, W., and Veenhoven, R. (2005). Measuring inequality of happiness in nations: In search for proper statistics. *Journal of Happiness Studies*, 6(4), 357-396.
- Keynes, J. M. (1905). A Theory of Beauty. *Keynes Papers, King's College*.
- Keynes, J. M. (1919). *The economic consequences of the peace*. Courier Dover Publications.
- Knight, J., Song, L., and Gunatilaka, R. (2009). Subjective well-being and its determinants in rural China. *China Economic Review*, 20(4), 635-649.
- Kőszegi, B., and Rabin, M. (2008). Choices, situations, and happiness. *Journal of Public Economics*, 92(8), 1821-1832.
- Laibman, D. (1999). Productive and unproductive labor: A comment. *Review of Radical Political Economics*, 31(2), 61-73.
- Layard, R. (2010). Measuring subjective well-being. *Science*, 327(5965), 534-535.
- Layard, P. R. G., and Layard, R. (2011). *Happiness: Lessons from a new science*: Penguin UK.

Legatum Institute. *The 2013 Legatum Prosperity Index*. Accessed on July 22, 2014,  
from <http://www.prosperity.com/#!/>

Leguizamon, S. J., & Ross, J. M. (2012). Revealed preference for relative status:  
Evidence from the housing market. *Journal of Housing Economics*, 21(1), 55-  
65.

Leigh, A., and Wolfers, J. (2006). Happiness and the human development index:  
Australia is not a paradox. *Australian Economic Review*, 39(2), 176-184.

Luttmer, E. F. (2005). Neighbours as negatives: Relative earnings and well-being.  
*The Quarterly Journal of Economics*, 120(3), 963-1002.

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

Madden, D. (2010). Ordinal and cardinal measures of health inequality: an empirical  
comparison. *Health economics*, 19(2), 243-250.

Madden, D. (2011). The Impact of an Economic Boom on the Level and Distribution  
of Subjective Well-Being: Ireland, 1994–2001. *Journal of Happiness Studies*,  
12(4), 667-679.

Marx, K., and Engels, F. (1920). *Wage-labor and capital*: Andrades.

Meier, S., and Stutzer, A. (2008). Is volunteering rewarding in itself? *Economica*,  
75(297), 39-59.

Michalos, A. C. (1991). *Global report on student well-being (Vol. 1)*: Springer-Verlag  
New York.

Mochon, D., Norton, M. I., & Ariely, D. (2008). Getting off the hedonic treadmill, one  
step at a time: The impact of regular religious practice and exercise on well-  
being. *Journal of Economic Psychology*, 29(5), 632-642.

- National Opinion Research Center (1999). *General Social Surveys, 1972-1998: Cumulative Codebook*. Chicago: National Opinion Research Center.
- New Economics Foundation. (2012). *The Happy Planet Index: 2012 Report*. Retrieved July 22, 2014, from <http://www.happyplanetindex.org/assets/happy-planet-index-report.pdf>
- Ng, Y. K. (1990). Welfarism and utilitarianism: a rehabilitation. *Utilitas*, 2(2), 171-193.
- Ng, Y. K., & Wang, J. (1993). Relative income, aspiration, environmental quality, individual and political myopia: Why may the rat-race for material growth be welfare-reducing?. *Mathematical Social Sciences*, 26(1), 3-23.
- Ng, Y. K. (1997). A case for happiness, cardinalism, and interpersonal comparability. *The Economic Journal*, 107(445), 1848-1858.
- Ng, Y. K. (2003). From preference to happiness: Towards a more complete welfare economics. *Social Choice and Welfare*, 20(2), 307-350.
- Ng, Y. K. (2008a). Environmentally responsible happy nation index: Towards an internationally acceptable national success indicator. *Social Indicators Research*, 85(3), 425-446.
- Ng, Y. K. (2008b). Happiness Studies: Ways to Improve Comparability and Some Public Policy Implications\*. *Economic Record*, 84(265), 253-266.
- Nussbaum, M. C. (2001). Symposium on Amartya Sen's philosophy: 5 Adaptive preferences and women's options. *Economics and Philosophy*, 17(1), 67-88.
- Olson, J. M., Herman, C. P., and Zanna, M. P. (1986). *Relative deprivation and social comparison: The Ontario symposium* (Vol. 4): Psychology Press.

- Organisation for Economic Co-operation and Development (OECD). (2014). *OECD Better Life Index*. Accessed July 22, 2014, from <http://www.oecdbetterlifeindex.org/>
- Oswald, A. J., and Powdthavee, N. (2008). Does happiness adapt? A longitudinal study of disability with implications for economists and judges. *Journal of Public Economics*, 92(5), 1061-1077.
- Oswald, A. J., and Wu, S. (2010). Objective confirmation of subjective measures of human well-being: Evidence from the USA. *Science*, 327(5965), 576-579.
- Ott, J. (2005). Level and inequality of happiness in nations: Does greater happiness of a greater number imply greater inequality in happiness? *Journal of Happiness Studies*, 6(4), 397-420.
- Ovaska, T., and Takashima, R. (2010). Does a rising tide lift all the boats? Explaining the national inequality of happiness. *Journal of Economic Issues*, 44(1), 205-224.
- Pollak, R. A. (1970). Habit formation and dynamic demand functions. *Journal of Political Economy*, 78(4), 745-763.
- Pollak, R. A. (1976). Interdependent preferences. *The American Economic Review*, 309-320.
- Rae, J. (1834). *Statement of some new principles on the subject of political economy: exposing the fallacies of the system of free trade, and of some other doctrines maintained in the "Wealth of nations."*. Hillard, Gray.
- Rasciute, S., & Downward, P. (2010). Health or happiness? What is the impact of physical activity on the individual?. *Kyklos*, 63(2), 256-270.
- Rawls, J. (1971). *A Theory of Justice*: Harvard University Press, Cambridge.

- Rehdanz, K., and Maddison, D. (2005). Climate and happiness. *Ecological Economics*, 52(1), 111-125.
- Rowe, C. J., & Broadie, S. (Eds.). (2002). *Nicomachean ethics*. Oxford University Press.
- Ryan, R. M., and Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual review of psychology*, 52(1), 141-166.
- Scitovsky, T. (1976). *The joyless economy: An inquiry into human satisfaction and consumer dissatisfaction*. Oxford University Press.
- Scitovsky, T. (1992). *The joyless economy: The Psychology of human satisfaction*. Oxford University Press.
- Sen, A. (1977). Social choice theory: A re-examination. *Econometrica: journal of the Econometric Society*, 53-89.
- Sen, A. (1999a). *Development as freedom*. Oxford University Press.
- Sen, A. (1999b). The possibility of social choice. *American Economic Review*, 349-378.
- Sen A. (2008). The Economics of Happiness and Capability. In L. Bruni, F. Comim and M. Pugno (Eds), *Capabilities and Happiness*: Oxford University Press.
- Senik, C. (2004). When information dominates comparison learning from Russian subjective panel data. *Journal of Public Economics*, 88, 2099–20123.
- Senik, C. (2008). Ambition and jealousy: Income interactions in the 'Old' Europe versus the 'New' Europe and the United States. *Economica*, 75(299), 495-513.

- Shields, M. A., and Price, S. W. (2005). Exploring the economic and social determinants of psychological well-being and perceived social support in England. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 168(3), 513-537.
- Skocpol, T. (1979). *States and social revolutions: A comparative analysis of France, Russia and China*. Cambridge University Press.
- Smith, T. W., Marsden, P., Hout, M., and Kim, J. (2011). General Social Surveys, 1972–2010 [machine-readable data file]. *Sponsored by National Science Foundation. NORC, Chicago: National Opinion Research Center [producer]*.
- Stevenson, B., and Wolfers, J. (2008a). Economic growth and subjective well-being: Reassessing the Easterlin paradox: National Bureau of Economic Research.
- Stevenson, B., and Wolfers, J. (2008b). Happiness inequality in the United States: National Bureau of Economic Research.
- Stevenson, B. (2010). What are the Economics of Happiness? *Yale University Interview*, conducted and edited by Ted O'Callahan. Retrieved from <http://insights.som.yale.edu/insights/what-are-economics-happiness-0>
- Stiglitz, J. E., Sen, A., and Fitoussi, J. P. (2010). Report by the commission on the measurement of economic performance and social progress. *Paris: Commission on the Measurement of Economic Performance and Social Progress*.
- Stutzer, A. (2004). The role of income aspirations in individual happiness. *Journal of Economic Behavior and Organization*, 54(1), 89-109.

- Tai, K., Narayanan, J., & McAllister, D. J. (2012). Envy as pain: Rethinking the nature of envy and its implications for employees and organizations. *Academy of Management Review*, 37(1), 107-129.
- Thurow, L. C. (1971). The income distribution as a pure public good. *The Quarterly Journal of Economics*, 85(2), 327-336.
- Tomes, N. (1986). Income distribution, happiness and satisfaction: A direct test of the interdependent preferences model. *Journal of Economic Psychology*, 7(4), 425-446.
- Van Praag, B., and Kapteyn, A. (1973). Further evidence on the individual welfare function of income: An empirical investigation in The Netherlands. *European Economic Review*, 4(1), 33-62.
- Veblen, T., (1899). *The theory of the leisure class*: Macmillan and Company Limited, New York.
- Veenhoven, R. (1993). *Happiness in Nations, Subjective Appreciation of Life in 56 Nations 1946-1992*: Rotterdam, Erasmus University.
- Veenhoven, R. (2000). Well-being in the welfare state: Level not higher, distribution not more equitable. *Journal of Comparative Policy Analysis: Research and Practice*, 2(1), 91-125.
- Veenhoven, R. (2005a). Return of inequality in modern society? Test by dispersion of life-satisfaction across time and nations. *Journal of Happiness Studies*, 6(4), 457-487
- Veenhoven, R. (2005b). Inequality of happiness in nations. *Journal of Happiness Studies*, 6(4), 351-355.

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

Wolfers, J. (2003). Is business cycle volatility costly? Evidence from surveys of subjective well-being. *International finance*, 6(1), 1-26.

## Appendix A: Spring Results

### Distribution of Responses

**Table A.1: Respondent Shares, Belgium (Spring Data)**

Year	Not satisfied	Fairly satisfied	Very satisfied
1975	7.1%	53.1%	39.8%
1976	11.1%	52.5%	36.4%
1977	10.0%	52.0%	38.0%
1978	11.1%	51.5%	37.4%
1979	9.2%	48.0%	42.9%
1980	11.1%	53.5%	35.4%
1981	13.3%	50.0%	36.7%
1982	16.7%	53.1%	30.2%
1983	16.2%	60.6%	23.2%
1984	23.2%	46.5%	30.3%
1985	15.2%	58.6%	26.3%
1986	20.2%	57.6%	22.2%
1987	14.3%	55.1%	30.6%
1988	15.2%	55.6%	29.3%
1989	13.3%	56.1%	30.6%
1990	9.1%	55.6%	35.4%
1991	9.1%	52.5%	38.4%
1992	10.2%	60.2%	29.6%
1993	11.0%	63.0%	26.0%
1994	11.1%	55.6%	33.3%
1995	10.1%	63.6%	26.3%
1996	12.1%	62.6%	25.3%
1997	21.2%	58.6%	20.2%
1998	20.2%	61.6%	18.2%
2000	19.2%	61.6%	19.2%
2001	13.3%	60.2%	26.5%
2002	15.2%	67.7%	17.2%
2005	11.9%	55.4%	32.7%
2006	8.1%	60.6%	31.3%
2007	11.0%	57.0%	32.0%
2008	13.0%	58.0%	29.0%
2009	9.0%	56.0%	35.0%
2010	12.0%	58.0%	30.0%
2011	9.0%	59.0%	32.0%
2012	9.0%	62.0%	29.0%
2013	8.0%	60.0%	32.0%

**Table A.2: Respondent Shares, Denmark (Spring Data)**

Year	Not satisfied	Fairly satisfied	Very satisfied
1975	4.2%	42.7%	53.1%
1976	6.0%	45.0%	49.0%
1977	3.0%	42.4%	54.5%
1978	6.0%	40.0%	54.0%
1979	5.1%	43.4%	51.5%
1980	5.0%	40.0%	55.0%
1981	4.0%	36.4%	59.6%
1982	5.1%	37.4%	57.6%
1983	5.0%	41.0%	54.0%
1984	5.1%	37.8%	57.1%
1985	4.0%	32.3%	63.6%
1986	4.0%	32.3%	63.6%
1987	3.0%	35.4%	61.6%
1988	3.0%	36.4%	60.6%
1989	4.0%	38.4%	57.6%
1990	2.5%	34.2%	63.3%
1991	2.6%	36.1%	61.2%
1992	2.6%	31.1%	66.3%
1993	3.0%	32.3%	64.6%
1994	2.6%	29.1%	68.3%
1995	2.3%	31.2%	66.5%
1996	2.3%	30.5%	67.1%
1997	3.3%	34.9%	61.8%
1998	2.5%	30.2%	67.3%
2000	4.7%	38.1%	57.2%
2001	2.6%	35.1%	62.2%
2002	4.0%	32.7%	63.4%
2005	3.0%	30.7%	66.3%
2006	3.0%	30.3%	66.7%
2007	3.0%	33.0%	64.0%
2008	4.0%	31.0%	65.0%
2009	2.0%	28.0%	70.0%
2010	2.0%	29.0%	69.0%
2011	3.0%	29.0%	68.0%
2012	3.0%	26.0%	71.0%
2013	4.0%	26.0%	70.0%

**Table A.3: Respondent Shares, France (Spring Data)**

Year	Not satisfied	Fairly satisfied	Very satisfied
1975	23.5%	60.2%	16.3%
1976	26.3%	59.6%	14.1%
1977	31.3%	57.6%	11.1%
1978	28.3%	59.6%	12.1%
1979	31.3%	58.6%	10.1%
1980	30.0%	60.0%	10.0%
1981	29.3%	58.6%	12.1%
1982	21.0%	63.0%	16.0%
1983	25.3%	63.6%	11.1%
1984	27.3%	60.6%	12.1%
1985	23.2%	63.6%	13.1%
1986	23.2%	63.6%	13.1%
1987	22.2%	63.6%	14.1%
1988	21.2%	63.6%	15.2%
1989	19.0%	64.0%	17.0%
1990	19.2%	64.6%	16.2%
1991	19.4%	65.3%	15.3%
1992	28.3%	59.6%	12.1%
1993	30.7%	55.4%	13.9%
1994	26.3%	59.6%	14.1%
1995	25.5%	61.2%	13.3%
1996	25.3%	62.6%	12.1%
1997	26.0%	62.0%	12.0%
1998	26.5%	61.2%	12.2%
2000	21.2%	65.7%	13.1%
2001	18.4%	66.3%	15.3%
2002	19.2%	66.7%	14.1%
2005	16.2%	64.6%	19.2%
2006	15.0%	66.0%	19.0%
2007	18.0%	64.0%	18.0%
2008	21.2%	62.6%	16.2%
2009	16.0%	64.0%	20.0%
2010	17.0%	63.0%	20.0%
2011	16.2%	63.6%	20.2%
2012	15.0%	65.0%	20.0%
2013	17.0%	68.0%	15.0%

**Table A.4: Respondent Shares, Germany (Spring Data)**

Year	Not satisfied	Fairly satisfied	Very satisfied
1975	18.6%	68.0%	13.4%
1976	19.4%	61.2%	19.4%
1977	17.3%	63.3%	19.4%
1978	17.2%	61.6%	21.2%
1979	12.2%	63.3%	24.5%
1980	13.3%	69.4%	17.3%
1981	19.8%	63.5%	16.7%
1982	14.4%	64.9%	20.6%
1983	18.2%	63.6%	18.2%
1984	14.4%	64.9%	20.6%
1985	16.0%	60.0%	24.0%
1986	12.0%	63.0%	25.0%
1987	13.1%	65.7%	21.2%
1988	13.0%	64.0%	23.0%
1989	9.1%	70.7%	20.2%
1990	11.1%	59.6%	29.3%
1991	14.3%	62.2%	23.5%
1992	16.2%	63.6%	20.2%
1993	16.2%	61.6%	22.2%
1994	16.2%	66.7%	17.2%
1995	16.2%	63.6%	20.2%
1996	18.2%	63.6%	18.2%
1997	28.3%	60.6%	11.1%
1998	22.2%	64.6%	13.1%
2000	27.6%	61.2%	11.2%
2001	16.2%	67.7%	16.2%
2002	18.0%	65.0%	17.0%
2005	16.2%	62.6%	21.2%
2006	18.0%	65.0%	17.0%
2007	14.0%	62.0%	24.0%
2008	18.0%	63.0%	19.0%
2009	15.2%	59.6%	25.3%
2010	15.2%	62.6%	22.2%
2011	12.0%	63.0%	25.0%
2012	11.0%	63.0%	26.0%
2013	11.0%	60.0%	29.0%

**Table A.5: Respondent Shares, Ireland (Spring Data)**

<b>Year</b>	<b>Not satisfied</b>	<b>Fairly satisfied</b>	<b>Very satisfied</b>
1975	12.0%	52.0%	36.0%
1976	12.0%	54.0%	34.0%
1977	12.0%	50.0%	38.0%
1978	10.0%	50.0%	40.0%
1979	16.0%	47.0%	37.0%
1980	14.0%	52.0%	34.0%
1981	16.2%	49.5%	34.3%
1982	13.1%	46.5%	40.4%
1983	17.2%	47.5%	35.4%
1984	16.2%	47.5%	36.4%
1985	18.2%	50.5%	31.3%
1986	17.2%	49.5%	33.3%
1987	19.2%	52.5%	28.3%
1988	20.0%	50.0%	30.0%
1989	18.0%	52.0%	30.0%
1990	10.1%	48.5%	41.4%
1991	12.1%	46.5%	41.4%
1992	14.0%	48.0%	38.0%
1993	14.1%	52.5%	33.3%
1994	14.1%	50.5%	35.4%
1995	10.2%	56.1%	33.7%
1996	10.0%	56.0%	34.0%
1997	9.0%	49.0%	42.0%
1998	9.2%	57.1%	33.7%
2000	11.1%	53.5%	35.4%
2001	9.1%	53.5%	37.4%
2002	9.2%	60.2%	30.6%
2005	10.1%	53.5%	36.4%
2006	8.1%	54.5%	37.4%
2007	8.2%	56.1%	35.7%
2008	8.3%	55.2%	36.5%
2009	11.1%	49.5%	39.4%
2010	11.1%	51.5%	37.4%
2011	12.0%	53.0%	35.0%
2012	14.0%	56.0%	30.0%
2013	18.2%	57.6%	24.2%

**Table A.6: Respondent Shares, Italy (Spring Data)**

<b>Year</b>	<b>Not satisfied</b>	<b>Fairly satisfied</b>	<b>Very satisfied</b>
1975	39.2%	53.6%	7.2%
1976	44.4%	48.5%	7.1%
1977	41.0%	50.0%	9.0%
1978	37.0%	53.0%	10.0%
1979	41.0%	50.0%	9.0%
1980	36.0%	54.0%	10.0%
1981	33.0%	54.0%	13.0%
1982	29.0%	57.0%	14.0%
1983	33.0%	56.0%	11.0%
1984	36.0%	54.0%	10.0%
1985	32.3%	52.5%	15.2%
1986	28.0%	61.0%	11.0%
1987	29.0%	57.0%	14.0%
1988	26.0%	62.0%	12.0%
1989	24.0%	59.0%	17.0%
1990	23.2%	60.6%	16.2%
1991	19.2%	61.6%	19.2%
1992	23.0%	62.0%	15.0%
1993	20.0%	65.0%	15.0%
1994	24.0%	63.0%	13.0%
1995	21.2%	64.6%	14.1%
1996	20.2%	67.7%	12.1%
1997	26.3%	61.6%	12.1%
1998	26.0%	61.0%	13.0%
2000	31.0%	61.0%	8.0%
2001	20.2%	63.6%	16.2%
2002	20.0%	64.0%	16.0%
2005	26.3%	64.6%	9.1%
2006	23.2%	62.6%	14.1%
2007	25.3%	63.6%	11.1%
2008	36.0%	59.0%	5.0%
2009	30.0%	61.0%	9.0%
2010	28.0%	65.0%	7.0%
2011	25.3%	65.7%	9.1%
2012	40.0%	53.0%	7.0%
2013	38.4%	55.6%	6.1%

**Table A.7: Respondent Shares, Netherlands (Spring Data)**

Year	Not satisfied	Fairly satisfied	Very satisfied
1975	9.6%	55.3%	35.1%
1976	10.1%	48.5%	41.4%
1977	7.1%	54.5%	38.4%
1978	7.0%	47.0%	46.0%
1979	4.0%	49.5%	46.5%
1980	5.0%	48.0%	47.0%
1981	8.0%	48.0%	44.0%
1982	5.1%	52.5%	42.4%
1983	8.0%	53.0%	39.0%
1984	7.1%	48.5%	44.4%
1985	8.2%	51.0%	40.8%
1986	5.1%	53.5%	41.4%
1987	7.1%	51.5%	41.4%
1988	6.1%	48.5%	45.5%
1989	5.0%	46.0%	49.0%
1990	6.4%	45.3%	48.3%
1991	4.8%	45.1%	50.1%
1992	6.5%	43.7%	49.8%
1993	5.7%	47.1%	47.1%
1994	6.0%	47.0%	47.0%
1995	6.0%	46.0%	48.0%
1996	5.1%	48.5%	46.5%
1997	6.9%	46.6%	46.6%
1998	5.0%	51.0%	44.0%
2000	9.0%	59.0%	32.0%
2001	5.8%	46.1%	48.1%
2002	6.9%	48.5%	44.6%
2005	5.0%	48.0%	47.0%
2006	4.0%	51.5%	44.4%
2007	3.0%	46.0%	51.0%
2008	4.0%	45.0%	51.0%
2009	4.0%	44.0%	52.0%
2010	5.0%	47.0%	48.0%
2011	4.0%	45.0%	51.0%
2012	6.0%	44.0%	50.0%
2013	5.0%	48.0%	47.0%

**Table A.8: Respondent Shares, U.K. (Spring Data)**

Year	Not satisfied	Fairly satisfied	Very satisfied
1975	7.1%	53.1%	39.8%
1976	11.1%	52.5%	36.4%
1977	10.0%	52.0%	38.0%
1978	11.1%	51.5%	37.4%
1979	9.2%	48.0%	42.9%
1980	11.1%	53.5%	35.4%
1981	13.3%	50.0%	36.7%
1982	16.7%	53.1%	30.2%
1983	16.2%	60.6%	23.2%
1984	23.2%	46.5%	30.3%
1985	15.2%	58.6%	26.3%
1986	20.2%	57.6%	22.2%
1987	14.3%	55.1%	30.6%
1988	15.2%	55.6%	29.3%
1989	13.3%	56.1%	30.6%
1990	9.1%	55.6%	35.4%
1991	9.1%	52.5%	38.4%
1992	10.2%	60.2%	29.6%
1993	11.0%	63.0%	26.0%
1994	11.1%	55.6%	33.3%
1995	10.1%	63.6%	26.3%
1996	12.1%	62.6%	25.3%
1997	21.2%	58.6%	20.2%
1998	20.2%	61.6%	18.2%
2000	19.2%	61.6%	19.2%
2001	13.3%	60.2%	26.5%
2002	15.2%	67.7%	17.2%
2005	11.9%	55.4%	32.7%
2006	8.1%	60.6%	31.3%
2007	11.0%	57.0%	32.0%
2008	13.0%	58.0%	29.0%
2009	9.0%	56.0%	35.0%
2010	12.0%	58.0%	30.0%
2011	9.0%	59.0%	32.0%
2012	9.0%	62.0%	29.0%
2013	8.0%	60.0%	32.0%

## Appendix B: Autumn Results

### Distribution of Responses

**Table B.1: Respondent Shares, Belgium (Autumn Data)**

Year	Not satisfied	Fairly satisfied	Very satisfied
1975	12.1%	51.5%	36.4%
1976	9.0%	51.0%	40.0%
1977	9.1%	44.4%	46.5%
1978	10.1%	43.4%	46.5%
1982	16.7%	62.5%	20.8%
1983	19.6%	61.9%	18.6%
1984	20.2%	63.6%	16.2%
1985	19.2%	62.6%	18.2%
1986	24.5%	62.2%	13.3%
1987	20.2%	56.6%	23.2%
1988	26.3%	57.6%	16.2%
1989	11.0%	61.0%	28.0%
1990	14.0%	63.0%	23.0%
1991	11.1%	56.6%	32.3%
1992	10.1%	59.6%	30.3%
1993	15.2%	58.6%	26.3%
1994	14.3%	64.3%	21.4%
1999	16.2%	59.6%	24.2%
2000	13.1%	62.6%	24.2%
2001	15.2%	66.7%	18.2%
2002	18.2%	68.7%	13.1%
2003	15.6%	61.4%	23.0%
2004	9.0%	58.0%	33.0%
2005	11.1%	59.6%	29.3%
2006	10.0%	57.0%	33.0%
2007	10.0%	58.0%	32.0%
2008	13.0%	59.0%	28.0%
2009	11.0%	61.0%	28.0%
2010	11.0%	60.0%	29.0%
2011	13.0%	61.0%	26.0%
2012	12.0%	59.0%	29.0%
2013	7.0%	61.0%	32.0%

**Table B.2: Respondent Shares, Denmark (Autumn Data)**

Year	Not satisfied	Fairly satisfied	Very satisfied
1975	4.4%	56.0%	39.6%
1976	7.1%	42.4%	50.5%
1977	6.0%	41.0%	53.0%
1978	4.0%	38.0%	58.0%
1982	3.0%	39.4%	57.6%
1983	4.0%	40.4%	55.6%
1984	3.1%	37.8%	59.2%
1985	4.0%	40.4%	55.6%
1986	5.1%	42.4%	52.5%
1987	5.1%	46.5%	48.5%
1988	17.0%	46.0%	37.0%
1989	3.7%	38.5%	57.8%
1990	3.7%	37.5%	58.8%
1991	2.6%	34.1%	63.3%
1992	3.6%	33.1%	63.3%
1993	2.6%	33.5%	63.9%
1994	3.5%	34.2%	62.3%
1999	3.6%	33.1%	63.3%
2000	2.1%	37.7%	60.1%
2001	3.6%	32.1%	64.3%
2002	3.0%	33.0%	64.0%
2003	3.6%	35.1%	61.3%
2004	3.0%	33.0%	64.0%
2005	4.0%	32.7%	63.4%
2006	3.0%	33.0%	64.0%
2007	2.0%	31.0%	67.0%
2008	4.0%	32.0%	64.0%
2009	2.0%	30.0%	68.0%
2010	3.0%	31.0%	66.0%
2011	3.0%	27.0%	70.0%
2012	3.0%	29.0%	68.0%
2013	3.0%	28.0%	69.0%

**Table B.3: Respondent Shares, France (Autumn Data)**

Year	Not satisfied	Fairly satisfied	Very satisfied
1975	24.5%	60.2%	15.3%
1976	30.3%	59.6%	10.1%
1977	26.3%	60.6%	13.1%
1978	29.3%	59.6%	11.1%
1982	27.0%	60.0%	13.0%
1983	24.2%	60.6%	15.2%
1984	26.3%	62.6%	11.1%
1985	30.6%	59.2%	10.2%
1986	28.6%	59.2%	12.2%
1987	31.3%	57.6%	11.1%
1988	43.0%	43.0%	14.0%
1989	20.2%	64.6%	15.2%
1990	24.5%	63.3%	12.2%
1991	24.5%	62.2%	13.3%
1992	25.0%	60.0%	15.0%
1993	27.3%	61.6%	11.1%
1994	24.0%	61.0%	15.0%
1999	19.2%	64.6%	16.2%
2000	17.2%	67.7%	15.2%
2001	20.4%	65.3%	14.3%
2002	21.2%	66.7%	12.1%
2003	23.4%	63.9%	12.7%
2004	17.2%	64.6%	18.2%
2005	19.0%	65.0%	16.0%
2006	15.0%	67.0%	18.0%
2007	15.0%	67.0%	18.0%
2008	20.0%	64.0%	16.0%
2009	18.0%	64.0%	18.0%
2010	16.0%	66.0%	18.0%
2011	23.2%	61.6%	15.2%
2012	14.0%	66.0%	20.0%
2013	17.0%	66.0%	17.0%

**Table B.4: Respondent Shares, Germany (Autumn Data)**

Year	Not satisfied	Fairly satisfied	Very satisfied
1975	19.4%	66.3%	14.3%
1976	17.2%	60.6%	22.2%
1977	14.1%	61.6%	24.2%
1978	13.3%	66.3%	20.4%
1982	14.3%	66.3%	19.4%
1983	17.9%	69.5%	12.6%
1984	15.2%	71.7%	13.1%
1985	20.4%	65.3%	14.3%
1986	16.2%	65.7%	18.2%
1987	16.2%	68.7%	15.2%
1988	18.2%	56.6%	25.3%
1989	9.1%	63.6%	27.3%
1990	11.0%	68.0%	21.0%
1991	14.1%	64.6%	21.2%
1992	13.1%	63.6%	23.2%
1993	16.0%	65.0%	19.0%
1994	14.1%	68.7%	17.2%
1999	18.0%	65.0%	17.0%
2000	18.2%	65.7%	16.2%
2001	17.0%	65.0%	18.0%
2002	20.4%	65.3%	14.3%
2003	25.0%	60.6%	14.4%
2004	16.0%	63.0%	21.0%
2005	21.0%	60.0%	19.0%
2006	18.2%	60.6%	21.2%
2007	17.0%	61.0%	22.0%
2008	15.0%	65.0%	20.0%
2009	14.1%	63.6%	22.2%
2010	13.0%	63.0%	24.0%
2011	12.0%	61.0%	27.0%
2012	11.0%	62.0%	27.0%
2013	11.0%	60.0%	29.0%

**Table B.5: Respondent Shares, Ireland (Autumn Data)**

Year	Not satisfied	Fairly satisfied	Very satisfied
1975	10.0%	50.0%	40.0%
1976	13.0%	50.0%	37.0%
1977	11.0%	47.0%	42.0%
1978	13.1%	45.5%	41.4%
1982	14.0%	53.0%	33.0%
1983	20.0%	53.0%	27.0%
1984	15.0%	55.0%	30.0%
1985	17.2%	57.6%	25.3%
1986	18.2%	58.6%	23.2%
1987	25.3%	53.5%	21.2%
1988	30.3%	46.5%	23.2%
1989	15.0%	48.0%	37.0%
1990	15.3%	56.1%	28.6%
1991	12.2%	46.9%	40.8%
1992	15.2%	48.5%	36.4%
1993	15.2%	52.5%	32.3%
1994	11.2%	49.0%	39.8%
1999	10.3%	57.7%	32.0%
2000	12.2%	53.1%	34.7%
2001	7.9%	60.0%	32.1%
2002	10.3%	62.9%	26.8%
2003	11.7%	59.1%	29.2%
2004	6.1%	54.5%	39.4%
2005	7.1%	53.5%	39.4%
2006	8.2%	55.1%	36.7%
2007	10.1%	56.6%	33.3%
2008	11.1%	59.6%	29.3%
2009	14.1%	56.6%	29.3%
2010	16.2%	52.5%	31.3%
2011	14.1%	56.6%	29.3%
2012	18.2%	56.6%	25.3%
2013	17.0%	57.0%	26.0%

**Table B.6: Respondent Shares, Italy (Autumn Data)**

Year	Not satisfied	Fairly satisfied	Very satisfied
1975	42.4%	48.5%	9.1%
1976	42.4%	48.5%	9.1%
1977	38.0%	54.0%	8.0%
1978	37.0%	54.0%	9.0%
1982	39.0%	50.0%	11.0%
1983	35.0%	57.0%	8.0%
1984	30.3%	57.6%	12.1%
1985	37.0%	53.0%	10.0%
1986	30.3%	57.6%	12.1%
1987	35.0%	54.0%	11.0%
1988	33.0%	49.0%	18.0%
1989	20.2%	64.6%	15.2%
1990	26.3%	60.6%	13.1%
1991	21.0%	60.0%	19.0%
1992	26.3%	60.6%	13.1%
1993	26.0%	60.0%	14.0%
1994	22.2%	65.7%	12.1%
1999	22.2%	66.7%	11.1%
2000	21.0%	65.0%	14.0%
2001	19.0%	66.0%	15.0%
2002	20.0%	67.0%	13.0%
2003	23.8%	64.0%	12.1%
2004	24.0%	60.0%	16.0%
2005	23.0%	63.0%	14.0%
2006	23.2%	64.6%	12.1%
2007	28.3%	61.6%	10.1%
2008	36.4%	58.6%	5.1%
2009	28.3%	64.6%	7.1%
2010	29.0%	60.0%	11.0%
2011	35.4%	60.6%	4.0%
2012	41.4%	53.5%	5.1%
2013	46.0%	49.0%	5.0%

**Table B.7: Respondent Shares, Netherlands (Autumn Data)**

<b>Year</b>	<b>Not satisfied</b>	<b>Fairly satisfied</b>	<b>Very satisfied</b>
1975	8.5%	55.3%	36.2%
1976	9.1%	52.5%	38.4%
1977	7.1%	48.5%	44.4%
1978	7.1%	48.5%	44.4%
1982	9.1%	44.4%	46.5%
1983	10.1%	51.5%	38.4%
1984	6.1%	45.9%	48.0%
1985	9.0%	56.0%	35.0%
1986	9.1%	55.6%	35.4%
1987	8.1%	56.6%	35.4%
1988	10.1%	58.6%	31.3%
1989	5.1%	52.0%	42.9%
1990	4.2%	51.4%	44.4%
1991	5.6%	47.2%	47.2%
1992	6.0%	44.0%	50.0%
1993	6.1%	48.5%	45.5%
1994	7.1%	53.5%	39.4%
1999	4.9%	57.7%	37.4%
2000	6.1%	49.5%	44.4%
2001	6.0%	47.0%	47.0%
2002	8.0%	55.0%	37.0%
2003	9.8%	50.7%	39.5%
2004	8.0%	48.0%	44.0%
2005	5.0%	48.5%	46.5%
2006	5.0%	45.0%	50.0%
2007	4.0%	44.0%	52.0%
2008	2.0%	44.0%	54.0%
2009	5.0%	45.0%	50.0%
2010	4.0%	43.0%	53.0%
2011	3.0%	44.0%	53.0%
2012	6.0%	47.0%	47.0%
2013	6.0%	50.0%	44.0%

**Table B.8: Respondent Shares, United Kingdom (Autumn Data)**

<b>Year</b>	<b>Not satisfied</b>	<b>Fairly satisfied</b>	<b>Very satisfied</b>
1975	17.2%	53.5%	29.3%
1976	16.0%	56.0%	28.0%
1977	13.0%	57.0%	30.0%
1978	12.1%	55.6%	32.3%
1982	13.1%	51.5%	35.4%
1983	16.2%	54.5%	29.3%
1984	13.1%	56.6%	30.3%
1985	15.0%	55.0%	30.0%
1986	14.0%	56.0%	30.0%
1987	14.1%	53.5%	32.3%
1988	31.0%	48.0%	21.0%
1989	11.1%	53.5%	35.4%
1990	14.1%	60.6%	25.3%
1991	14.1%	53.5%	32.3%
1992	15.2%	54.5%	30.3%
1993	13.9%	55.4%	30.7%
1994	13.0%	55.0%	32.0%
1999	15.3%	59.2%	25.5%
2000	10.0%	58.0%	32.0%
2001	10.1%	58.6%	31.3%
2002	13.1%	56.6%	30.3%
2003	12.1%	56.8%	31.1%
2004	9.1%	57.6%	33.3%
2005	10.0%	56.0%	34.0%
2006	10.0%	55.0%	35.0%
2007	9.0%	58.0%	33.0%
2008	13.0%	55.0%	32.0%
2009	9.0%	49.0%	42.0%
2010	11.0%	54.0%	35.0%
2011	13.0%	49.0%	38.0%
2012	9.0%	53.0%	38.0%
2013	10.0%	53.0%	37.0%

## Dominance Ranking Results (Autumn Surveys)

**Table B.9: Dominance Ranking Matrix, Belgium (Autumn Data)**

	75	76	77	78	82	83	84	85	86	87	88	89	90	91	92	93	94	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	F*	S*
75	n.a	F	F	F								S		S	S								S	S	S	S		S	S		S	S	3	11
76		n.a																					S								S		0	2
77			n.a																				S								S		0	3
78				n.a											S								S		S	S					S		0	7
82	F	F	F		n.a							F	F	F	F	F	F	F	F	S		F	F	F	F	F	F	F	F	F	F	F	23	1
83	F	F	F	F		n.a		S				F	F	F	F	F	F	F	F	S	S	F	F	F	F	F	F	F	F	F	F	F	24	3
84	F	F	F	F	F		n.a					F	F	F	F	F	F	F	F	S		F	F	F	F	F	F	F	F	F	F	F	27	1
85	F	F	F	F	F			n.a				F	F	F	F	F	F	F	F	S	S	F	F	F	F	F	F	F	F	F	F	F	24	2
86	F	F	F	F	F	F			n.a	F		F	F	F	F	F	F	F	F	S		F	F	F	F	F	F	F	F	F	F	F	29	1
87	F	F	F	F	S	S	S			n.a		F	S	F	F	F	S	F	F	S	S	S	F	F	F	F	F	F	F	F	F	F	20	9
88	F	F	F	F	F	F	S	F	S	F	n.a	F	F	F	F	F	F	F	F	S		F	F	F	F	F	F	F	F	F	F	F	28	3
89		F	F	F							n.a		F										F	F	F		n.a				F		8	0
90	F		F	F	F							n.a		F				F					F	F	F	F	F	F	F	F	F	F	18	0
91		F	F	F								S		n.a	S								F	S	F	S		S	S		S		5	7
92		F	F											n.a									F		F	F					F		6	0
93	F	F	F	F								F	S	F	F	n.a	S		S	S		F	F	F	F	F	F	F	F	S	F	F	16	5
94	F	F	F	F								F	F	F	F		n.a		F				F	F	F	F	F	F	F	F	F	F	19	0
99	F	F	F	F								F	S	F	F	F	S	n.a	S	S		S	F	F	F	F	F	F	F	F	F	F	18	5
00	F	F	F	F								F		F	F			n.a					F	F	F	F	F	F	F	F	F	F	17	0
01	F	F	F	F								F	F	F	F		F		n.a				F	F	F	F	F	F	F	F	F	F	20	0
02	F	F	F	F	F							F	F	F	F	F	F	F	n.a				F	F	F	F	F	F	F	F	F	F	25	0
03	F	F	F	F								F	F	F	F	F	S		F	S		n.a	F	F	F	F	F	F	F	F	F	F	20	2
04																							n.a								S		0	1
05		F	F	F								S			F								F	n.a	F	F		S	S		F		8	3
06		F	F																				S		n.a	S					S		2	3
07		F	F																				F			n.a					S		3	1
08	F	F	F	F								S		F	F								F	F	F	F	n.a	S	F	S	F	F	13	3
09		F	F	F								n.a			F								F		F	F		n.a				F	8	0
10		F	F	F								S			F								F		F	F		S	n.a			F	8	2
11	F	F	F	F								F		F	F								F	F	F	F		F	F	n.a	F	F	15	0
12		F	F	F								S		F	F								F	F	F	F		S	S		n.a	F	10	3
13																															n.a		0	3
F*	17	27	27	24	6	3	1	3	0	2	0	16	10	18	22	10	8	8	12	4	0	7	25	18	24	23	15	16	17	14	17	23	417	
S*	0	2	1	0	1	1	2	2	1	0	0	6	3	1	3	0	4	0	2	7	6	2	5	2	2	4	0	6	4	2	1	8	81	

Notes: Autumn surveys were not undertaken for seven years including, 1979-81 and 1995-98. Each cell in the matrix represents the dominance relation between two given years, represented by a specific column with respect to the various yearly row entries. S represents *S-dominance* and F represents *F-dominance* with S\* and F\* representing their respective totals. Lastly, an entry shaded in grey and labelled 'n.a.' indicates that the two years being compared have identical distributions and thus cannot be ranked using the two dominance criteria.

**Table B.10: Dominance Ranking Matrix, Denmark (Autumn Data)**

	75	76	77	78	82	83	84	85	86	87	88	89	90	91	92	93	94	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	F*	S*
75	n.a			F	F	F	F	F				F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	26	0
76	S	n.a	F	F	F	F	F	F	F	S		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	28	2
77	S		n.a	F	F	F	F	F	S	S		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	26	3
78				n.a	S		F					S	F	F	F	F	F	F	F	F	F	F	F	F	F			F	F	F	F	F	20	2
82					n.a									F		F			F		F		F		F			F	F	F	F	F	12	0
83				F	F	n.a	F	n.a				F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	24	0
84					S			n.a						F		F			F		F		F		F			F	F	F	F	F	12	1
85				F	F	n.a	F	n.a				F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	24	0
86	S			F	F	F	F	F		n.a	S		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	26	2
87	S			F	F	F	F	F			n.a		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	26	1
88	F	F	F	F	F	F	F	F	F	F	n.a		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	31	0
89				S			F					n.a		F	F	F	F	F	F	F	F	F	F			F	F		F	F	F	F	18	1
90				S			F					S	n.a	F	F	F	F	F	F	F	F	F	F			F	F		F	F	F	F	18	2
91													n.a						S								F	F					2	1
92				S		S						S	n.a	F	S	n.a	S		S		F		F			F	F		F	F	F	F	10	5
93												S			n.a			S								F		F					2	2
94				S		S						F		F	n.a			S			F		F			F	F		F	F	F	F	11	3
99				S		S						S	n.a	F	S	n.a	S				F		F			F	F		F	F	F	F	10	5
00																		n.a								F		F					2	0
01				S		S						S	S	S	S	S	S	n.a	S		S		S		S		F		F	F	F	F	6	11
02												S		S				S		n.a		n.a		n.a		n.a	F		F				2	3
03				S		S						F	F	F	F	F	S	F	F	n.a	F		F		F		F		F	F	F	F	15	3
04												S		S				S		n.a		n.a		n.a		n.a	F		F				2	3
05				S		S						S	S	S	S	F	S	S	S	F	F	S	F	n.a	F	F		F	F	F	F	F	11	10
06													S		S			S			n.a		n.a		n.a	F		F					2	3
07																										n.a							0	0
08				S	S		S					S	S	S	S	S	S	S	S	F	S	S	S	S	S	F	n.a	F	F	F	F	F	7	16
09																										S		n.a					0	1
10														S		S		S		S		S		S		S	F	F	n.a				2	6
11														S		S		S		S		S		S		S	S	S	n.a	S	S		0	11
12														S		S		S		S		S		S		S	S	S		n.a			0	9
13														S		S		S		S		S		S		S	S	S	S	S	n.a		0	13
F*	1	1	2	8	8	6	11	6	2	1	0	8	9	15	12	18	12	12	13	14	18	11	18	9	18	27	8	27	20	20	20	20	375	
S*	4	0	0	1	11	0	7	0	1	3	0	4	2	13	3	9	5	3	16	0	6	2	6	1	6	4	0	3	3	0	2	1	119	

Notes: Autumn surveys were not undertaken for seven years including, 1979-81 and 1995-98. Each cell in the matrix represents the dominance relation between two given years, represented by a specific column with respect to the various yearly row entries. S represents *S-dominance* and F represents *F-dominance* with S\* and F\* representing their respective totals. Lastly, an entry shaded in grey and labelled 'n.a.' indicates that the two years being compared have identical distributions and thus cannot be ranked using the two dominance criteria.

**Table B.11: Dominance Ranking Matrix, France (Autumn Data)**

	75	76	77	78	82	83	84	85	86	87	88	89	90	91	92	93	94	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	F*	S*	
75	n.a					S						S	S	S			S	S	S	S	S	S	F	F	F	F	F	F	F	S	F	F	9	11	
76	F	n.a	F	F	F	F	F		F			F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	28	0	
77	F		n.a				F	S				F	S	F	F		F	F	F	F	F	S	S	F	F	F	F	F	F	F	F	F	19	4	
78	F			F	n.a	F	F	S				F	F	F	F	S	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	25	2	
82	F			F		n.a	F	S				F	S	F	F		F	F	F	F	S	S	F	F	F	F	F	F	F	F	F	F	20	4	
83						n.a						S					S	F	S	S	S	S	F	F	F	F	F	F	F	S	F	F	10	7	
84	F					F	n.a					F	F	F	F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	22	0	
85	F	S	F	F	F	F	F	F	n.a	F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	28	1	
86	F		F		F	F	S		n.a			F	S	F	F	S	F	F	F	F	S	F	F	F	F	F	F	F	F	F	F	F	22	4	
87	F	S	F	S	F	F	S	S	F	n.a		F	F	F	F	S	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	25	5	
88	F	S	S	S	S	F	S	S	S	S	n.a	F	S	S	F	S	F	F	F	F	S	S	F	F	F	F	F	F	F	F	F	F	18	13	
89											n.a							F	S				F	F	F	F	F	F	F		F	F	10	1	
90						F					F	n.a					F	F	F	F	S	F	F	F	F	F	F	F	F	F	F	F	17	1	
91						F					F	S	n.a				F	F	F	F	S	S	F	F	F	F	F	F	F	F	F	F	16	3	
92	F					F					F	S	S	n.a			S	F	F	S	S	S	F	F	F	F	F	F	F	F	F	F	15	6	
93	F		F		F	F	S				F	F	F	F	n.a		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	24	1	
94											F						n.a	F	F	S	S	S	F	F	F	F	F	F	F	F	F	F	13	3	
99																		n.a	S				F	S	F	F		F	F		F	F	7	2	
00																			n.a						F	F			F		F	F	5	0	
01																	F	F	n.a				F	F	F	F	F	F	F		F	F	12	0	
02																	F	F	F	n.a			F	F	F	F	F	F	F		F	F	13	0	
03																	F	F	F	S	n.a		F	F	F	F	F	F	F	F	F	F	14	1	
04																						n.a		S	S			S		F	S	1	5		
05																				S			F	n.a	F	F		F	F		F	F	7	1	
06																									n.a	n.a							1	0	
07																									n.a	n.a							1	0	
08																	F	S					F	S	F	F	n.a	F	F		F	F	8	2	
09																					S		F			S	S		n.a	S		F	S	2	5
10																					S	S			S	S			n.a		F		1	2	
11												S						F	S	S	S		F	F	F	F	F	F	F	F	n.a	F	F	10	4
12																															n.a		0	0	
13																									F	F			F		n.a		4	3	
F*	11	0	7	2	6	13	2	0	4	0	0	17	6	9	10	2	12	21	17	14	6	8	25	21	26	26	21	24	26	15	31	25	407		
S*	0	3	1	2	1	1	7	2	1	1	0	3	7	3	0	4	3	1	9	5	12	8	0	2	3	3	0	0	2	2	0	2		91	

Notes: Autumn surveys were not undertaken for seven years including, 1979-81 and 1995-98. Each cell in the matrix represents the dominance relation between two given years, represented by a specific column with respect to the various yearly row entries. S represents *S-dominance* and F represents *F-dominance* with S\* and F\* representing their respective totals. Lastly, an entry shaded in grey and labelled 'n.a.' indicates that the two years being compared have identical distributions and thus cannot be ranked using the two dominance criteria.

**Table B.12: Dominance Ranking Matrix, Germany (Autumn Data)**

	75	76	77	78	82	83	84	85	86	87	88	89	90	91	92	93	94	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	F*	S*
75	n.a	F	F	F	F	S	S		F	F	F	F	F	F	F	F	F	F	F	F			F		F	F	F	F	F	F	F	F	25	2
76		n.a	F	S	S		S		S	S		F	S	S	F	S	S			S			S			S	S	S	F	F	F	F	7	14
77			n.a	S								F	S	S	S		S											S	S	F	F	F	4	7
78				n.a								F	F		F														F	F	F	F	7	0
82			F	F	n.a							F	F	F	F		S											F	F	F	F	F	11	1
83		F	F	F	F	n.a	F		F	F		F	F	F	F	F	F			F			F			F	F	F	F	F	F	F	22	0
84			F	F	F		n.a					F	F	F	F		F										F	F	F	F	F	F	14	0
85	S	F	F	F	F	S	S	n.a	F	F	F	F	F	F	F	F	F	F	F	F	n.a		F		F	F	F	F	F	F	F	F	25	3
86			F	F	F		S		n.a	S		F	F	F	F	F	S					F					F	F	F	F	F	F	15	3
87			F	F	F		S			n.a		F	F	F	F	F	F					F					F	F	F	F	F	F	16	1
88		S	S	S	S	S	S		S	S	n.a	F	S	S	S	S	S	S	S	S		S		S	S	S	S	S	S	F	F	F	4	22
89												n.a																					0	0
90												F	n.a																				1	0
91			S									F	S	n.a	F		S											F	F	F	F	6	3	
92												F	S		n.a													F	F	F	F	5	1	
93			F	F	F		S					F	F	F	F	n.a	S										F	F	F	F	F	13	2	
94				F								F	F		F		n.a											F	F	F	F	8	0	
99		F	F	F	F	S	S		F	S		F	F	F	F	F	F	n.a	F			F			F	F	F	F	F	F	F	20	3	
00		F	F	F	F	S	S		F	S		F	F	F	F	F	F	F	n.a	F			F			F	F	F	F	F	F	21	3	
01			F	F	F		S		F	S		F	F	F	F	F	S		n.a			F				F	F	F	F	F	F	16	3	
02	S	F	F	F	F	S	S	n.a	F	F	F	F	F	F	F	F	F	F	F	F	n.a		F		F	F	F	F	F	F	F	25	3	
03	S	F	F	F	F	S	S	S	F	F	F	F	F	F	F	F	F	F	F	S	n.a		F		F	F	F	F	F	F	F	26	5	
04			F	S	S		S					F	S	F	F	S	S					n.a					S	F	F	F	F	9	7	
05	S	F	F	F	F	S	S	S	S	S	F	F	F	F	F	S	S	S	S	S		F	n.a	F	F	F	F	F	F	F	F	18	12	
06		F	F	S	S	S	S		S	S		F	S	S	F	S	S	S	S	S		S			n.a	F	S	F	F	F	F	10	15	
07			F	S	S		S		S	S		F	S	S	F	S	S					S				n.a	S	F	F	F	F	8	12	
08			F	F	S							F	F	F	F		S									n.a		F	F	F	F	11	2	
09				S								F	S	S	F		S										n.a		F	F	F	6	4	
10												F	S														n.a		F	F	F	4	1	
11												F	S															n.a	S	F		2	2	
12												F	S																n.a			1	1	
13												S	S																S	n.a		0	6	
F*	0	9	19	16	13	0	1	0	8	5	5	30	17	16	23	10	9	5	4	7	0	0	11	1	5	9	13	18	24	27	28	360		
S*	4	1	1	8	6	9	16	2	5	9	0	1	13	6	2	6	14	3	3	5	2	0	4	0	1	2	5	3	2	0	2	0	138	

Notes: Autumn surveys were not undertaken for seven years including, 1979-81 and 1995-98. Each cell in the matrix represents the dominance relation between two given years, represented by a specific column with respect to the various yearly row entries. S represents *S-dominance* and F represents *F-dominance* with S\* and F\* representing their respective totals. Lastly, an entry shaded in grey and labelled 'n.a.' indicates that the two years being compared have identical distributions and thus cannot be ranked using the two dominance criteria.

**Table B.13: Dominance Ranking Matrix, Ireland (Autumn Data)**

	75	76	77	78	82	83	84	85	86	87	88	89	90	91	92	93	94	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	F*	S*
75	n.a																		S				S	S	S								0	4
76	F	n.a	F											F			F	S	S	S	S	S	F	F		S	S						6	8
77	S		n.a															S		S	S		S	S	S	S							0	8
78	S	S	F	n.a										S			S	S	S	S	S	S	S	S	S	S							1	14
82	F	F	F	F	n.a									F			F	S	F	S	S	S	F	F	F	F	S						11	5
83	F	F	F	F	F	n.a	F	S	S				F	F	F	F	F	F	F	F	S	F	F	F	F	F	F	F	F	F	S	S	24	5
84	F	F	F	F	F		n.a						F				F	F	F	F	S	S	F	F	F	F	S	S		S			14	5
85	F	F	F	F	F			n.a					F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		F	26	0
86	F	F	F	F	F				n.a				F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		F	27	0
87	F	F	F	F	F	F	F	F		n.a			F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	30	0
88	F	F	F	F	F	F	F	F	S	S	n.a		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	29	2
89	F	S	F	F	S						n.a		F				F	S	S	S	S	S	F	F	S	S	S	S		S			7	13
90	F	F	F	F	F							n.a		F	F	F	F	F	F	F	S	F	F	F	F	F	F	F	F				22	1
91	S		F										n.a				S	S	S	S	S	S	S	S	S	S	S						1	12
92	F	F	F	F	S							F		F	n.a	S	F	S	S	S	S	S	F	F	F	S	S	S		S			10	12
93	F	F	F	F	F							F		F		n.a	F	S	F	S	S	S	F	F	F	F	S	S		S			13	8
94	F		F														n.a	S		S	S		S	S	S	S	S						2	8
99	F																	n.a		F	S		F	F	F	F							6	1
00	F		F														F	S	n.a	S	S	S	F	F	F	S	S						6	6
01																			n.a				F	F									2	0
02	F																			n.a		F	F	F	F								6	0
03	F		F														F	F		F	S	n.a	F	F	F	F	F						10	1
04																						n.a											0	0
05																							S	n.a									0	1
06																				S			F	F	n.a								2	1
07	F			F													F		F	S		F	F	F	n.a								4	1
08	F		F															F	F	F	S	F	F	F		n.a							8	1
09	F	F	F	F	F								F	S			F	F	F	F	S	S	F	F	F	F	S	n.a		n.a			14	3
10	F	F	F	F	F												F	F	F	F	S	S	F	F	F	S	S	n.a					17	7
11	F	F	F	F	F												F	F	F	F	S	S	F	F	F	S	n.a		n.a				14	3
12	F	F	F	F	F			F	S	S			F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	n.a	F		26	2
13	F	F	F	F	F								F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		n.a		25	3
F*	24	15	23	16	13	2	8	3	1	0	0	11	7	17	9	9	19	14	14	16	6	8	25	25	21	18	9	8	7	8	2	5	363	
S*	3	2	0	0	2	0	4	2	3	1	0	0	1	1	0	1	2	10	5	13	19	12	6	5	7	8	13	5	0	5	1	1	135	

Notes: Autumn surveys were not undertaken for seven years including, 1979-81 and 1995-98. Each cell in the matrix represents the dominance relation between two given years, represented by a specific column with respect to the various yearly row entries. S represents *S-dominance* and F represents *F-dominance* with S\* and F\* representing their respective totals. Lastly, an entry shaded in grey and labelled 'n.a.' indicates that the two years being compared have identical distributions and thus cannot be ranked using the two dominance criteria.

**Table B.14: Dominance Ranking Matrix, Italy (Autumn Data)**

	75	76	77	78	82	83	84	85	86	87	88	89	90	91	92	93	94	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	F*	S*
75	n.a	n.a	S	S	F	S	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S	S	F	S	S		22	7
76	n.a	n.a	S	S	F	S	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S	S	F	S	S		22	7
77			n.a	F		S	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S	S	F	S		22	4	
78				n.a		S	F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S	S	F	S		20	4	
82			S	S	n.a	S	F	S	F	S	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S	S	S	S	S		17	10
83						n.a	F		F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		S	F			19	1	
84							n.a		n.a			F	F	F	F	F	S	S	F	F	F	F	F	F	F	S	S		S	S			11	6
85			S		S	F	n.a	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S	S	F	S		20	5	
86							n.a		n.a			F	F	F	F	F	S	S	F	F	F	F	F	F	F	S	S		S	S			11	6
87						S	F		F	n.a	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S		S	S		17	4	
88						S		S		n.a	S	S	F	S	S	S	S	S	S	S	S	S	S	S	S	S		S	S			1	18	
89											n.a									S	S											0	2	
90											F	n.a	F	n.a	F	S	S	F	F	S	S	F	F	S								7	5	
91											S		n.a						S	S	S											0	4	
92											F	n.a	F	n.a	F	S	S	F	F	S	S	F	F	S								7	5	
93											F		F		n.a	S	S	S	F	S	S	F	S	S								4	7	
94											F		F			n.a	S	F	F	F												5	1	
99											F		F				n.a	F	F	F												5	0	
00											F							n.a	F	S												2	1	
01																			n.a													0	0	
02																			F	n.a												1	0	
03											F		F			S	S	F	F	F	n.a	F	S									6	3	
04											S		F			S	S	S	S	S	S	n.a	S	S								1	9	
05											F		F			S	S	S	F	S				n.a								3	4	
06											F		F			S	S	F	F	F			F	n.a								6	2	
07											F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	n.a		S				14	1	
08						F	F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	n.a	F	F	S		22	1	
09											F	F	F	F	F	F	F	F	F	F	F	F	F	F	F			n.a				14	0	
10											F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S		S	n.a			14	2	
11						F	F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	n.a		22	0	
12					F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S	F	F	S	n.a	26	2	
13					F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	S	F	n.a	30	4
F*	1	1	2	3	4	4	12	5	12	9	12	26	17	27	17	19	15	15	23	27	21	17	20	21	15	10	1	4	10	0	1	0	371	
S*	0	0	3	4	0	7	1	1	1	1	0	3	1	0	1	1	10	11	5	4	9	5	1	3	8	6	7	13	5	9	2	0	125	

Notes: Autumn surveys were not undertaken for seven years including, 1979-81 and 1995-98. Each cell in the matrix represents the dominance relation between two given years, represented by a specific column with respect to the various yearly row entries. S represents *S-dominance* and F represents *F-dominance* with S\* and F\* representing their respective totals. Lastly, an entry shaded in grey and labelled 'n.a.' indicates that the two years being compared have identical distributions and thus cannot be ranked using the two dominance criteria.

**Table B.15: Dominance Ranking Matrix, Netherlands (Autumn Data)**

	75	76	77	78	82	83	84	85	86	87	88	89	90	91	92	93	94	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	F*	S*
75	n.a		F	F			F			S		F	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	23	1
76	S	n.a		F	F		F	S	S	S		F	F	F	F	F	F	S	F	F	S		F	F	F	F	F	F	F	F	F	F	21	6
77			n.a	n.a			F					S	S	F	F	F	S	S	S	F			F	F	F	F	F	F	F	F	F	S	13	6
78			n.a	n.a			F					S	S	F	F	F	S	S	S	F			F	F	F	F	F	F	F	F	F	S	13	6
82	S	S	S	S	S	n.a	F	S	S	S		S	S	F	F	S	S	S	S	F	S		S	F	F	F	F	F	F	F	F	S	12	16
83	S	S		F	F	F	n.a	F	S	S	S	S	F	F	F	F	F	S	F	F	S	F	F	F	F	F	F	F	F	F	F	F	23	8
84							n.a					S	S	S	F	S		S	S	S			S	F	F	F	F	F	F	F	S	S	7	10
85	F			F	F		F	n.a		F		F	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	25	0
86	F			F	F		F	S	n.a	S		F	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	24	2
87				F	F		F			n.a		F	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	23	0
88	F	F	F	F	F		F	F	F	F	n.a	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	30	0
89											n.a	F						S						F	F	F	F	F	F	F	F		8	1
90											n.a																		F	F			4	0
91												S	S	n.a				S					S	F	F	F	F	F	F	F			6	4
92												S	S	S	n.a			S		S			S	S	F	F	S	F	F	S	S		4	10
93												S	S	F	F	n.a		S	S	F				F	F	F	F	F	F	F	F	S	11	5
94							F					F	F	F	F	F	n.a	S	F	F				F	F	F	F	F	F	F	F		17	1
99												F					n.a																5	0
00												S	S	F	F			S	n.a	F				F	F	F	F	F	F	F	F	S	11	4
01												S	S	F				S		n.a				S	F	F	F	F	F	F	n.a	S	7	5
02			F	F			F					F	F	F	F	F	F	F	F	F	n.a			F	F	F	F	F	F	F	F	F	21	0
03	S	S		F	F	F		F	S	S	S	F	F	F	F	F	S	S	F	F	S	n.a	F	F	F	F	F	F	F	F	F	F	21	8
04				F	F		F					S	F	F	F	F	S	S	F	F	S		n.a	F	F	F	F	F	F	F	F	S	17	5
05												S						S						n.a									4	2
06												S						S					S	n.a	F	F	n.a	F	F				4	3
07																																	2	0
08																																	0	0
09													S					S					S	n.a	F	F	n.a	F	F				4	3
10																																	1	2
11																																	1	0
12												S	S	F				S		n.a				S	F	F	F	F	F	F	n.a	S	7	5
13												S	F	F				S						F	F	F	F	F	F	F	n.a		9	5
F*	3	1	10	10	3	0	14	1	1	2	0	10	14	19	17	13	8	6	11	16	5	2	8	18	22	28	31	22	28	29	16	10	378	
S*	4	3	1	1	0	0	0	5	4	6	1	12	13	2	0	2	5	20	5	2	5	0	1	7	1	1	0	1	0	1	2	10	118	

Notes: Autumn surveys were not undertaken for seven years including, 1979-81 and 1995-98. Each cell in the matrix represents the dominance relation between two given years, represented by a specific column with respect to the various yearly row entries. S represents *S-dominance* and F represents *F-dominance* with S\* and F\* representing their respective totals. Lastly, an entry shaded in grey and labelled 'n.a.' indicates that the two years being compared have identical distributions and thus cannot be ranked using the two dominance criteria.

**Table B.16: Dominance Ranking Matrix, U.K. (Autumn Data)**

	75	76	77	78	82	83	84	85	86	87	88	89	90	91	92	93	94	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	F*	S*
75	n.a	S	F	F	F	S	F	F	F	F		F	S	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	27	3	
76		n.a	F	F	F		F	F	F	F		F	S	F	F	F	F	S	F	F	F	F	F	F	F	F	F	F	F	F	F	26	2	
77			n.a	F								F							F	F		F	F	F	F			F	F		F	13	0	
78				n.a								F							S	S		S	F	F	F	F			F	F		F	9	3
82			S	S	n.a		S					S					S		S	S	S	S	S	S	S	S	S	F	S	F	F	F	4	15
83		S	F	F	F	n.a	F	F	F	F		F	S	F	F	F	F	S	F	F	F	F	F	F	F	F	F	F	F	F	F	F	26	3
84			S	F			n.a					F					F		F	n.a	F	F	F	F	F	F	F	F	F	F	F	F	16	1
85			S	F	F		F	n.a	S	F		F	S	F			F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	22	3
86			S	F	F		F		n.a			F				F	F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	20	1
87			S	S	F		S		S	n.a		F	S	n.a		S	S		S	S	S	S	F	F	F	F	S	F	F	F	F	F	11	12
88	F	F	F	F	F	F	F	F	F	F	n.a	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	31	0
89												n.a							S	S			S	S	S	S		F	S		F	F	3	7
90			F	F	F		F		F			F	n.a			F	F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	22	0
91			S	S	F		S		S	n.a		F	S	n.a		S	S		S	S	S	S	F	F	F	F	S	F	F	F	F	F	11	12
92			S	F	F		S	S	S	F		F	S	F	n.a	F	F		F	F	S	F	F	F	F	F	F	F	F	F	F	F	20	6
93			S	F	F		S					F				n.a	F		F	F	S	F	F	F	F	F	F	F	F	F	F	F	17	3
94			S	F								F					n.a		S	S		S	F	F	F	F	n.a	F	F		F	F	10	4
99			F	F	F		F	F	F	F		F	S	F	F	F	F	n.a	F	F	F	F	F	F	F	F	F	F	F	F	F	F	26	1
00																			n.a				F			F		F		F		F	4	0
01																			F	n.a			F	F	F	F		F		F		F	8	0
02			S	F			n.a					F					F		F	F	n.a	F	F	F	F	F	F	F	F	F	F	F	16	1
03												F										n.a	F	F	F	F		F	F		F	F	11	0
04																							n.a		S			F			F		2	1
05																		S					S	n.a	S		F			F		F	2	3
06																		S				S	S	n.a	S		F			F		F	2	4
07																										n.a							0	0
08			S	F								F					n.a	S	S		S	F	F	F	F	n.a	F	F		F	F	10	4	
09																									S		n.a			S		0	2	
10																			S	S			S	S	S	S		F	n.a		F	F	3	6
11			S	S								S					S		S	S	S	S	S	S	S	S	F	S	n.a	S	S	1	15	
12																										S				n.a		F	0	1
13																			S				S	S	S	S		F			F	n.a	2	8
F*	1	1	6	15	12	1	8	5	6	7	0	19	1	7	5	9	12	2	15	14	8	13	21	20	20	21	12	29	19	15	28	23	375	
S*	0	2	12	4	0	1	5	1	4	0	0	2	8	0	0	2	4	2	12	9	5	7	7	6	5	10	4	0	3	0	2	1	121	

Notes: Autumn surveys were not undertaken for seven years including, 1979-81 and 1995-98. Each cell in the matrix represents the dominance relation between two given years, represented by a specific column with respect to the various yearly row entries. S represents *S-dominance* and F represents *F-dominance* with S\* and F\* representing their respective totals. Lastly, an entry shaded in grey and labelled 'n.a.' indicates that the two years being compared have identical distributions and thus cannot be ranked using the two dominance criteria.

## Happiness Inequality & Mean Happiness Indices (Autumn Surveys)

**Table B.17: Happiness Inequality & Mean Happiness Measures, Belgium (Autumn Data)**

Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
1975	1.939	2.424	1.455	0.485	0.573	0.666	2.242
1976	1.960	2.580	1.340	0.490	0.584	0.668	2.310
1977	2.222	2.970	1.475	0.556	0.643	0.702	2.374
1978	2.263	2.990	1.535	0.566	0.652	0.709	2.364
1982	1.500	1.583	1.417	0.375	0.432	0.538	2.042
1983	1.526	1.505	1.546	0.381	0.426	0.526	1.990
1984	1.455	1.374	1.535	0.364	0.399	0.493	1.960
1985	1.495	1.475	1.515	0.374	0.418	0.517	1.990
1986	1.510	1.286	1.735	0.378	0.394	0.472	1.888
1987	1.737	1.798	1.677	0.434	0.490	0.595	2.030
1988	1.697	1.495	1.899	0.424	0.448	0.535	1.899
1989	1.560	1.900	1.220	0.390	0.473	0.585	2.170
1990	1.480	1.660	1.300	0.370	0.438	0.549	2.090
1991	1.737	2.162	1.313	0.434	0.522	0.627	2.212
1992	1.616	2.020	1.212	0.404	0.492	0.602	2.202
1993	1.657	1.879	1.434	0.414	0.486	0.595	2.111
1994	1.429	1.571	1.286	0.357	0.420	0.530	2.071
1999	1.616	1.778	1.455	0.404	0.470	0.579	2.081
2000	1.495	1.717	1.273	0.374	0.446	0.558	2.111
2001	1.333	1.394	1.273	0.333	0.386	0.489	2.030
2002	1.253	1.152	1.354	0.313	0.342	0.426	1.949
2003	1.543	1.690	1.396	0.386	0.450	0.559	2.073
2004	1.680	2.160	1.200	0.420	0.513	0.618	2.240
2005	1.616	1.980	1.253	0.404	0.489	0.599	2.182
2006	1.720	2.180	1.260	0.430	0.521	0.625	2.230
2007	1.680	2.120	1.240	0.420	0.510	0.616	2.220
2008	1.640	1.940	1.340	0.410	0.489	0.599	2.150
2009	1.560	1.900	1.220	0.390	0.473	0.585	2.170
2010	1.600	1.960	1.240	0.400	0.485	0.595	2.180
2011	1.560	1.820	1.300	0.390	0.466	0.577	2.130
2012	1.640	1.980	1.300	0.410	0.493	0.602	2.170
2013	1.560	2.060	1.060	0.390	0.486	0.596	2.250
Mean	1.634	1.891	1.377	0.408	0.478	0.579	2.128

Notes: Autumn surveys were not undertaken for seven years including, 1979-81 and 1995-98. Columns 2, 3 & 4 represent AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 are NY inequality measures with different subjective societal judgements. Column 8 provides mean index under a linear scale.

**Table B.18: Happiness Inequality & Mean Happiness Measures, Denmark (Autumn Data)**

Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean c=(1,2,3)
1975	1.758	2.462	1.055	0.440	0.543	0.633	2.352
1976	2.303	3.172	1.434	0.576	0.661	0.703	2.434
1977	2.360	3.300	1.420	0.590	0.671	0.703	2.470
1978	2.480	3.560	1.400	0.620	0.691	0.702	2.540
1982	2.424	3.515	1.333	0.606	0.680	0.694	2.545
1983	2.384	3.414	1.354	0.596	0.674	0.697	2.515
1984	2.490	3.612	1.367	0.622	0.691	0.698	2.561
1985	2.384	3.414	1.354	0.596	0.674	0.697	2.515
1986	2.303	3.253	1.354	0.576	0.660	0.695	2.475
1987	2.141	3.010	1.273	0.535	0.628	0.682	2.434
1988	2.160	2.560	1.760	0.540	0.618	0.704	2.200
1989	2.458	3.542	1.375	0.615	0.687	0.699	2.542
1990	2.499	3.602	1.396	0.625	0.694	0.701	2.552
1991	2.635	3.847	1.422	0.659	0.713	0.701	2.606
1992	2.675	3.867	1.482	0.669	0.721	0.708	2.596
1993	2.661	3.886	1.436	0.665	0.717	0.702	2.613
1994	2.633	3.809	1.457	0.658	0.715	0.706	2.588
1999	2.675	3.867	1.482	0.669	0.721	0.708	2.596
2000	2.491	3.651	1.331	0.623	0.690	0.693	2.580
2001	2.715	3.928	1.502	0.679	0.727	0.709	2.606
2002	2.680	3.900	1.460	0.670	0.720	0.705	2.610
2003	2.597	3.751	1.443	0.649	0.709	0.705	2.577
2004	2.680	3.900	1.460	0.670	0.720	0.705	2.610
2005	2.693	3.881	1.505	0.673	0.724	0.711	2.594
2006	2.680	3.900	1.460	0.670	0.720	0.705	2.610
2007	2.760	4.060	1.460	0.690	0.729	0.701	2.650
2008	2.720	3.920	1.520	0.680	0.728	0.712	2.600
2009	2.800	4.120	1.480	0.700	0.734	0.702	2.660
2010	2.760	4.020	1.500	0.690	0.732	0.707	2.630
2011	2.920	4.260	1.580	0.730	0.752	0.711	2.670
2012	2.840	4.140	1.540	0.710	0.742	0.709	2.650
2013	2.880	4.200	1.560	0.720	0.747	0.710	2.660
Mean	2.551	3.666	1.436	0.638	0.698	0.701	2.558

Notes: Autumn surveys were not undertaken for seven years including, 1979-81 and 1995-98. Columns 2, 3 & 4 represent AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 are NY inequality measures with different subjective societal judgements. Column 8 provides mean index under a linear scale.

**Table B.19: Happiness Inequality & Mean Happiness Measures, France (Autumn Data)**

<b>Year</b>	<b>AF (-2,0,2)</b>	<b>AF (-2,-1,2)</b>	<b>AF (-2,1,2)</b>	<b>NY (1,1)</b>	<b>NY (1,2)</b>	<b>NY (1,4)</b>	<b>Mean (1,2,3)</b>
1975	1.592	1.408	1.776	0.398	0.422	0.508	1.908
1976	1.616	1.212	2.020	0.404	0.396	0.452	1.798
1977	1.576	1.313	1.838	0.394	0.406	0.482	1.869
1978	1.616	1.253	1.980	0.404	0.402	0.465	1.818
1982	1.600	1.320	1.880	0.400	0.410	0.485	1.860
1983	1.576	1.394	1.758	0.394	0.418	0.504	1.909
1984	1.495	1.192	1.798	0.374	0.378	0.444	1.848
1985	1.633	1.224	2.041	0.408	0.400	0.456	1.796
1986	1.633	1.306	1.959	0.408	0.412	0.482	1.837
1987	1.697	1.293	2.101	0.424	0.418	0.479	1.798
1988	2.280	1.700	2.860	0.570	0.552	0.614	1.710
1989	1.414	1.313	1.515	0.354	0.386	0.476	1.949
1990	1.469	1.224	1.714	0.367	0.380	0.453	1.878
1991	1.510	1.286	1.735	0.378	0.394	0.472	1.888
1992	1.600	1.400	1.800	0.400	0.422	0.506	1.900
1993	1.535	1.212	1.859	0.384	0.386	0.451	1.838
1994	1.560	1.380	1.740	0.390	0.414	0.499	1.910
1999	1.414	1.354	1.475	0.354	0.391	0.485	1.970
2000	1.293	1.253	1.333	0.323	0.361	0.455	1.980
2001	1.388	1.265	1.510	0.347	0.376	0.462	1.939
2002	1.333	1.152	1.515	0.333	0.352	0.428	1.909
2003	1.443	1.230	1.657	0.361	0.377	0.454	1.893
2004	1.414	1.434	1.394	0.354	0.402	0.503	2.010
2005	1.400	1.340	1.460	0.350	0.388	0.481	1.970
2006	1.320	1.380	1.260	0.330	0.382	0.485	2.030
2007	1.320	1.380	1.260	0.330	0.382	0.485	2.030
2008	1.440	1.360	1.520	0.360	0.396	0.488	1.960
2009	1.440	1.440	1.440	0.360	0.406	0.506	2.000
2010	1.360	1.400	1.320	0.340	0.390	0.492	2.020
2011	1.535	1.374	1.697	0.384	0.410	0.497	1.919
2012	1.360	1.480	1.240	0.340	0.400	0.508	2.060
2013	1.360	1.360	1.360	0.340	0.385	0.484	2.000
Mean	1.507	1.332	1.682	0.377	0.400	0.483	1.913

Notes: Autumn surveys were not undertaken for seven years including, 1979-81 and 1995-98. Columns 2, 3 & 4 represent AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 are NY inequality measures with different subjective societal judgements. Column 8 provides mean index under a linear scale.

**Table B.20: Happiness Inequality & Mean Happiness Measures, Germany (Autumn Data)**

<b>Year</b>	<b>AF (-2,0,2)</b>	<b>AF (-2,-1,2)</b>	<b>AF (-2,1,2)</b>	<b>NY (1,1)</b>	<b>NY (1,2)</b>	<b>NY (1,4)</b>	<b>Mean (1,2,3)</b>
1975	1.347	1.245	1.449	0.337	0.367	0.455	1.949
1976	1.576	1.677	1.475	0.394	0.453	0.561	2.051
1977	1.535	1.737	1.333	0.384	0.454	0.565	2.101
1978	1.347	1.490	1.204	0.337	0.399	0.509	2.071
1982	1.347	1.449	1.245	0.337	0.394	0.501	2.051
1983	1.221	1.116	1.326	0.305	0.332	0.415	1.947
1984	1.131	1.091	1.172	0.283	0.318	0.405	1.980
1985	1.388	1.265	1.510	0.347	0.376	0.462	1.939
1986	1.374	1.414	1.333	0.343	0.394	0.496	2.020
1987	1.253	1.232	1.273	0.313	0.353	0.448	1.990
1988	1.737	1.879	1.596	0.434	0.498	0.605	2.071
1989	1.455	1.818	1.091	0.364	0.450	0.564	2.182
1990	1.280	1.480	1.080	0.320	0.389	0.501	2.100
1991	1.414	1.556	1.273	0.354	0.417	0.526	2.071
1992	1.455	1.657	1.253	0.364	0.434	0.545	2.101
1993	1.400	1.460	1.340	0.350	0.403	0.508	2.030
1994	1.253	1.313	1.192	0.313	0.364	0.467	2.030
1999	1.400	1.380	1.420	0.350	0.393	0.491	1.990
2000	1.374	1.333	1.414	0.343	0.383	0.478	1.980
2001	1.400	1.420	1.380	0.350	0.398	0.499	2.010
2002	1.388	1.265	1.510	0.347	0.376	0.462	1.939
2003	1.575	1.362	1.789	0.394	0.413	0.496	1.893
2004	1.480	1.580	1.380	0.370	0.429	0.536	2.050
2005	1.600	1.560	1.640	0.400	0.443	0.542	1.980
2006	1.576	1.636	1.515	0.394	0.449	0.554	2.030
2007	1.560	1.660	1.460	0.390	0.449	0.556	2.050
2008	1.400	1.500	1.300	0.350	0.408	0.515	2.050
2009	1.455	1.616	1.293	0.364	0.429	0.539	2.081
2010	1.480	1.700	1.260	0.370	0.442	0.554	2.110
2011	1.560	1.860	1.260	0.390	0.470	0.582	2.150
2012	1.520	1.840	1.200	0.380	0.462	0.575	2.160
2013	1.600	1.960	1.240	0.400	0.485	0.595	2.180
Mean	1.434	1.517	1.350	0.358	0.413	0.516	2.042

Notes: Autumn surveys were not undertaken for seven years including, 1979-81 and 1995-98. Columns 2, 3 & 4 represent AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 are NY inequality measures with different subjective societal judgements. Column 8 provides mean index under a linear scale.

**Table B.21: Happiness Inequality & Mean Happiness Measures, Ireland (Autumn Data)**

<b>Year</b>	<b>AF (-2,0,2)</b>	<b>AF (-2,-1,2)</b>	<b>AF (-2,1,2)</b>	<b>NY (1,1)</b>	<b>NY (1,2)</b>	<b>NY (1,4)</b>	<b>Mean (1,2,3)</b>
1975	2.000	2.600	1.400	0.500	0.592	0.675	2.300
1976	2.000	2.480	1.520	0.500	0.586	0.677	2.240
1977	2.120	2.740	1.500	0.530	0.619	0.693	2.310
1978	2.182	2.747	1.616	0.545	0.630	0.705	2.283
1982	1.880	2.260	1.500	0.470	0.553	0.653	2.190
1983	1.880	2.020	1.740	0.470	0.534	0.637	2.070
1984	1.800	2.100	1.500	0.450	0.528	0.633	2.150
1985	1.697	1.859	1.535	0.424	0.490	0.598	2.081
1986	1.657	1.758	1.556	0.414	0.474	0.581	2.051
1987	1.859	1.778	1.939	0.465	0.505	0.603	1.960
1988	2.141	2.000	2.283	0.535	0.571	0.665	1.929
1989	2.080	2.520	1.640	0.520	0.602	0.690	2.220
1990	1.755	2.020	1.490	0.439	0.514	0.621	2.133
1991	2.122	2.694	1.551	0.531	0.618	0.695	2.286
1992	2.061	2.485	1.636	0.515	0.597	0.687	2.212
1993	1.899	2.242	1.556	0.475	0.555	0.655	2.172
1994	2.041	2.612	1.469	0.510	0.600	0.682	2.286
1999	1.691	2.124	1.258	0.423	0.512	0.618	2.216
2000	1.878	2.327	1.429	0.469	0.557	0.654	2.224
2001	1.598	2.083	1.114	0.400	0.494	0.602	2.242
2002	1.485	1.814	1.155	0.371	0.454	0.568	2.165
2003	1.635	1.986	1.284	0.409	0.492	0.602	2.175
2004	1.818	2.485	1.152	0.455	0.555	0.644	2.333
2005	1.859	2.505	1.212	0.465	0.563	0.651	2.323
2006	1.796	2.367	1.224	0.449	0.545	0.641	2.286
2007	1.737	2.202	1.273	0.434	0.525	0.629	2.232
2008	1.616	1.980	1.253	0.404	0.489	0.599	2.182
2009	1.737	2.040	1.434	0.434	0.513	0.620	2.152
2010	1.899	2.202	1.596	0.475	0.552	0.653	2.152
2011	1.737	2.040	1.434	0.434	0.513	0.620	2.152
2012	1.737	1.879	1.596	0.434	0.498	0.605	2.071
2013	1.720	1.900	1.540	0.430	0.498	0.605	2.090
Mean	1.847	2.214	1.481	0.462	0.542	0.639	2.183

Notes: Autumn surveys were not undertaken for seven years including, 1979-81 and 1995-98. Columns 2, 3 & 4 represent AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 are NY inequality measures with different subjective societal judgements. Column 8 provides mean index under a linear scale.

**Table B.22: Happiness Inequality & Mean Happiness Measures, Italy (Autumn Data)**

Year	AF (-2,0,2)	AF (-2,-1,2)	AF (-2,1,2)	NY (1,1)	NY (1,2)	NY (1,4)	Mean (1,2,3)
1975	2.061	1.394	2.727	0.515	0.478	0.516	1.667
1976	2.061	1.394	2.727	0.515	0.478	0.516	1.667
1977	1.840	1.240	2.440	0.460	0.427	0.462	1.700
1978	1.840	1.280	2.400	0.460	0.434	0.476	1.720
1982	2.000	1.440	2.560	0.500	0.478	0.530	1.720
1983	1.720	1.180	2.260	0.430	0.403	0.441	1.730
1984	1.697	1.333	2.061	0.424	0.425	0.492	1.818
1985	1.880	1.340	2.420	0.470	0.448	0.497	1.730
1986	1.697	1.333	2.061	0.424	0.425	0.492	1.818
1987	1.840	1.360	2.320	0.460	0.446	0.503	1.760
1988	2.040	1.740	2.340	0.510	0.526	0.611	1.850
1989	1.414	1.313	1.515	0.354	0.386	0.476	1.949
1990	1.576	1.313	1.838	0.394	0.406	0.482	1.869
1991	1.600	1.560	1.640	0.400	0.443	0.542	1.980
1992	1.576	1.313	1.838	0.394	0.406	0.482	1.869
1993	1.600	1.360	1.840	0.400	0.416	0.496	1.880
1994	1.374	1.172	1.576	0.343	0.360	0.435	1.899
1999	1.333	1.111	1.556	0.333	0.346	0.416	1.889
2000	1.400	1.260	1.540	0.350	0.376	0.461	1.930
2001	1.360	1.280	1.440	0.340	0.374	0.465	1.960
2002	1.320	1.180	1.460	0.330	0.354	0.436	1.930
2003	1.439	1.204	1.673	0.360	0.373	0.447	1.883
2004	1.600	1.440	1.760	0.400	0.428	0.516	1.920
2005	1.480	1.300	1.660	0.370	0.392	0.475	1.910
2006	1.414	1.192	1.636	0.354	0.368	0.442	1.889
2007	1.535	1.172	1.899	0.384	0.380	0.438	1.818
2008	1.657	1.030	2.283	0.414	0.370	0.383	1.687
2009	1.414	0.990	1.838	0.354	0.335	0.374	1.788
2010	1.600	1.240	1.960	0.400	0.398	0.461	1.820
2011	1.576	0.949	2.202	0.394	0.346	0.352	1.687
2012	1.859	1.131	2.586	0.465	0.410	0.418	1.636
2013	2.040	1.220	2.860	0.510	0.446	0.449	1.590
Mean	1.651	1.274	2.029	0.413	0.409	0.468	1.811

Notes: Autumn surveys were not undertaken for seven years including, 1979-81 and 1995-98. Columns 2, 3 & 4 represent AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 are NY inequality measures with different subjective societal judgements. Column 8 provides mean index under a linear scale.

**Table B.23: Happiness Inequality & Mean Happiness Measures, Netherlands (Autumn Data)**

<b>Year</b>	<b>AF (-2,0,2)</b>	<b>AF (-2,-1,2)</b>	<b>AF (-2,1,2)</b>	<b>NY (1,1)</b>	<b>NY (1,2)</b>	<b>NY (1,4)</b>	<b>Mean (1,2,3)</b>
1975	1.787	2.340	1.234	0.447	0.542	0.639	2.277
1976	1.899	2.485	1.313	0.475	0.569	0.659	2.293
1977	2.061	2.808	1.313	0.515	0.610	0.679	2.374
1978	2.061	2.808	1.313	0.515	0.610	0.679	2.374
1982	2.222	2.970	1.475	0.556	0.643	0.702	2.374
1983	1.939	2.505	1.374	0.485	0.577	0.666	2.283
1984	2.163	3.000	1.327	0.541	0.632	0.687	2.418
1985	1.760	2.280	1.240	0.440	0.534	0.634	2.260
1986	1.778	2.303	1.253	0.444	0.538	0.637	2.263
1987	1.737	2.283	1.192	0.434	0.530	0.630	2.273
1988	1.657	2.081	1.232	0.414	0.503	0.611	2.212
1989	1.918	2.673	1.163	0.480	0.580	0.657	2.378
1990	1.944	2.746	1.141	0.486	0.586	0.658	2.401
1991	2.112	2.944	1.281	0.528	0.622	0.681	2.416
1992	2.240	3.120	1.360	0.560	0.648	0.694	2.440
1993	2.061	2.848	1.273	0.515	0.610	0.676	2.394
1994	1.859	2.505	1.212	0.465	0.563	0.651	2.323
1999	1.692	2.344	1.040	0.423	0.526	0.623	2.326
2000	2.020	2.788	1.253	0.505	0.602	0.672	2.384
2001	2.120	2.940	1.300	0.530	0.623	0.683	2.410
2002	1.800	2.380	1.220	0.450	0.546	0.642	2.290
2003	1.974	2.569	1.379	0.493	0.586	0.671	2.297
2004	2.080	2.800	1.360	0.520	0.613	0.683	2.360
2005	2.059	2.891	1.228	0.515	0.611	0.673	2.416
2006	2.200	3.100	1.300	0.550	0.640	0.687	2.450
2007	2.240	3.200	1.280	0.560	0.648	0.687	2.480
2008	2.240	3.280	1.200	0.560	0.647	0.678	2.520
2009	2.200	3.100	1.300	0.550	0.640	0.687	2.450
2010	2.280	3.260	1.300	0.570	0.655	0.690	2.490
2011	2.240	3.240	1.240	0.560	0.647	0.683	2.500
2012	2.120	2.940	1.300	0.530	0.623	0.683	2.410
2013	2.000	2.760	1.240	0.500	0.597	0.669	2.380
<b>Mean</b>	<b>2.014</b>	<b>2.759</b>	<b>1.270</b>	<b>0.504</b>	<b>0.597</b>	<b>0.667</b>	<b>2.372</b>

Notes: Autumn surveys were not undertaken for seven years including, 1979-81 and 1995-98. Columns 2, 3 & 4 represent AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 are NY inequality measures with different subjective societal judgements. Column 8 provides mean index under a linear scale.

**Table B.24: Happiness Inequality & Mean Happiness Measures, U.K. (Autumn Data)**

<b>Year</b>	<b>AF (-2,0,2)</b>	<b>AF (-2,-1,2)</b>	<b>AF (-2,1,2)</b>	<b>NY (1,1)</b>	<b>NY (1,2)</b>	<b>NY (1,4)</b>	<b>Mean (1,2,3)</b>
1975	1.859	2.101	1.616	0.465	0.537	0.641	2.121
1976	1.760	2.000	1.520	0.440	0.513	0.620	2.120
1977	1.720	2.060	1.380	0.430	0.512	0.619	2.170
1978	1.778	2.182	1.374	0.444	0.531	0.634	2.202
1982	1.939	2.384	1.495	0.485	0.571	0.666	2.222
1983	1.818	2.081	1.556	0.455	0.529	0.634	2.131
1984	1.737	2.081	1.394	0.434	0.516	0.623	2.172
1985	1.800	2.100	1.500	0.450	0.528	0.633	2.150
1986	1.760	2.080	1.440	0.440	0.520	0.626	2.160
1987	1.859	2.222	1.495	0.465	0.547	0.648	2.182
1988	2.080	1.880	2.280	0.520	0.549	0.640	1.900
1989	1.859	2.343	1.374	0.465	0.555	0.651	2.242
1990	1.576	1.798	1.354	0.394	0.466	0.577	2.111
1991	1.859	2.222	1.495	0.465	0.547	0.648	2.182
1992	1.818	2.121	1.515	0.455	0.533	0.637	2.152
1993	1.782	2.119	1.446	0.446	0.527	0.632	2.168
1994	1.800	2.180	1.420	0.450	0.534	0.637	2.190
1999	1.633	1.837	1.429	0.408	0.479	0.588	2.102
2000	1.680	2.120	1.240	0.420	0.510	0.616	2.220
2001	1.657	2.081	1.232	0.414	0.503	0.611	2.212
2002	1.737	2.081	1.394	0.434	0.516	0.623	2.172
2003	1.726	2.107	1.346	0.432	0.517	0.623	2.190
2004	1.697	2.182	1.212	0.424	0.517	0.621	2.242
2005	1.760	2.240	1.280	0.440	0.532	0.633	2.240
2006	1.800	2.300	1.300	0.450	0.542	0.641	2.250
2007	1.680	2.160	1.200	0.420	0.513	0.618	2.240
2008	1.800	2.180	1.420	0.450	0.534	0.637	2.190
2009	2.040	2.700	1.380	0.510	0.603	0.680	2.330
2010	1.840	2.320	1.360	0.460	0.550	0.648	2.240
2011	2.040	2.540	1.540	0.510	0.596	0.683	2.250
2012	1.880	2.460	1.300	0.470	0.564	0.655	2.290
2013	1.880	2.420	1.340	0.470	0.562	0.656	2.270
Mean	1.802	2.178	1.426	0.450	0.533	0.634	2.188

Notes: Autumn surveys were not undertaken for seven years including, 1979-81 and 1995-98. Columns 2, 3 & 4 represent AF happiness inequality indices under linear, convex & concave scales respectively. Columns 5, 6 & 7 are NY inequality measures with different subjective societal judgements. Column 8 provides mean index under a linear scale.

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