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Essays in Happiness Economics

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Essays in Happiness Economics

by

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Dedication

To my grandparents

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When I first started working on this dissertation, over three years ago, I had no idea what I was about to undertake. People often describe the process as a journey, although, in my opinion, it is more like a quest – you neither know where you are going to start nor where you are going to finish, if you ever do. This quest has taught me more about myself and less about economics, and, most importantly, it is not over yet. Many people along the way have contributed to my work – some of them directly with advice, and others with their warm support. I am grateful to all of you for your kindness.

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Abstract

The goal of this dissertation is to contribute to the new field of happiness economics which over the past several decades has substantially enhanced our understanding of cognitive judgment, human behavior, and the nature of happiness. Chapter 1 starts with a discussion of the subjective approach to measuring well-being and lays the foundation for the empirical work that follows in chapters 2 and 3. This approach has a strong appeal because ancient and modern cultures, and a long tradition in philosophy, view achieving happiness as the ultimate goal of human existence. It also recognizes that humans are the best judges of their own condition. In this first chapter, I discuss some common ambiguities related to the term happiness and outline some of the most common ways in which subjective well-being (SWB)data is measured. Next, I discuss how reliable subjective well-being data is and what are some of its strengths and weaknesses in the context of economic research. Some major insights from the growing literature on happiness economics are also provided and alternative approaches to measuring quality of life (and well-being) are suggested in the last section.

One puzzle in the happiness economics literature has been that although real incomes have substantially improved over the past 40 years, happiness levels in the United States have stagnated. In chapter 2, I show that the rising level of income inequality in the United States since the 1970s can explain the stagnating happiness levels of Americans. First, using subjective well-being data from the General Social

Survey, I estimate the concavity of the utility function within a neo-utilitarian framework of welfare analysis and calculate the Atkinson index of inequality. Although the estimates suggests that Americans have become increasingly more inequality-averse over time, the results suggest that the concavity of the utility function alone cannot explain the happiness patterns observed in the past several decades. Once I account for the negative external cost from economic inequality, however, the empirical analysis implies that economic growth has not been sufficient to compensate for the loss of subjective well-being associated with the rising level of inequality. This is consistent with the findings of several different surveys on subjective well-being. Finally, I evaluate the equality-efficiency trade-off in the US, and discover a small and positive trade-off.

Chapter 3 considers another important policy topic in recent years – the increasing cost of college tuition and the scrutinized value of higher education. Using subjective well-being data, I show that higher education has a large non-monetary (happiness) return that goes beyond the benefit of finding a better paid and more satisfying job. A person with a high school degree, for instance, would have to earn \$41,683 more per year to be equally as happy as somebody with a college degree that has a similar socio-economic background. This large non-monetary return is associated with better marriage, health, and parenting choices, and stronger social networks that translate into higher levels of interpersonal trust. The lion's share of this non-monetary return is earned in college while the majority of the returns from graduate school are associated with higher salary. This return varies among the different subgroups of the population. Women, for example, benefit twice as much from a college education as men, and this non-monetary return has slightly increased over time. This may explain, at least partially, the increase in demand for college education over the past 30 years, and the unprecedented rise in the price of college tuition. It is hypothesized that one way in which education works is to change the attitudes, values, and behavior

of students. Higher education, for example, makes students more open-minded, tolerant, and risk-averse. Evidence in support of this hypothesis is found by estimating the coefficient of risk (and inequality) aversion. Finally, using subjective well-being data from the European Value Study, the average non-monetary return from higher education is also calculated for Europeans and compared to that in the United States. Although higher education is also found to have a positive effect on happiness in Europe, the non-monetary returns are much larger in the United States. Furthermore, contrary to the United States, the direct effect of education on happiness in Europe is substantial, while the indirect effect is negligible.

Chapter 1

The Economics of Happiness

"Nature has placed mankind under the governance of two sovereign masters, pain and pleasure. It is for them alone to point out what we ought to do, as well as to determine what we shall do. On the one hand the standard of right and wrong, on the other the chain of causes and effects, are fastened to their throne. They govern us in all we do, in all we say, in all we think: every effort we can make to throw off our subjection, will serve but to demonstrate and confirm it. In words a man may pretend to abjure their empire: but in reality he will remain subject to it all the while. The principle of utility recognizes this subjection, and assumes it for the foundation of that system, the object of which is to rear the fabric of felicity by the hands of reason and of law. Systems which attempt to question it, deal in sounds instead of sense, in caprice instead of reason, in darkness instead of light."

<div align="right">Jeremy Bentham (1789, p.1)</div>

"The care of human life and happiness and not their destruction is the only legitimate object of good government."

<div align="right">Thomas Jefferson (1809, p.359)</div>

1.1   Introduction

Few people would disagree with Bentham that maximizing pleasure and minimizing pain, or the principle of *utility*, is what ultimately governs human behavior. Over two centuries ago, for instance, the American colonies declared the pursuit of happiness, along with life and liberty, to be an unalienable right. Maximizing happiness is also in the core of economic analysis which is deeply rooted in a long philosophical tradition that starts with the works of ancient hedonistic philosophers, passes through the utilitarian tradition that evolved out of the works of Jeremy Bentham and John Stuart Mill, and today is realized in the models of modern economists who maximize utility and social welfare functions. This approach has a strong appeal to most people because of the universal view that the ultimate goal of human existence is to make people "happy" and "satisfied" with their life.

Yet, measures of material standards of living such as gross domestic product (GDP), or household and individual income, have dominated national debates about social and economic progress. Such measures have been used by economists as a proxy for well-being despite of their limitations which have long been recognized by social scientists.[1] GDP, for example, does not take into account environmental externalities and the depletion of natural resources; it does not recognize social inequalities, or the value of nonmarket work such as raising a child or volunteering; it increases after a natural disaster, during crime waves, and health epidemics as infrastructure is renewed, burglar alarms installed, and new patients diagnosed. More generally, GDP is a poor measure for quality of life because it does not account for the crucial dimension of psychological well-being, or *utility*.

The measurement of social and economic progress, however, is undergoing a fun-

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[1]For a comprehensive overview of the limitations of GDP see Bergh (2009). The author also explains why GDP has been traditionally used as a measure of social performance regardless of the overwhelming criticism that it is not a good measure for quality of life.

damental change. Some have call it a revolution (Frey, 2008), and others have called for a revolution (Layard, 2006). In 2008, for example, the French president, Nicolas Sarkozy, formed a commission of twenty-five members, including five Nobel Prize laureates, which produced the most comprehensive study on measuring quality of life[2] to date (Stiglitz *et al.*, 2009). The so-called Sarkozy Report, a 292-page document, represents a "remarkable breakthrough in economist's thinking about the direction in which economic measurement needs to go" (Easterlin *et al.*, 2010, p. 1). The commission recognizes that quality of life is a much broader concept than economic production and living standards which are currently used to assess how well economies are doing in both the developed and developing world. The key message of the report is that there must be a shift from measuring economic production to measuring people's well-being.

Such shift is now happening and gathering momentum. In Britain, for example, a coalition led by David Cameron is starting to measure general well-being (GWB) by asking people how happy, anxious, and satisfied they are with their lives and how worthwhile are the things they do. For the past couple of years, the Organization of Economic Cooperation and Development (OECD) has published an index on well-being, *Your Better Life Index*, which includes eleven different dimensions for quality of life – housing, income, jobs, community, education, civic engagement, environment, health, work-life balance, safety, and life satisfaction. Most of these categories are constructed using both objective measures (e.g., life expectancy) and subjective ones (e.g., self-reported level of health).

Similarly, the New Economic Foundation, a London based think-tank, is producing a happiness index, *The Happy Planet Index*, which takes into account concerns about sustainability and subjective well-being. Gallup is now conducting surveys in 140

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[2]One of the key motivations for the formation of the commission by Sarkozy is the huge discrepancy between standard measures of socioeconomic performance such as economic growth, inflation, and inequality and the widespread perceptions of the population about the quality of life.

countries around the world that ask people about their life-evaluation and emotional states. In the United States, the Rockefeller Foundation launched a project in 2010, *The State of USA*, which aims to create a national dataset of key indicators that go beyond GDP. And while there is still considerable debate whether these new measures of (subjective) well-being are more meaningful than traditional indicators, the fact is that the economic literature on happiness has exploded exponentially in the past decade and the subjective approach to measuring well-being is becoming increasingly accepted.

In this chapter, I overview the concept of subjective well-being, its multidimensional nature, and how it is measured. I further discuss whether happiness data is meaningful and can be collected in a reliable manner, and identify some of the methodological stumbling blocks with respect to economics research. Finally, I discuss some basic insights from the happiness economics literature and suggest some alternative approaches to measuring well-being.

1.2   Decision vs Experienced Utility

For a long time economists have assumed that utility cannot be measured. More importantly, they have assumed that utility need not be measured directly because it can be inferred from the choices that people make which reveal their preferences. This more objective approach to measuring well-being has come to dominate modern (neoclassical) economic theory which assumes that individuals derive utility only from the consumption of tangible goods and services as well as leisure. Within this tradition, subjective well-being data, usually collected from surveys, is seen as highly suspicious and often regarded as unscientific.

This objectivist approach to measuring well-being, however, has been challenged in recent years as research in psychology and economics has pointed out that there

are large discrepancies between how people feel and what they value and how they actually behave in real life. A large literature in behavioral economics, for instance, has demonstrated inconsistencies in the axioms of revealed preference starting with the seminal work of Allais (1953) and Ellsberg (1961). A particularly influential critique of the expected utility theory as a descriptive model of human behavior under risk is Kahneman and Tversky's (1979) *Prospect Theory*. In their paper, Kahneman and Tversky (1979) demonstrate that decision making under uncertainty is subject to several pervasive biases that are inconsistent with the basic tenets of utility theory. These biases, for example the bias to underweight outcomes that are merely probable in comparison with outcomes that are obtained with certainty, has implications for risk-aversion and ultimately may lead people to make choices that do not maximize their utility. Many other studies have also demonstrated that people have "bounded rationality," do not always act in a way consistent with maximizing behavior, and that their judgment is subject to many systematic mistakes. For example, people overestimate the degree to which their future tastes will resemble their current ones (Loewenstein *et al.*, 2003), which leads them to make less than optimal choices in the long-run. Thus, behavioral psychologists and economists have started drawing a distinction between *decision utility* and *experienced utility* (e.g., Kahneman and Thaler 2006). Decision utilities are the utilities that describe (determine) our choices within the revealed preference tradition. Experienced utilities, on the other hand, measure utility directly and are the subject of interest for happiness research.

Measuring *experienced utility* provides an alternative hypotheses, and in many ways it is a complementary approach to testing economic assumptions and ultimately understanding the world. It is particularly useful for testing standard economic assumptions and discovering systematic deviations between predicted behavior (decision utility) and experienced behavior. Its greatest strength is its simplicity: "relying on people's own judgments is a convenient shortcut and potentially provides a natural

way to aggregate various experiences in a way that reflects people's own preferences. Further, this approach makes it possible to reflect the diversity of people's views about what is important in their lives" (Stiglitz *et al.*, 2009, p.145).

1.3 The Multi-Dimensional Nature of Happiness

The terms "happiness," "subjective well-being," and "life-satisfaction" are often used interchangeably in common language (and by economists) which has caused some ambiguities. Like well-being, however, which has many different dimensions – being healthy, having strong social connections, and economic opportunities – happiness is a multi-dimensional concept too. Diener (1984), for example, identifies three separate aspects of well-being:

- life-satisfaction (i.e., person's overall life evaluation at a point in time)

- the presence of positive feelings or affect (i.e., positive emotions such as feeling of happiness and joy, or a sense of vitality and energy)

- absence of negative feelings of affects (i.e., feelings of anger, sadness, stress, etc...)

The first one, life-satisfaction, is a reflective assessment which involves *evaluative judgment* of one's life, and requires an effort to remember and evaluate past experiences. The latter two aspects of subjective well-being, positive and negative affects, represent *hedonic experiences* which are experienced in real time. These dimensions of subjective well-being are distinct. For example, it is possible for a person to experience positive affects (perhaps because his favorite football team just won the Super Bowl) and at the same time report low life satisfaction. Similarly, the presence of positive affects does not necessarily imply the absence of negative affects. A person

could feel stressed at work and at the same time enjoy the respect of his colleagues. It is not clear in the literature which aspect of subjective well-being is more important.

Throughout this study, the terms "happiness," "subjective well-being," and "life satisfaction" are used interchangeably although they reflect cognitive assessment of one's overall happiness from life. It has to be noted, however, that to derive a more comprehensive understanding of one's happiness, each one of these three dimensions of well-being has to be measured and evaluated separately. In the next section I review how data on subjective well-being is typically collected.

1.4   Measuring Subjective Well-Being

Data on life-evaluation has been collected by representative surveys for several decades. In the United States, for example, subjective well-being data is available since 1972 from the General Social Survey (GSS). Internationally, data is available from the World Value Survey since the early 1980's and covers more than 80 countries that represent 80 percent of the world's population. Other sources such as the Latinobarometer, European Value Survey, Eurobarometer, and Gallup have also been conducting surveys on life satisfaction for some time.

A common way to collect such data has been to rely on questions with qualitative responses such as feeling "*fairly*" or "*pretty*" happy about my life. In the US General Social Survey, for example, subjective well-being data is measured with the following 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?*" Similar questions are also found in the World Value Survey, the European Value Survey, and the Latinobarometer. The Latinobarometer, for instance, uses the following modification: "*In general terms, would you say that you are satisfied with life? 1 = Very satisfied; 2 = Pretty satisfied; 3 = Not very satisfied; 4 = Not satisfied at all.*"

Another approach has been to use a visual scale (ladder-of-life), which explicitly defines visual reference points with 0 "dissatisfied" and 10 "satisfied." For example, the World Value Survey uses the following question to collect subjective well-being data: "*All things considered, how satisfied are you with your life as a whole these 1'days? Please use this card to help with your answer.*"

Both approaches measure how people evaluate their life as a whole rather than their current feelings. Thus, they reflect an *evaluative judgment* in which life circumstances and conditions are important for subjective well-being. Both approaches, however, have been criticized that they are vulnerable to interpersonal and cross country comparability because even if questions do not change across countries and over time, reference points and definitions of happiness do (Deaton, 2008).

Hedonic experiences, on the other hand, are measured in real time (or shortly after an event has occurred) and thus measure emotional states. Because of their relatively high cost, they are far less common than life-evaluation surveys, although this does not necessarily imply that they are less preferred or useful. The two most common measures are the *Experience Sampling* and the *Day Reconstruction Method*, but neither one has been applied to a representative portion of the population (Stiglitz *et al.*, 2009).

The only survey data that captures both hedonic experiences and life-evaluation is available from the *Gallup World Poll* which is a nationally representative survey in around 140 countries. In this survey, questions about life evaluation are based on the 0-10 ladder scale, and questions on hedonic experiences measure multiple dimensions of positive and negative experiences from the previous day – feeling happy, sad, tired, stressed, etc... Based on the Gallup Poll, for instance, the average life satisfaction in the OECD countries is 6.7. This score, however, varies across member countries – Hungary, Turkey, Portugal and Greece, for instance, have relatively low satisfaction scores of 5.5 while countries such as Denmark, Norway and Sweden have scores above

the 7.5 mark. In addition, 80% of people in the OECD countries report having more positive experiences than bad ones, with Turkey, Estonia, and Hungary showing the lowest level of hedonic happiness. (OECD Factbook, 2010).

1.5   How Reliable Is Happiness Data?

Measuring feelings can be very subjective. It is therefore important to check if individuals provide meaningful answers to survey questions on happiness. An important criticism of subjective well-being data is that it is not *interpersonally comparable.* Answers to survey questions may depend on many different factors: cultural interpretation of the scale that is used, the order and wording of the questions, the mood of the respondent when the survey is taken, and many others. This is less of a problem when subjective well-being data is used to estimate "averages" across a homogeneous population, and more of a problem when data is compared across countries and over time as definitions of happiness may change.

Another inherent problem with subjective well-being data is that external events may influence survey answers. Making general evaluations of life involves cognitive effort to remember and reflect on past events, which may be influenced by many different factors such as time of the day, how the survey is carried out, etc. Most importantly, answers about overall satisfaction from life may reflect current moods. The main use of happiness data, however, is to identify the determinants of happiness and not to compare levels between different individuals in the absolute sense. In this case, it is not necessary to make the assumption that happiness data is *cardinally measurable* or that it is *interpersonally comparable.* (Frey, 2010).

Self-reported data, by its nature, cannot be validated. However, an extensive literature exits that attempts to validate such data *indirectly.* Below I provide a short overview of the main arguments why happiness data is reliable, valid, consistent, and

can be used in economic analysis.

First, self-reported happiness tends to be consistent with other meaningful measures of utility. For example, people that report themselves happy smile more often during social interactions (Fernandez-Dols and Ruiz-Belda, 1995). Happy people are also more likely to be rated happy by friends and family (Sandvik *et al.*, 1993) and by their spouses (Costa and McCrae, 1988), and less likely to commit suicide (Helliwell, 2006).

Second, happiness data tends to move in an expected manner with many external factors such as unemployment and marriage. For example, unemployed people report lower levels of happiness and so do those who are recently divorced. On the other hand, work promotion and marriage are associated with higher self-reported happiness (Kahneman, 1999). Similarly, happiness data tends to move in a predictable way with many macroeconomic variables such as GDP per capita, the general level of unemployment, and income inequality (e.g., see Di Tella *et al.*, 2003; Alesina *et al.*, 2006). Richer countries tend to report higher levels of mean happiness, and countries with high levels of income inequality tend to have, on average, lower levels of life-satisfaction.

A third important validation comes from neuropsychological studies that measure electrical changes in brain activity and heart rate. These changes tend to be significantly correlated with a variety of hedonic experiences and the subject's self-report (Davidson 1992, 2000; Davidson *et al.*, 2000). Finally, a principal axis factor analysis of self- and non-self-reported subjective well-being measures reveals a single unitary construct underlying the measures(Sandvik, Diener and Seidlitz, 1993).

Thus, despite its many shortcomings, a growing body of evidence suggests that it is possible to collect subjective well-being data in a reliable, consistent, valid, and meaningful way. Although such data has many limitations, it nevertheless reveals important information about quality of life that is often not found in traditional

indicators such as income. Subjective well-being studies (Oswald, 1997), for example, suggests an U-shape relationship between life-satisfaction and age which tends to be the opposite conclusion if income is all that matters to maximizing utility.

1.6 Methodological Issues

There are several methodological issues, however, that make causal inferences especially difficult in the context of subjective well-being data. Here I review some of these major stumbling blocks.

(i) Spurious correlations: A great deal of analysis in the happiness literature is based on simple bivariate regressions (e.g., see Easterlin 1974, 1995, and 2010). Happiness, however, depends on a large number of personal characteristics and socioeconomic variables. Answers to survey questions may also depend on many other internal and external factors such as cultural interpretation of the scale that is used, the mood of the respondent when the survey is taken, and many others. Data is rarely available for all of these variables, which limits the researchers' ability to control for all of these important factors and may cause omitted variable bias or spurious correlations.

(ii) Multi-level analysis: Often the relevant hypotheses in the literature are related to the effect of variables at the both the individual and aggregate level. For example, to assess the effect of personal unemployment and the general level of unemployment, we need to control for both micro and macro level variables. Similarly, evaluating the effect of the general level of inequality involves controlling for personal income and one's relative position in society.

(iii) Reverse causation: Perhaps one of the most difficult problems in happiness studies is to distinguish between *causes* and *correlates.* For example, the reason why divorced people report lower life-satisfaction may be because the experience of be-

ing divorced lowers their life evaluation as a whole. In this case, divorce *causes* less happiness. But it is also possible that people who report lower satisfaction with life are more likely to get divorced, in which case cognitive evaluations *cause* divorce. A third possibility is that people who experience depression are more likely to report lower life satisfaction and to be divorced. In this case a third variable determines the relationship between life evaluation and divorce. Thus, it is not clear whether outcomes such as divorce affect happiness, or happiness affects many of these outcomes. This is especially true for variables like marriage, friendship, unemployment, and job satisfaction, but may also affect variables such as income. It seems apparent that the self-reported level of happiness (or health) will be correlated systematically with one's outlook of life. These problems, however, are persistent in most econometric studies. The happiness literature is rather new and limited research has been done to determine the direction of causality.

(iv) Adaptation (the "hedonic treadmill"): If people adapt rapidly to their new environment, then cross-sectional data may overstate the long-run effect of some variables on happiness. Lottery winners, for example, experience a spike in their baseline happiness but then quickly adjust to their new wealth (Smith & Razzell 1973; Brickman *et al.* 1978). Similarly, severe physical trauma and permanent physical disability are associated with a sharp decline of subjective well-being, but then victims gradually recover their happiness and even return to their pre-trauma levels (Brickman *et al.*, 1978).

One popular view is that each person has a genetically determined happiness "set point." According to this view, short-run changes in happiness are possible, but in the long-run, adaptation always forces individuals back to their set-point. An important implication of this view is that public policy can do very little to improve happiness. This view, however, has been challenged over the past decade. For example, Diener *et al.* (2006) show that the happiness of some people can,

and does, change over time. Similarly, Inglehart *et al.* (2008) argue that economic development, democratization, and increases in social tolerance over the past thirty years have increased the subjective well-being of millions of people around the world. Thus, "most proponents of this set-point view now seem to be leaning towards the view that adaptation is less than complete" (Stiglitz *et al.*, p.148).

While adaptation is not an inherent problem with the measurement of happiness, and may very well reveal a fundamental aspect of human nature, the presence of adaptation has two important implications for happiness research. First, life satisfaction may not be a sufficient measure for evaluating well-being as individuals constantly adjust their expectations and desires. For example, it is possible to be less satisfied with a better life if, for instance, you have higher aspirations which remain unfulfilled. Similarly, as the standard of living improves, social standards may adjust so that happiness levels will stay relatively stable at different levels of socio-economic development. Second, data on happiness is almost always cross-sectional. Cross-sectional data do not allow one to take into consideration adaptation effects, which means that cross-sectional studies will almost always overstate the long-run effect of the determinants of happiness. As Helliwell and Putnam (2008) suggest, longitudinal data and quasi-experimental methods will be necessary to resolve these uncertainties.

1.7   What Can Happiness Research Teach Us?

Perhaps the most promising aspect of happiness research is to provide a better understanding of the determinants of happiness. If the ultimate goal of human existence is to be happy or satisfied with life, then understanding what objective conditions (e.g., income, health, or education) make people happier, and to what extent, can help individuals and society pursue this goal. In this respect, one of the most important insights from happiness research so far has been that non-economic factors such

as the frequency of interaction with others, the quality of personal relationships, civic engagement, and self-mastery and independence are crucial determinants of human happiness. Although economists have traditionally acknowledged the importance of leisure, the implications of these findings are that society may be facing a much larger trade-off than commonly believed. In fact, research in happiness economics has shown that people often overestimate the satisfaction from higher income and material consumption and underestimate the satisfaction from non-monetary aspects of their life such as friendships, hobbies, and work (Frey, 2010). As a result of these systematic mistakes in decision making people often find themselves less satisfied with their lives in the long run.

Happiness research has also allowed economists to measure utility *directly*, although not perfectly, and to test the robustness of the assumptions and predictions of standard economic models. Neoclassical theory, for example, does not distinguish between expected utility and experienced utility. Individuals are often caricatured as lightning fast calculators that always maximize their utility given the available information. In this framework, errors are made in random ways. Studies in happiness economics, on the other hand, show that individuals do not always know what their preferences will be in the future, that they are prone to making systematic mistakes when choosing between alternatives that involve uncertainty and risk, and ultimately fail to maximize experienced utility. A large number of studies in the last several decades have discovered that people are prone to variety of cognitive biases when forecasting future utility (for summaries see Kahneman, 1994; Loewenstein and Schkade, 1999; and Kahneman and Thaler, 2006).

One of the most pervasive biases in human decision making, for example, is the *impact bias* – the tendency to overestimate the hedonic impact of positive and negative events in the future. This bias is explained by the remarkable ability of humans

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to adjust quickly to their life circumstances, known as *hedonic adaptation*, which has been a great advantage during ice ages, plagues, and wars. Many people, for example, tend to overestimate the happiness that positive life events such as marriage will bring them in the long run, which can lead to premature decisions, perhaps revealed in the high rate of divorce around the world. Similarly, individuals tend to overestimate how much unhappiness negative events such as the loss of a job or divorce may cause them in the future. Yet, the mere expectation for unhappiness in the future may exacerbate current life-evaluations and depress one's mood. Some psychologists have argued that individuals who understand these cognitive mistakes are better able to cope with adaptation and achieve a happier life (Lyubomirsky, 2013)

Decisions may also be influenced by current emotional states. When aroused by hunger, sex, or anger, for example, people often mispredict how they will feel in the future when they will be in a "cool" state. Similarly, when in a cool state people mispredict the hedonic impact of arousal in the future. For example, "hungry shoppers" are more likely to buy more and less healthy food (Gilbert *et al.*,1998). Heroin addicts who had not yet received a dose of a heroin substitute Buprenophrine (BUP) are more likely to be willing to pay higher prices to receive an extra dose of BUP five days later (Badger *et al.*, 2004). The idea that forecasts of future hedonic experiences are anchored in current emotional states is known as "projection bias" (Loewenstein *et al.*, 2003). Current emotional states may also influence how people remember events, which may influence their decisions later.

For the early economists – Adam Smith, Jeremy Bentham, and John Stuart Mill – the concept of utility was related to experienced utility. John Stuart Mill, for example, believed that intellectual pleasures outweigh physical ones, and Francis Edgeworth explicitly defined utility as the temporal integral of the momentary joy derived from

consumption (Kahneman and Thaler, 2006). Since the beginning of the twentieth century, however, the use of term utility as a hedonic experience has been lost. The basic assumptions of contemporary economic models is that utility cannot be measured, and, even more importantly, that it need not be measured because it is revealed in people's choices. Thus, utility is used in a rather abstract way to reflects the consistency of people's choices. Research in happiness economics, however, has renewed interest in the nature of experienced utility. It is now understood that happiness is multi-dimensional. On the one hand, happiness involves cognitive evaluations of one's life, but on the other hand, it also has an emotional component – positive and negative feelings, also known as affects, that are related to a variety of different emotions encapsulating pleasure and pain. These two dimensions of happiness are not necessarily related to each other. People may choose to maximize their short run hedonic experiences at the expense of their long-term life-satisfaction. It is not clear, however, which aspect of happiness is more important.

In addition, psychologists have pointed out that humans derive pleasure not only from outcomes (higher income), but also from processes (work). This may help explain the otherwise paradoxical observation that although work is often considered by economists as a burden, unemployed people, even after accounting for their loss of income, are still more likely to experience lower levels of satisfaction with life. Such observations suggest that the standard approach to incentivize (and understand) work performance may be mistaken. Institutions, for example, that allow people to experience greater autonomy at work may increase both productivity and life-satisfaction (Pink, 2011). Indeed, people's behavior may sometimes be motivated by variety of reasons. Previous studies, for example, have emphasized the importance of emotions (Elster,1998), mastery and meaning (Lowenstein, 1999), intrinsic motivation (Olsterloh and Frey, 2000), altruism, cooperation, and reciprocity (Fehr and Schmidt, 2003), duties (Leven, 1996), and status (Frank, 1999). Some studies have even suggested

that human behavior is sometimes rather impulsive (Lewin, 1996).

1.8 Alternative Approaches

There are other approaches that can be used to measure well-being. One alternative approach to measuring quality of life, identified by the Sarkozy report, is based on the notion of *capabilities*. This approach views people's life as:

> [A] combination of various "doings and beings" (*functionings*), and of the freedom to choose among these functionings (*capabilities*). Some of these capabilities may be quite elementary, such as being adequately nourished and escaping premature mortality, while others may be more complex, such as having the literacy required to participate actively in political life. The foundations of the capability approach, which has strong roots in philosophical notions of social justice, reflect a focus on human ends and on respecting the individual's ability to pursue and realize the goals that he or she values; a rejection of the economic model of individuals acting to maximize their self-interest heedless of relationships and emotions; an emphasis on the complementarities between various capabilities; and a recognition of human diversity, which draws attention to the role played by ethical principles in the design of the "good" society (Stiglitz, Sen, and Fitoussi, 2009, p.42).

A third approach is developed within the economics tradition, and is based on the notions of *fair allocations*. This approach is common in welfare economics and requires weighing the non-monetary dimensions of quality of life (beyond the goods and services traded on the market) in a way that respects people's preferences.

The *capabilities* and *fair allocations* approach favors measurement of people's objective conditions and the opportunities available to them. Although these objective features can be instrumental to one's happiness, both of these conceptual approaches

consider the expansion of people's functionings and freedoms as intrinsically valuable. And while the list of objective features depends on value judgments, there seems to be a universal agreement across individuals, cultures, and times about the most important aspects that determine quality of life. The Sarkozy Commission identifies eight dimensions important to quality of life: health, education, economic well-being, work, political voice, personal relationships, environment, and security (Stiglitz *et al.*, 2008, p.45-58). Finally, the Commission recommends that each dimension of quality of life should be evaluated on the basis of inequality across people, socio-economic groups, and generations.

1.9   Conclusion

Although happiness measures are still in their infancy, and certainly not ideal, they are nevertheless an important complement to traditional measures of quality of life such as income. Happiness data can be collected in a reliable and consistent way and provides meaningful information about human behavior. At the least, the subjective well-being approach presents an opportunity to inform policy debates from a unique point of view that is often not found in standard measures of socio-economic progress.

The empirical analyses that follow in Chapters 2 and 3 rely heavily on the use of subjective well-being data. The results from this study, of course, should be taken with a grain of salt due to the shortcomings of happiness data. These estimates should be viewed as a first order approximation. They do provide an idea about the order of magnitude of the relationships that are studied, which is better than the plain assumptions that economic theories often make.

Chapter 2

Income Inequality and Economic Growth – Are Americans Better Off?

2.1 Introduction

Recent studies in the field of happiness economics suggest that creating a more egalitarian society and increasing the absolute level of personal income can promote a happier society. Yet, as Okun (1975) pointed out, fairly dividing the pie and raising the living standards are to a great extent mutually exclusive. While the US economy has grown, on average, 2.8 percent per year since the 1970s, income inequality has rapidly increased too. Figure 2.1 and 2.2 in the Appendix to Chapter 2 show the evolution of top income shares in the US from 1920 to 2010.[1] The share of national income concentrated in the top 1 percent of the US population, for example, has

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[1]Thomas Piketty and Emmanuel Saez (2003) provide one of the most comprehensive studies on the topic in which they document the pattern of income inequality in the US from 1913 to 2002 (while the actual paper covers the period from 1913-1998, updated series can be found on the website of Emmanuel Saez, Table A.3).

increased from less than 8 percent in the late 1970s to almost 19 percent in 2008. This level of income inequality is the highest level since the creation of the federal income tax in 1913[2]. Parallel with this trend, resentment over economic inequality has also grown more vocal, culminating in the Occupy Wall Street movement in 2011.[3] Are Americans better off today, then, as a result of the growth in national income, even if this growth has come at the expense of its more equal distribution? Or is the growing gap between the rich and the poor one of the reasons that explain the stagnating happiness levels of Americans, which, as Stevenson and Wolfers (2008) point out, remains a "puzzling outlier"?

To answer these questions, I use subjective well-being data from the General Social Survey (GSS) to estimate the parameter of inequality aversion, ε, within a neo-utilitarian framework of social welfare analysis (Atkinson, 1970). This allows me to calculate the Atkinson index of inequality with precision and compare how social welfare has evolved over time while accounting for inequality aversion that is inherent in the concavity of the utility function. The results suggest that economic growth has been sufficient to raise average happiness in the US since the 1970s despite the rising level of income inequality.

I find, however, that the increase in the general level of income inequality has an adverse effect on happiness that goes beyond the direct loss associated with the concavity of the utility function. I hypothesize that this external negative cost is related to increase in positional consumption, deterioration of physical and mental health, corrosion of social capital, and decay of political and democratic structures that may lead to loss of personal liberty. Once I account for this external cost, I find that the majority of Americans have been made worse off from the increasing level

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[2]With the exception of 1928 when the share of income concentrated in the top 1 percent of the population reached 28 percent

[3]Figure 2.3 shows that the number of books written on the topic of income inequality has more than tripled since the 1970s.

of income inequality since the 1970's. This is true, however, only if one assumes that income inequality has been generated solely from economic growth. But, even after I account for a possible trade-off between equality and efficiency, I find that only the top two income quintiles have benefited from economic growth while everybody else has been made worse off.

The results should be interpreted with caution due to several philosophical and empirical shortcomings of happiness research.[4] Nevertheless, this study advances the growing literature on happiness economics in a number of ways. First, and foremost, it links the existing literature to a tradition in economics that discusses the trade-off between equality and efficiency. Thus, it suggests an additional trade-off that policy makers and researchers should consider.

Second, the parameter of inequality aversion, ε, is found to be close to 0.5, which indicates that the majority of happiness studies are overestimating the concavity of the utility function by using a log-linear form. Although this parameter is broadly consistent across groups, there still exist some meaningful differences. For example, Republicans tend to be much less inequality averse than the average person. People with a graduate degree, on the other hand, are found to be extremely inequality averse. Most importantly, ε has steadily increased over time, which may be a reflection of the growing discontent with economic inequality in the past couple of decades.

Third, the results in this Chapter are consistent with most previous studies that examine the relationship between economic inequality and subjective well-being (Graham and Felton, 2006; Smith and Qian, 2008, and Oishi *et al.*, 2011). They come, however, in stark contrast to the findings of Alesina *et al.* (2004) who show that, unlike Europeans, most Americans are insensitive to economic inequality. One possible explanation is the updated dataset that covers the past couple decades when resentment over inequality has been especially pronounced.

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[4]For a thorough discussion on the shortcomings of happiness research see Booth, 2012.

Fourth, this study provides support for the observation made by Oishi *et al.* (2011) that economic inequality affects subjective well-being through the channels of social trust and the perception of fairness. However, I show that the cost of inequality extends beyond the corrosion of social cohesion. Even after controlling for social capital, relative income, and inequality aversion, income inequality has a negative effect on subjective well-being.

Fifth, the model investigates the interaction between the variables of inequality and personal income and finds evidence that as income goes up, the negative external cost of inequality diminishes. Beyond a personal income of $362,616, income inequality does not seem to have any adverse effects on well-being. This suggests that a vast majority of the US population has been affected negatively by the rising level of income inequality over the past several decades.

Finally, this study suggests a method of more precisely quantifying the relationship between income inequality and happiness in a more meaningful way by estimating the marginal rate of substitution between market inequality and personal income while accounting for the concavity of the utility function.[5]

2.2 Theoretical Considerations

2.2.1 Economic Growth and Happiness

2.2.1.1 The Income-Happiness Paradox

The question whether economic growth leads to greater happiness has been widely debated in the economic literature. One popular view, expressed by Easterlin (1974,

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[5]Usually the typical study reports the beta coefficients from an ordered probit (or logit) model which are interpreted as the change in the probability of "the event" (e.g. reporting oneself in the highest happiness category "very happy") for every 1-unit increase in X (e.g. additional year of schooling), where the probability is determined by a z-score for a cumulative normal distribution (e.g., $Pr(z < 1.645) = .55$). While such results are informative about the general relationship, they provide little advice to policy makers who may want to compare different policy alternatives using more straightforward measures.

1995, 2010), is that economic growth does not improve the subjective well-being of individuals. This view is based on the empirical observation that although real incomes have substantially increased over the past fifty years, there have been no corresponding gains in reported levels of happiness. In his earlier work, Easterlin (1974, 1995) showed that this relationship holds for a list of developed nations including the United States, Japan, and nine developed countries in Europe. His most recent work (Easterlin, 2010), however, points out that is also true for a large number of less developed countries in Asia, Latin America, and some transitional economies in Europe. Short-run gains in happiness are possible, but over the longer run, usually more than 10 years, both rich and poor are stuck on a "hedonic treadmill." In the United States, happiness levels have stagnated since the 1970s despite of the fact that real income per capita has almost doubled (Figure 2.5).

One argument explaining this observation is that beyond some "subsistence" level of income, money does not buy happiness. Frey and Stutzer (2000) find this "subsistence" level to be as low as $10,000 while Kahneman and Deaton (2010) find it to be close to $75,000.[6] Beyond $75,000, Kahneman and Deaton argue, "higher income is neither the road to experienced happiness nor the road to the relief of unhappiness or stress, although higher income continues to improve individuals life evaluations"(Kahneman and Deaton, 2010).

Yet, a large body of economic literature shows that income is one of the strongest determinants of happiness within and across countries. For example, panel studies that control for country specific fixed-effects find that the level of self-reported happiness moves predictably with macroeconomic variables such as GDP per capita (see Di Tella *et al.*, 2003). In addition, panel studies that control for unobserved individ-

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[6]It is important to note that Kahneman and Deaton acknowledge that happiness is multidimensional and differentiate between emotional well-being, or *hedonic experiences*, and life-satisfaction, or *life evaluation*. Although money is not a good predictor of emotional happiness beyond $75,000 of annual household income, it is significantly and positively correlated with higher life satisfaction even beyond this level of earnings.

ual fixed-effects (such as different personality traits) find that the income variable is positively correlated with life-satisfaction. Figure 2.7 in the Appendix shows that the average self-reported happiness in the United States increases with income. Similarly, Figure 2.8 indicates that the same relationship is true across countries. All of these findings, which seem inconsistent with the observations made by Easterlin, suggest that income plays an important role in determining individual happiness. Hence, a great deal of the happiness literature in the past couple of decades has been dedicated to solving this income-happiness paradox.

2.2.1.2 Income Comparisons and Adaptation

An answer to the income-happiness paradox that is also consistent with the findings of the above literature comes from Clark *et al.* (2011). The authors reconcile both views using the notion of *income comparisons*. For example, consider the following utility function, which is an adaptation of Clark's model:

$$U = U(u_1(y), u_2(y/y^*), u_3(Z)) \tag{2.1}$$

where total utility, U, is determined by the combinations of the sub-utilities u_1, u_2, and u_3. In this function, y is individual income, and $u_1(y)$ is the classic textbook utility function, which is increasing, but at a decreasing rate. Thus, depending on the concavity of $u_1(y)$, additional income brings gradually less additional happiness. It is often assumed in the happiness literature that the relationship between U and y is log-linear. This implies, for example, that a person with \$10,000 of income will experience five times more utility from an additional dollar of earnings than someone with an income of \$50,000. The second subutility function $u_2(y/y^*)$ reflects the idea of income comparisons. In this function y^* is often called the "reference group," and the ratio y/y^* is known as "relative income." The reference can be internal, e.g., to one's own past or expected income (adaptation), or external, e.g., to the income of some

specific demographic group (social comparison). In the latter case, $u_2(y/y^*)$ is called the "status return" from income (or the consumption of some positional good). The early economists Adam Smith, John Stuart Mill, Karl Marx, and Thorstein Veblen all emphasized the social nature of consumption. Finally, the sub-utility function $u_3(Z)$ picks up the effect of leisure and other socioeconomic and demographic variables.

The empirical implementation of this function is:

$$U_i = \beta_1 ln y_i + \beta_2(y_i/y_i^*) + Z_i^{'}\gamma + \varepsilon_{it} \tag{2.2}$$

where y_i is some measure of real income, y_i^* is a reference group (usually median country income), and $Z_i^{'}$ is a vector of demographic variables.

An important characteristic of $u_2(y/y^*)$ is that it is homogeneous of degree zero, i.e. $u_2(ay/ay^*)=u_2(y/y^*)$, which implies that status is unaffected by proportional increases in y and y^*. The main implication of this model is that the gradient between income and happiness will be steeper in a country at a point in time than over time. This is because status does not have an effect on the aggregate level of happiness in a country – it is a zero sum game, i.e. what individuals with above average income growth gain in status happiness is lost by those with below average income growth. At a point in time, then, those individuals within a country that have higher incomes enjoy higher status and are happier, but over time, as everyone becomes richer, and the amount of status is fixed, the only benefit to the country is from higher consumption, which approaches zero as countries become richer.

2.2.1.3 The Importance of Absolute Income

Diener *et al.* (2006), however, show that the happiness of some people can and does change over time. Sacks *et al.* (2010) find that within a given country richer individuals report higher levels of life-satisfaction, across countries richer ones have higher levels of life satisfaction, and as countries become richer the aggregate level of

happiness tends to go up. Their estimations reveal that the gradient of the relationship between income and happiness is roughly the same across all three comparisons, which indicates that absolute income plays a large role in determining subjective well-being and that social comparisons alone cannot explain the Easterlin paradox.

Inglehart *et al.* (2008) show that economic development, democratization, and increase in social tolerance over the past thirty years have increased the subjective well-being of millions of people around the world. It is true that as society becomes richer, economic gains have decreasing importance to human happiness. Economic growth, however, is important even beyond some basic level of development because it allows people to maximize their free choice in other realms of life:

> Under conditions of scarcity, people focus on survival needs, giving top priority to economic and physical security. Economic development increases people's sense of existential security, leading them to shift their emphasis from survival values toward self-expression values and free choice which is a more direct way to maximize happiness and life satisfaction. This model proposes that human development shifts emphasis from the pursuit of happiness through economic means toward a broader pursuit of happiness by maximizing free choice in all realms of life (Inglehart et al, 2008, p.266).

Figure 2.9 provides evidence for Inglehart's model of human development. Beyond some level of economic development more money may not buy more happiness directly. However, the belief that one has free choice and control over one's life is strongly correlated with happiness (Johnson & Krueger, 2006). In a recent study, for example, Paolo Verme (2009) shows that a variable that measures freedom of choice and the locus of control is found to predict life satisfaction better than any other known factor such as health, employment, income, marriage or religion across countries and within countries. This effect is as strong for developing countries as it is for developed ones. If absolute income plays an important role in determining life

satisfaction, yet no corresponding gains in happiness have been experienced in the United States, then the observation that average happiness in the United States have stayed flat remains a puzzle.

An implicit assumption of the model in (1) is that economic growth affects only consumption levels and has no effect on the distribution of income. Yet, if economic growth causes inequalities in income, then as inequality in a country increases, the aggregate level of happiness can decrease. This follows directly from the concavity of utility function. For example, consider Figure 2.10 where W is the social welfare function (or one can think of it as the aggregate level of happiness), which is determined by the sum of individual utility functions, so that $W = \frac{1}{n} \sum u_i(y_i)$. If the marginal utility of income is declining with one's earnings, i.e., richer people gain less utility from an additional dollar of income than poorer people, then the social welfare function (W) will be concave. In this case, it is possible for mean national income to increase and average happiness to decline if most of the income gains go to the people at the top of the income distribution and those at the bottom are made worse off. Figure 2.10 presents one such possible scenario in which the gains from additional income at the top of the income distribution will be more than offset by the loses of income (and happiness) at the bottom of the income distribution. Thus, the aggregate level of happiness will depend on the relationship between economic growth and income inequality. Most income gains in the United States have been to the top income quintile with real incomes declining for the bottom 40 percent of income earners, and stagnating for those in the middle of the income distribution (Figure 2.11 in the Appendix at the end of chapter 2).

2.2.1.4   Inequality Aversion

Since Adam Smith's *Wealth of Nations* (1776), the idea that self-interest is the primary drive of human action has become the cornerstone of economic theory. But

in the *Theory of Moral Sentiments*(1759), Smith also points out that there are a multitude of psychological motives, such as compassion for others and a sense of propriety, that are also inherent in human nature:

> How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortunes of others, and render their happiness necessary to him, though he derives nothing from it, except the pleasure of seeing it. Of this kind is pity or compassion, the emotion we feel for the misery of others, when we either see it, or are made to conceive it in a very lively manner. That we often derive sorrow from the sorrows of others, is a matter of fact too obvious to require any instances to prove it; for this sentiment, like all the other original passions of human nature, is by no means confined to the virtuous or the humane, though they perhaps may feel it with the most exquisite sensibility. The greatest ruffian, the most hardened violator of the laws of society, is not altogether without it (Smith, 1759, p.1).

A vast amount of experimental and empirical literature since Smith provides evidence that people are not only driven by selfish motives, but are often concerned for the well-being of others. Formal theories have been developed that take into consideration these preferences. Within this literature, one of the most popular is the theory of inequality aversion (Bolton and Ockenfels, 2000; Fehr and Schmidt, 1999). One conclusion from this literature is that individuals are often willing to sacrifice some of their income to obtain a more equitable distribution. Another implication is that additional income may bring less utility if it comes at the cost of higher inequality. Thus, inherent in the concavity of the utility function is the direct effect of inequality aversion. A possible explanation comes from Aknin *et al.*(2011). In making judgments about the ideal income distribution, people draw not only on their moral instincts about right and wrong, but also on their intuition about the relationship between income and happiness. Most people realize that increases in income at the top of the

income ladder are not going to provide as much happiness as equal increases at the bottom.

Perhaps not surprisingly, as income inequality in the US has increased over the past 40 years, resentment over economic inequality has become more vocal. The recent Occupy Wall Street movement has seen millions of Americans protest on the street with the campaign slogan "We are the 99%," which expresses the popular discontent with the current level of inequality in the US. These observations are consistent with survey data that examines attitudes toward economic inequality. A recent study by Norton and Ariely (2011), for example, finds that most Americans, regardless of their political affiliation and wealth status, prefer to live in a country with a far more equitable distribution of wealth than the one that characterizes the current state of affairs.

2.2.2 The Price of Inequality

A large literature in economics, psychology, sociology, and epidemiology has emerged over the past 30 years showing that income inequality causes large social welfare loses that go beyond the direct loss from inequality aversion inherent in the concavity of the utility function. This is to say that income inequality can reduce social welfare through variety of indirect channels. These channels are related to increase of positional consumption, deterioration of mental and physical health, corrosion of social capital, and the erosion of political and democratic institutions. Below I describe some of the main arguments advanced in this literature.

2.2.2.1 Positional Arm Races

Although standard economic models often ignore concerns about social status, most economists agree that such considerations are an important aspect of economic decision making. Many of the early economists, including Adam Smith, John Stuart

Mill, Karl Marx, and Thorstein Veblen, pointed out that a great deal of consumption is motivated by concerns for displaying social status. Adam Smith (1759), for example, noted:

> To what purpose is all the toil and bustle of the world? What is the end of avarice and ambition, of the pursuit of wealth, of power, and preeminence? Is it to supply the necessities of nature? The wages of the meanest labourer can supply them. ... From when, then, arises that emulation which runs through all the different ranks of men, and what are the advantages which we propose by that great purpose of human life which we call bettering our condition? To be observed, to be attended to, to be taken notice of with sympathy, complacency and approbation, are all the advantages which we can propose to derive from it. It is the vanity, not the ease or the pleasure that interests us. But vanity is always founded upon the belief of our being an object of attention and approbation (Smith, 1759, p.108).

In his book, *The Theory of the Leisure Class*, Thorstein Veblen (1899) further argued that people pursue social status often with no regard to their own long-term happiness. Most people try to emulate the consumption and lifestyle of the rich to achieve a higher social status within their own group. This behavior, however, can lead to wasteful consumerism or to conspicuous consumption[7] and leisure that do not contribute to the material productivity required for the healthy functioning of society.

Using Veblen's ideas, for example, Robert Frank (1999, 2003, 2011) argues that income inequality can lead to an expenditure arms race focused on positional goods. As society grows richer, everyone spends furiously to keep up with the Joneses. The result, resources diverted from non-positional to positional goods cause large welfare losses – financially and socially. As cars and houses grow bigger and more expensive,

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[7]Conspicuous consumption refers to the idea that money and resources are spent on goods that are used only to display higher social status. Since the primary purpose of these goods is to display one's success in society, they must be of publicly observable

consumers spend more time at work and less time enjoying family and friends. They save less and borrow more. On a personal level, such behavior is rational. If everybody pursues such behavior, however, society as a whole is made worse off.

Veblen further argued that there is an appropriate level of conspicuous consumption associated with one's rank in society, and this social reference point increases with one's rank and as society grows richer. One implication of this observation is that even if the absolute level of income increases, there will be no corresponding gains in social welfare unless everyone benefits equally from economic growth. Higher mean income will increase the social standard (or reference point) and may cause various feelings of resentment and envy if there are no corresponding gains in income. Thus, Pareto improvements in income which involve small gains for the poor and large gains for the rich may decrease social welfare. Income inequality feeds and exacerbates this vicious cycle of positional consumption.

Finally, economic inequality may lead to inequality of opportunity as people below some social reference point experience positional discrimination in many different aspects of their life such as education, socializing with friends, and obtaining some forms of employment (Harold *et al.*, 1992; Thurow,1980).

2.2.2.2 Deterioration of Mental and Physical Health

It is also often argued that economic inequality causes deterioration of mental and physical health. Low social status and lack of autonomy over one's life and workplace decisions lead to stress and low self-esteem which are associated with higher levels of stress hormones such as cortisol. These hormones are linked with depression and hypertension. For example, the famous Whitehall studies (I and II) found that people with low social status are more likely to experience a number of risk factors such as obesity, smoking, reduced leisure time, lower levels of physical activity, higher prevalence of underlying illness, higher blood pressure, and shorter height. But even

after controlling for these risk factors, people with low social status are still more likely to have a cardiovascular disease. In a follow-up study, twenty years later, Marmot *et al.* (1991) discovered that social status may be related to a wide range of diseases in addition to heart disease: some cancers, chronic lung disease, gastrointestinal disease, depression, suicide, job sickness absence, back pain and general feelings of ill-health.

A recent study by Pickett and Wilkinson (2010) is a good representation of this literature. The authors argue that higher GDP does not translate to better quality of mental and physical life. Instead, the root cause of social ills is found in large income inequalities. The gap between the rich and poor, the authors argue, is the strongest predictor of the functioning and health of a nation. They show that high income inequality correlates with spikes in homicide, obesity, drug use, mental illness, anxiety, teenage pregnancies, high school dropouts, and even incidents of playground bullying.

Greater inequality, Pickett and Wilkinson (2010) argue, heightens people's social evaluation anxieties by increasing the importance of social status. Social status carries the strongest message of superiority or inferiority. It is one of the most powerful sources of stress together with lack of friends and stress in early life that is seriously detrimental to health and longevity. Developed countries have experienced substantial rises in anxiety and depression which may be linked to a growing level of inequality. The American psychologist Jean Twenge (2000), for example, observed that anxiety levels in the US have substantially increased since the 1970s. This has been accompanied by increases in the frequency of behavioral problems including crime, alcohol, and drug abuse among younger adults.

2.2.2.3 Corrosion of Social Capital

Income inequality may also cause corrosion of social capital. A recent study by Oishi *et al.*, (2011), for example, suggests that income inequality affects happiness in-

directly through lowering interpersonal trust and established social norms of fairness. As the gap between the rich and the poor grows, people perceive the world as being less fair. In addition, inequalities in income cause community members to separate which decreases social trust. Both a lower level of interpersonal trust and a perception of a less fair society affect subjective well-being negatively. Figure 2.12 shows that happiness, trust, and perceptions of fairness, have followed similar patterns since the 1970s.

In addition, Helliwell and Putnam (2004) find that social capital, measured by the strength of family, neighborhood, religious, and community ties are all independently and robustly correlated to life satisfaction – both directly and through their impact on health. Norms of reciprocity and trustworthiness are a nearly universal concomitant of dense social networks so that that the belief that others around you can be trusted is one of the strongest predictors of social capital at the aggregate level. High levels of social trust in the context of dense social networks provides the crucial mechanism through which social capital affects aggregate outcomes.

2.2.2.4   Political Inequality and Democracy

Over a century ago, Karl Marx (1867) argued that capitalism leads to concentration of economic power and class struggle that will eventually lead to its demise. Although Marx's prediction did not come to fruition, his ideas have provided useful insights into the functioning of the capitalistic system. One implication of Marx's theory is that as economic inequality increases, the political and economic system becomes highly insensitive to the welfare of the poor and highly sensitive to the welfare of the rich which eventually leads to social conflict.

Similar arguments have been advanced by Stiglitz (2010) who contends that much of the economic inequality in the US was not created by abstract market forces, but was generated by the political process. His argument is rooted in a long tradition of

the public choice literature on rent-seeking first developed by Gordon Tullock (1967). As economic power becomes more concentrated, the incentive to extract rents from the political system increase. Thus, it becomes more profitable for large corporations to invest their resources in lobbying and lawsuits that create a favorable business environment than on pursuing productive market activities that ultimately increase the wealth of society. In the *The Rise and Decline of Nations*, Mancur Olson (1982) traces the historic consequences of rent-seeking and finds that as countries become increasingly dominated by interest groups they lose their economic vitality and fall into decline.

According to Stiglitz, rent-seeking has been the primary cause of income inequality in the United States. High levels of rent-seeking not only generate more inequality, but are also costly to economic growth. Likewise, Acemoglu and Robinson (2012) admit that although economic inequality is not a problem in itself, it can lead to political inequality, which in the long run may reduce public investment in physical and human capital and hurt economic growth and development.

Finally, Bartels (2010) demonstrates that elected officials are highly responsive to the views of the affluent, but ignore the views of the poor. He shows that much of the economic inequality in the US has been the result of carefully chosen political agendas. High levels of economic inequality, then, may have corrosive effects on political and democratic institutions and lead to even greater inequalities and the loss of personal and economic liberty.

One can think of these adverse effects as a negative externality associated with the general level of income inequality that can shift down the social welfare function (W) from Figure 2.10. Figure 2.13 illustrates this idea. In this case, even though real incomes increase for majority of the population, the negative external costs associated with the growing level of inequality shifts the social welfare function down and no overall gains in happiness are achieved.

Recent studies have also confirmed that people who live in less equal societies tend to report lower levels of subjective well-being. This is true for developed nations (Alesina *et al.*, 2004; and Oishi *et al.*, 2011 for the US and Europe), and for developing ones (see Smyth and Qian, 2008 for China; Graham and Felton, 2006 for Latin America).

2.2.3   The Trade-off Between Equality and Efficiency

If raising the absolute level of income or creating a more equal society improves the subjective well-being of individuals, then the relationship between economic growth and happiness will be determined by the relationship between economic growth and income inequality. As Scully (2002, p.1) notes: "The single most important political question of modern times is how to fabricate government policy so that the standard of living advances and all income classes benefit."

Yet, as Arthur Okun (1975) observed a long time ago, efficiency is often bought at the price of greater inequality. This trade-off is a product of an inescapable conflict between the political principles of democracy and the economic principles of capitalism. On the one hand, Okun argued, democracy proclaims all citizens equal and provides universally distributed rights and privileges. On the other hand, capitalism relies on market-determined outcomes to promote efficiency. Economic inequality serves an important efficiency role because it provides incentives to channel productive energies into experimentation and innovation. Higher rewards generate productivity that makes society richer, but the newly created wealth is inevitably distributed unevenly across the different income classes as some do better than others. Moreover, some of the winners of the economic race use their newly acquired wealth to obtain a head start in the economic race which creates even greater inequalities and makes opportunities more unequal.

Policies designed to reduce the scope of inequality, however, distort market in-

centives and cause inefficiencies. As Okun noted, transfers are made with a "leaky bucket." Thus, society is facing an uneasy trade-off – more equality at the expense of efficiency or higher efficiency at the expense of equality.[8]

Since Okun's seminal work, a very large literature has emerged that explores the relationship between economic growth and inequality.[9] Indeed, the question of how to generate economic growth and at the same time reduce poverty has been the center of attention for development economics. The theoretical and empirical predictions, however, have been mixed. Barro(2000), for example, summarizes the theoretical literature into four major arguments that favor either a positive or negative relationship:(1) credit-market imperfections, (2) political economy, (3) social unrest, and (4) savings rate. At the empirical level, the relationship between economic growth and inequality is also unclear. Although earlier studies suggested a negative correlation between growth and income inequality (Benabou, 1996; Alesina and Rodrik, 1994; Persson and Tabellini, 1994; Perotti, 1996), these results have been rather sensitive to robustness checks and suffered serious problems with measurement error. On the other hand, Li and Zou (1998) and Forbes (2000) find a positive short-run relationship between income inequality and growth. Additionally, Barro (2000) found that the relationship between income inequality and economic growth depends on the level of economic development. In poorer countries income inequality impairs economic growth, but in richer countries a higher level of income inequality is associated with faster growth rates.

Although the view that economic growth comes at the expense of income inequality is widely debated, the data from the US shows that growth in national income since the 1970s has been accompanied by a steady increase in market inequality.

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[8]As Duflo (2011) argues, the trade-off can come from a possible influence of growth on the distribution of wealth or from a possible influence of the distribution of wealth on growth. A third possibility is that some policies that favor growth can have an increase in inequality as a direct by-product and that policies that favor equity could have a decrease in growth as a direct by-product.

[9]For a review of the literature see Banerjee (2010).

Figures 2.14 and 2.15 in the Appendix to Chapter 2 show the strong and positive correlation between the log of real GDP per capita and income inequality, measured by the Gini coefficient, from 1970-2010.

The sharp rise in earnings inequality and the virtual stagnation of the average real wage in the United States since the early 1970's have been explained by a large number of arguments including neo-liberal tax policies, globalization and outsourcing of labor, corporate governance and regulation (or lack thereof), decline in unionization (Harvey, 2007; Stiglitz, 2010; Wolff, 2012), skill-based technological change, and education (Johnson, 1997; Goldin and Katz, 2010), and rent-seeking activity (Stiglitz, 2010; Acemoglu & Robinson, 2012; and Bartels, 2010). Overall, the evidence supports Okun's (1975) observation that some inequality is inherent in the free market system while the rest of it is generated by the political system. If the rising level of income inequality in the US is largely a socio-political phenomenon, generated by policies such as lower marginal tax rates that favor the rich, then policy changes can reduce some, although not all, of the inequality. Understanding the effect of economic inequality on subjective well-being is critical for determining the optimal policy.

2.3   Data

Data on personal characteristics and subjective well-being were collected from the nationally representative General Social Survey (GSS) conducted by the National Opinion Research Center at the University of Chicago. Macroeconomic variables were collected from variety of sources. Table 2.1 in the Appendix provides description and sources for all variables, and Table 2.2 and 2.3 show summary statistics.

2.3.1 Subjective Well-Being

The dependent variable in this study is the self-reported level of happiness, which was collected using the following 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?"*[10] The data was then recoded so that the answers correspond to the following numerical values: (1) 'not too happy', (2) 'pretty happy', and (3) 'very happy'. For justification of using subjective well-being data see Frey & Stutzer (2002), Kahneman & Kruger (2006), and Di Tella & McCulloch (2003). These studies argue that subjective well-being data passes different validation tests and moves predictably with other external variables (such as income, marriage, and unemployment or growth in GDP) and is thus valid, reliable, and comparable.

2.3.2 Income Inequality

Data on income inequality came from the historical income tables of the U.S. Census Bureau. Specifically, data on the gross Gini ratios can be found in Table IE-2: *Measures of Individual Earning Inequality*, and data on mean quintile income in Table F3: *Mean Income Received by Each Fifth and Top 5 Percent of Households*. Data on net gini ratios were obtained from the Standardized World Income Inequality Database (Solt, 2009). Data on top income shares came from Picketty and Saez (2003). The period between 1974 and 2010 is characterized with an exceptional increase in income inequality which provides a lot of variation in the data and makes this study even more attractive from a statistical standpoint.

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[10]A small fraction of responses "Don't know" and "No answer" are ignored by the analysis.

2.3.3 Personal Income

The independent variable on income from the GSS, *conrinc*, is constructed from categorical data, and represents inflation adjusted personal income before taxes (in constant 2005 dollars).[11] This variable has been widely used in the social sciences and previous research has successfully applied it in estimating the return from college education with results that do not deviate significantly from what hundreds of other studies on this topic uncover (see Card, 1999).

2.3.4 Background Variables

The GSS dataset also provides a number of background variables at the individual level. The ones that are used as controls in this study are well known in the happiness literature to affect the individual level of subjective well-being, and include age, gender, race, educational level, marital status, and personal unemployment.

2.3.5 Other Variables

Other macroeconomic variables used in this study include the general level of unemployment, government size, gross capital formation, percent of population with college degrees, female labor force, the KOF index of globalization, and immigration and were obtained from a variety of sources.

2.4 Model and Empirical Strategy

The empirical analysis consists of three parts. First, I estimate the parameter on inequality aversion, ε, using SWB data from the GSS. Next, I calculate the Atkinson index of inequality. The main analysis follows where I estimate the effect of the

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[11]For details refer to GSS Methodological Report No. 101 (Holt, 2004)

general level of inequality on SWB by accounting for the diminishing marginal utility of income (direct inequality aversion). Finally, I use the results to calculate the marginal rate of substitution between personal income and inequality and to determine if economic growth has been sufficient to offset the negative effect associated with the general increase of income inequality in the US since the 1970s.

2.4.1   Theoretical Model

My goal is to evaluate the equity efficiency trade-off in the US from the early 1970s to 2010. Measures such as the mean level of income ignore the problem of economic inequality and measures such as the Gini coefficient do not consider the importance of personal income.[12] This makes it difficult to evaluate different states of socio-economic development which may embody a trade-off between economic growth and equality.

In the first part of this section, I turn to a neo-utilitarian social welfare analysis which was developed by Atkinson (1970). In particular, I am interested in estimating the Atkinson Index of inequality which takes into consideration the trade-off between income and inequality. The index is related to a class of additive welfare functions:

$$W = \frac{1}{n} \sum u_i(y_i) \tag{2.3}$$

where social welfare, W, is aggregate utility, a function of personal income, y_i.[13] To incorporate the idea that additional income may bring greater marginal utility to

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[12]For example, two societies may have the same level of general inequality and thus the same Gini coefficient, but one of them could be far richer and its citizens enjoying greater consumption and welfare.

[13]Deaton (1997, p.135) provides a useful definition of the social welfare function: "[The social welfare function] should be seen as a statistical 'aggregator' that turns distribution into a single number that provides overall judgment on that distribution and that forces us to think coherently about welfare and its distribution. Whatever our view of the policy making process, it is always useful to think about policy in terms of its effects on efficiency and equity, and the social welfare function should be thought of as a tool for organizing our thoughts in a coherent way."

poorer people, I use an iso-elastic utility function, which assigns weights to different levels of income:

$$u_i = \begin{cases} \dfrac{y_i^{1-\varepsilon} - 1}{1 - \varepsilon} & \text{if} \quad \varepsilon \neq 1 \\ \\ log y_i & \text{if} \quad \varepsilon = 1 \end{cases} \tag{2.4}$$

where ε is the parameter of inequality aversion, or the negative elasticity of marginal income (Layard, 2008). Conceptually this function is equivalent to a constant relative risk aversion function (CRRA). When $\varepsilon = 0$ (zero inequality aversion), then the social welfare function collapses to:

$$W = \frac{1}{n} \sum u_i(y_i) \rightarrow Utilitarian. \tag{2.5}$$

In this case society does not care about inequality at all, and social welfare is determined only by the level of average income. There is no trade-off between the size of the cake and how it is sliced. Both rich and poor receive the same utility from an additional dollar. This particular functional form is often referred to as "utilitarian" because the only thing that matters is maximizing total consumption and as long as consumption increases it does not really matter who receives the largest share.

On the other hand, when $\varepsilon \rightarrow \infty$ the social welfare function turns into:

$$W = min(u_i(y_i)) \rightarrow Rawlsian. \tag{2.6}$$

Since society is infinitely averse to inequality, social welfare now is equivalent with the welfare of the poorest. There is a maximum trade-off between the size of the cake and how it is sliced. The optimal world is one in which income is divided equally and the primary goal of social policy should be to improve the condition of the poorest. This functional form is known as "Rawlsian" because in his *Theory of Justice* (1971), John Rawls argues that inequality is acceptable only if it is to the advantage of those

who are worst-off.

Finally, when the value of ε is between these two polar cases, the social welfare function has an iso-elastic form:

$$W = \frac{1}{n} \sum \frac{y_i^{1-\varepsilon} - 1}{1 - \varepsilon} \rightarrow Iso-elastic. \tag{2.7}$$

This function is increasing with income:

$$\frac{\partial W}{\partial y_i} = \frac{y_i^{-\varepsilon}}{n} > 0 \tag{2.8}$$

but at a decreasing rate:

$$\frac{\partial^2 W}{\partial y_i^2} = -\varepsilon \frac{y_i^{-\varepsilon-1}}{n} < 0 \tag{2.9}$$

so that as ε increases, lower incomes are given relatively more weight in producing social welfare, i.e., the welfare (and utility) function is concave. A nice property is that the ratio of the marginal social utilities of two individuals is equal to:

$$\frac{\partial W/\partial y_A}{\partial W/\partial y_B} = \left(\frac{y_B}{y_A}\right)^{\varepsilon}. \tag{2.10}$$

Thus, when $\varepsilon = 1$, and $u_i = log y_i$, the marginal utilities are inversely proportional so that somebody with an income of \$10,000 will derive ten times more utility from an additional dollar than someone with an income of \$100,000. Most studies in the happiness economics literature use the log-linear specification and thus make the implicit assumption that $\varepsilon = 1$, i.e., the marginal utilities are inversely proportional. Fig. 2.16 in the Appendix shows the strong fit between life satisfaction and log of GDP per capita for a pooled sample of countries from the World Value Survey from 1981-2010, which suggests that that this modeling choice is reasonable.

Within this framework of analysis, the Atkinson (1970) index of inequality is

defined as:

$$A(\varepsilon) = 1 - \left(\frac{1}{n} \sum (y_i/\mu)^{1-\varepsilon} \right)^{1/1-\varepsilon} \tag{2.11}$$

where μ is the mean level of income. When $\varepsilon = 1$, the Atkinson index has the multiplicative form:

$$A(\varepsilon) = 1 - \prod (y_i/\mu)^{1/n} . \tag{2.12}$$

The core idea of the Atkinson index is that there exists a level of income, ξ, which is received by all members of society, such that $W(\xi) = W(y_i)$. Intuitively, this index tells us how much society is willing to give up in terms of the size of the cake in order to achieve an egalitarian distribution of income.

Figure 2.17 demonstrates this concept for a society of two individuals. The x axis shows the income of person A, and the y axis shows the income of person B. Let's assume that the income distribution is at point A where $y_A < y_B$. If $\varepsilon = 0$ (zero inequality aversion), then the social welfare function (SFW) will be utilitarian (a straight line between A, B ,and C). Thus, anywhere along the straight line social welfare will be maximized regardless of the distribution of income. Any reduction of the overall level of income, however, will make society worse off (even if the cake is divided more equally).

When $0 < \varepsilon < \infty$, then the SWF will be convex reflecting a trade-off between equality and income. Thus, there is a point E where incomes are equally divided with both A and B receiving ξ, such that the welfare of society is unchanged, i.e., $W(\xi) = W(y_i)$. This level of income is known as the equally distributed equivalent (EDE). Due to the convexity of the SWF, $\xi < \mu$ is always true. Even though total income is lower at E compared to A, the social welfare that is lost due to a decline of total income is compensated for by the gain in equality. This is to say that society is

willing to pay a price to achieve a more equal distribution of total income.

Since equality is measured by the ratio OC/OE, or equivalently between ξ/μ, then a society with an egalitarian distribution will have $\xi/\mu = 1$. The Atkinson index of inequality then can be expressed as:

$$A(\varepsilon) = 1 - \frac{\xi}{\mu}. \tag{2.13}$$

In order to find an expression for ξ, we observe that by virtue of (2.4):

$$u(\xi) = \frac{\xi^{1-\varepsilon} - 1}{1 - \varepsilon} \tag{2.14}$$

and from (2.7) we get:

$$W = \frac{1}{n}\sum \frac{y_i^{1-\varepsilon} - 1}{1 - \varepsilon} = \frac{1}{n}n\frac{\xi^{1-\varepsilon} - 1}{1 - \varepsilon}. \tag{2.15}$$

Thus, from the definition of ξ we can directly express it as:

$$\xi(y_i) = \frac{1}{n}\left(\sum y_i^{1-\varepsilon}\right)^{1/1-\varepsilon}. \tag{2.16}$$

Given any income distribution, then, we can calculate ξ. Of course ξ will depend on the level of inequality aversion, ε. For $\varepsilon = 0$, ξ will simply be the the average level of income. For $\varepsilon > 0$, ξ will be lower than the average income, μ, and will decrease as ε grows larger, reflecting a greater cost of inequality. Finally, we can derive a social welfare function in abbreviated terms by solving equation (2.4) for ξ (2.16):

$$W(\mu, A(\xi)) = \mu(1 - A(\xi)). \tag{2.17}$$

Since social welfare increases with μ, it is possible to have an increase in welfare and an increase in inequality simultaneously when μ increases. Fig. 2.18 presents a possible scenario in which economic growth has been sufficient to offset the neg-

ative effect on welfare from an increase in inequality (although this is not a Pareto improvement since some groups have been made worse off). The overall change in social welfare will ultimately depend on the concavity of the social welfare function which is determined by the level of inequality aversion, or the the value of ε. Usually, determining ε is a value judgment. The Census Bureau, for example, reports ε for arbitrary values of 0.25, 0.5 and 0.75.

Thus, the first goal of this analysis is to estimate parametrically the value of ε using subjective well-being data from the GSS (the exact procedure is outlined in section 3.2). Once I estimate the value of ε, I then calculate the value of $A(\varepsilon)$, $\xi(\varepsilon)$, and $W(\varepsilon)$ to determine whether economic growth in the US has been sufficient to compensate for the growing level of income inequality.

2.4.2 Estimating the Parameter of Inequality Aversion ε

There is a large literature that estimates the parameter on inequality aversion, ε. Since ε is conceptually the same as the risk-aversion parameter in a CRRA utility function, the majority of previous estimates are based on the behavioral theory of choice under uncertainty. As Layard *et al.* (2008) point out, however, these estimates have been highly inconsistent, ranging from 0 to 10.[14] One problem is that previous studies rely on indirect measures of utility and involve a large number of extraneous assumptions. A second problem is that these estimates are based on expected utility, not experienced utility. Yet, as Kahneman (1999) points out, most of the time people make erroneous forecasts about their true utility. In this study, I am interested in estimating ε based on a direct measurement of experienced utility.

I start the analysis by estimating the parameter on inequality aversion, ε, with

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[14]For a survey of the literature see Lanot *et al.* (2006).

the following specification:

$$u_i = \alpha \left(\frac{y_i^{1-\varepsilon} - 1}{1 - \varepsilon} \right) + \sum \beta' \mathbf{X} + \nu_i \tag{2.18}$$

where y_i is individual income, $\mathbf{X}$ is a vector of personal characteristics that includes age, age squared, sex, race, marital status, and level of education, and ν_i is random error. In this specification, ε captures the concavity of the utility function with respect to income or the negative elasticity of the marginal utility of income. The coefficient α is assumed to be the same for all people. I use a Box-Cox transformation on the income variable so that:

$$u_i = \alpha \left(\frac{y_i^{\lambda} - 1}{\lambda} \right) + \sum \beta' \mathbf{X} + \nu_i \tag{2.19}$$

where $\lambda = 1 - \varepsilon$.

Since true utility is not observed, I follow Layard *et al.* (2008) and make the following assumptions:

1. Reported happiness, h_i, is linked to true utility, u_i via a fixed transformation such that:

$$h_i = f_i(u_i) = f(u_i) + \mu_i \tag{2.20}$$

so that f_i is common to all individuals up to a random additive term μ_i, which is independent of the circumstances affecting true utility.

2. In addition, the transformation is assumed to be linear:

$$h_i = u_i + \mu_i \tag{2.21}$$

Thus, my final model is given by:

$$h_i = \alpha \left(\frac{y_i^{\lambda} - 1}{\lambda} \right) + \sum \beta' \mathbf{X} + \epsilon_i \tag{2.22}$$

where $\epsilon = \nu_i + \mu_i$

A significant body of literature exists to justify the assumptions above. First, reports on happiness tend to be consistent with other measures of well-being. For example, Diener & Suh (1999) show that the level of self-reported happiness is correlated with reports made by a third-party (e.g., a friend of the subject). Second, happiness data tends to move in a predictable way with external factors such as unemployment and marriage. For example, income increases predicted happiness, unemployment decreases it, etc. (Kahneman, 1999). Finally, studies in neuropsychology suggest that answers to happiness reports are correlated in a consistent manner with the activity in different areas of the brain associated with positive and negative experiences (Davidson, 1992, 2000). For a more thorough discussion see Section 1.5 of this dissertation.

Table 2.4 presents the main results from the Box-Cox regressions. The inequality aversion parameter, ε, is found to be 0.50 for the overall sample. I further estimate ε for a variety of subgroups and over time. The parameter shows consistency across groups with values ranging from 0.29 (strong Republicans) to 0.97 (people with graduate degrees). Interestingly, ε increased over time from 0.19 in the 1970s to 0.65 in the 2000s. This is consistent with the growing public resentment over the increasing gap between the rich and the poor which culminated with the Occupy Wall Street movement in recent years. As Figure 2.3 points out the number of books on the topic of income inequality has quadrupled since the 1970s. These observations are also consistent with economic and social theory. Republicans, for instance, share more conservative values that emphasize the importance of personal independence, hard work and meritocracy. Thus, they are less inclined to believe that society has an obligation to reduce social inequalities.

2.4.3 Calculating A(ε), $\xi(\varepsilon)$, and W(ε), 1974-2010

Next, I calculate the Atkinson index of inequality, A(ε), the equivalently distributed income, $\xi(\varepsilon)$, and social welfare, W(ε), based on the value of $\varepsilon = 0.5$ found in the previous section. Since ε has increased over time and differs across subgroups of the population, I also include the same calculations for $\varepsilon = 1$. I use this value of the inequality aversion parameter because it corresponds to the log-linear form of the utility function that is a standard assumption in the happiness literature.

The main results are presented in Table 2.5 and cover the period from 1974 to 2012. In 1974, for example, mean income in the GSS sample was \$29,852 (column 2) and the Gini coefficient was .43 percentage points (column 3). If we assume that the value of $\varepsilon = 0.5$, then such levels and distribution of income correspond to an Atkinson index of inequality of .16 percentage points (column 4). This number suggests that if incomes were equally distributed, the same level of social welfare could be achieved with only 84 percent of the national income in 1974, i.e., 16 percent of national income can be sacrificed to achieved an egalitarian income distribution and at the same time preserve the same level of national happiness. Column (5) shows that this is equivalent to \$24,977 – the equivalent distributed income, ξ. Finally, column (6) calculates the welfare of society using equation 2.7. This number by itself does not have any meaning. It is useful, however, in comparing different distributions to each other and in this case to track the evolution of welfare over time. For instance, the results in this column suggest that social welfare slightly increased from 316 in 1974 to 329 in 2012. The increasing value of the Atkinson index of inequality in column (4), A(ε=0.5), however, indicates that society is willing to pay an increasing portion of total income to divide the pie into more equal slices. In 1974 the same level of social welfare could have been obtained if everybody received an income of \$24,977 (the equivalently distributed income, $\xi(\varepsilon = 0.5)$), i.e., this was equivalent to a reduction of 16 percent of total income. By 2010, $A(\varepsilon)$ increased by more than half, indicating

that the same level of welfare could have been obtained if society gave up 26 percent of total income to achieve an equal distribution of income where everybody earned $27,060.

The results, of course, are sensitive to the value of ε. Thus, the last three columns of Table 2.5 repeat the same exercise but for a value of the inequality aversion parameter of $\varepsilon = 1$. At this level of inequality aversion, society has experienced no gains in social welfare since the 1974 (column 9). As expected, greater inequality aversion is associated with a much higher trade-off between equity and efficiency. According to the results in column (8), society could have achieved the same level of welfare in 2012 if everybody received an income of $19,399 (47 percent reduction in total income).

2.5   Estimating the Indirect Costs of Inequality

2.5.1   Empirical Model

Although some level of inequality can be productive and promote economic growth through innovation and productivity, in the past 20 years a large literature has emerged that shows that high levels of economic inequality impose large welfare loses in addition to those associated with the concavity of the utility function. For example, a high degree of economic inequality may affect well-being indirectly by encouraging status consumption, negatively affecting mental and physical health, corroding social capital, and compromising the political and democratic institutions in a country. One can think of these effects as a form of negative externality. Although economic growth has been sufficient to improve social welfare even after we account for the direct cost of inequality aversion, the negative externality from economic growth shifts the welfare function downward, and may result in the stagnating levels of welfare.

The second part of this chapter, then, estimates the external cost of inequality while accounting for the direct loses associated with the concavity of the utility func-

tion. To estimate the external cost of the general level of inequality on SWB, I use the following model which is a modification of model (2.22):

$$h_i = \alpha \left(\frac{y_i^\lambda - 1}{\lambda} \right) + \gamma G + \sum \beta' \mathbf{X} + \epsilon_i \tag{2.23}$$

where G is the measure of income inequality. In the case of the Gini coefficient, which is used for the empirical portion of this study, G takes the following form:[15]

$$G = \frac{n+1}{n-1} - \frac{2}{n(n-1)\mu} \left(\sum_{i=1}^{n} R_i y_i \right) \tag{2.24}$$

where μ is the average income in the GSS population and R_i is the income rank R of person i who has income y_i.

Since the parameter of inequality aversion has increased over time, to be more conservative in my estimation, and for comparison purposes with previous studies, I assume that $\varepsilon = 1$, so that:

$$h_i = \alpha log y_i + \gamma G + \sum \beta' \mathbf{X} + \epsilon_i \tag{2.25}$$

An implicit assumption is that the variable on the level of inequality will capture the external cost as opposed to the direct cost. Since survey data shows that most Americans significantly underestimate the level of inequality in the US (Norton and Ariely, 2010), this assumption may be reasonable. It is also important to note that the continuous variable happiness is not observed directly. Instead, what is observed are three discrete responses: "very happy," "pretty happy," and "not too happy." Due to the ordinal nature of the dependent variable the model from the theoretical section then requires estimation using an ordered probit technique. Although I use an ordered probit estimation as a robustness test, I report the coefficients from OLS estimation in the main analytical part of this paper. There are two reasons for this approach. First,

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[15]The calculation of G is a simplified version proposed by Deaton (1997).

Ferrer-i-Carbonell (2004) provide extensive evidence that the results from OLS and ordered probit regressions hardly differ in the context of happiness research. Second, I am interested in estimating the marginal effects on the interaction between inequality and income on happiness. Ai and Norton (2003) show that the interaction terms in ordered probit regressions are more difficult to interpret than commonly assumed.

2.5.2 Empirical Results

Table 2.6 presents the main results from the empirical estimation. Four different variations of this model are presented each building from the previous one by examining additional variables and relationships. The common variables to all four models are the ones that describe the personal characteristics of the respondents: age (and its quadratic), gender, race, marital status, employment status, and educational level. Following Di Tella *et al.* (2003), an additional control variable on the general level of unemployment is also included. The estimates on these core variables show consistency across all four models, are sensible, statistically significant, and thus provide confidence about the foundation of the model. Furthermore, the results agree with the findings of previous studies on happiness (e.g., see Di Tella *et al.*, 2003, and Alesina *et al.*, 2004).

Model 1 is the most basic specification which explores the effect of the general level of inequality and income on the self-reported level of happiness. This model includes controls for age, sex, race, and marital status, and the rate of unemployment. The results suggest that income inequality has a negative and significant effect on subjective well-being even beyond the one associated with inequality aversion inherent in the concavity of the utility function. The variable on personal income also has the expected sign and is statistically significant. Similar results are found when the model is expanded to include additional control variables on employment status (dummy indicating if the person is unemployed) and educational attainment in Model (2).

Model (3) tests for the interaction effect between inequality and the level of income. In other words, the model tests the hypothesis that as personal income goes up the negative external effect from income inequality diminishes. This hypothesis is consistent with the discussion in section 2.2.2. Although income inequality may negatively affect both rich and poor by encouraging wasteful positional consumption, in some instances, economic inequality may be beneficial to the rich who may use their wealth to extract rents from the political system. Both the coefficient on income inequality and its interaction term have the expected signs and are statistically significant. The coefficients imply that that beyond $362,616 of annual income, inequality has virtually no negative effect on the level of happiness. This level of income, however, is even higher than the mean level of income for the top income quintile in the US for 2010, which suggests that income inequality affects the welfare of majority of the US population.

Finally, following Oishi *et al.* (2011) and Helliwell and Putnam (2004), I include additional controls for the general level of trust and perception of fairness. My findings, which are consistent with their results, suggest that lower levels of social trust are associated with reduced happiness, and a greater sense of fairness increases the subjective well-being of people. Unlike Oshi *et al.* (2011), however, who find that once they control for social capital income inequality loses its significance, my results suggest that the negative effect of inequality on happiness goes beyond the corrosion of social capital. This is consistent with the theory reviewed in section 2.2.2.

Table 2.7 provides additional evidence on the relationship between income inequality and happiness. All models presented in this table are identical to Model (2) in Table 2.6, but use different measure on income inequality to test if the results are sensitive to the measure of income inequality. Model (1), for example, examines the effect of the net gini coefficient obtained from the World Standardized Income Inequality database (Solt, 2009). Model (2) and (3) use data on share of income to

the top 1 and 10 percent of income earners from Picketty and Saez (2003). Finally, model (4) looks at the ratio between the average income of the top five percent of income earners and the bottom twenty percent using data on mean household income from the U.S. Department of Commerce. The results are virtually the same as the ones obtained in Table 2.6. All variables of interest are significant and have the expected signs. Interestingly, the concentration of income among the top one percent of income earners has a negative effect on subjective well-being that is stronger than the concentration of income among the top 10 percent of income earners. This is consistent with the observation that higher concentration of economic power leads to more political inequality, erosion of democratic institutions, and eventually to loss of personal liberties, which people value.

Table 2.8 decomposes the effect of income inequality on happiness for several different subgroups in the population. The results are consistent with the findings so far suggesting a negative and significant correlation between inequality and subjective well-being in most cases. For example, although inequality tends to have a negative effect on the well-being of both men and women, this adverse effect is almost four time as strong for females. This is not a surprising result since women have been traditionally discriminated against in the workplace and although the wage and educational gap has almost disappeared in recent years, it has been present for most of the study. Republicans tend to be less affected by the inequality than Democrats. This could be due to ideological differences as suggested by Alesina *et al.* (2011). One, perhaps, surprising result is that blacks do not seem to be affected by the general level of income inequality since the coefficient on income inequality is insignificant. This result, however, could be driven by the relatively small subsample.

The results reported so far are consistent with most previous findings in the literature (Graham and Felton, 2006; Smyth and Qian, 2008, and Oishi *et al.*, 2011). However, they come in contrast to those of Alesina *et al.* (2004) who find that al-

though Europeans are sensitive to income inequality, Americans are not affected by it. Table 2.9 further decomposes the effect of income inequality over time and suggests one possible reason for this difference. The results suggest that the external cost from inequality has sharply increased over time. In fact, relatively low levels of income inequality in the 70s have been associated with a positive effect on subjective well-being. This is consistent with standard economic theory that up to some point economic inequality serves an important role to promote effort and channel it to productive market activities such as innovation. Yet, as income inequality grew over time, the external effect became negative and the cost associated with it grew even larger. In the case of the US, this external cost has almost quadrupled. The insignificant coefficient on the variable of income inequality in Alesina *et al.* (2004) could be due to the fact that their sample does not cover the past couple of decades when the negative effect of inequality has been especially pronounced.

These results are also consistent with the change in reported attitudes over time reported in Table 2.10. As income inequality has increased over time, a larger proportion of the population has reported a lower level of social trust and perception of fairness. In addition, more people today think that the rich should be paying higher taxes although the GSS data reveals that fewer Americans today have confidence in the US government as a means of redistributing income.

2.5.3 Robustness Test

Table 2.11 provides additional robustness tests for the main model in this study. Four alternative specifications are considered. Model (1), for instance, uses an ordered probit estimation. Model (2) uses robust regression with iteratively reweighted least squares. This technique allows us to control for influential observations. Model (3) is an OLS estimation with robust standard errors which also includes dummy variables for each year. Finally, model (4) uses a maximum likelihood procedure and a Box-

Cox transformation on the income variable. The results from all estimations are consistent with the findings from our preferred specification of model. In all models, the coefficient on income inequality has a negative sign and is significant at the .01 level. It appears, then, that the results are not sensitive to the choice of estimation technique.

Table 2.12 reports one final robustness test in which two separate measures for relative income are included in the estimation. Model (1) analyzes the effect of relative income proposed in equation (1), $\frac{y}{y*}$, where y* is the median income in the sample for each year. Model (2) includes the relative position of a person in society defined as $(y - y*)^2$. The squared term reflects the idea that the further is a person from the median income, the stronger the effect of inequality aversion. An additional interaction term with income is included to account for the possibility that as income goes up, relative considerations diminish. Model (3) and (4) include a variable on the general level of income inequality in addition to relative income. Again, the results are consistent with the main hypothesis in this study – the negative effect of income inequality goes beyond the inequality aversion associated with the concavity of the utility function and one's relative position in society. Relative income, however, seems to also play an important role in determining one's happiness with a positive and significant coefficient at the .01 level in all four regressions.

2.6   Calculating the Net Benefit

2.6.1   Calculating the Marginal Rate of Substitution

If the level of self-reported happiness reflects true utility in a reliable and comparable way, then combining the marginal effects of income inequality and personal

income will give an estimate of the marginal rate of substitution between the two:

$$MRS_{INEQ-Y} = \frac{\gamma}{\alpha} * y = \psi \qquad (2.26)$$

The marginal rate of substitution shows how much personal income would have to go up so that there is no loss in happiness as a result of one unit increase in income inequality.

Using Model (3) in Table 2.6, I next calculate the marginal rate of substitution between income inequality and personal income in equation (2.26). While direct interpretation of the individual marginal effects of market inequality and personal income on happiness is straightforward, taking the ratio of the derivatives reveals the trade-off between the two and provides an alternative way to evaluate this trade-off. Column (3) in Table 2.13 (ψ) displays the marginal rate of substitution between the two variables. This number shows how much personal income will have to increase in order to offset a decrease in the level of happiness associated with a 1 percentage point increase in the Gini coefficient. For example, the ψ in 1976 suggests that 1 percentage point increase in the Gini coefficient will require personal income (Y) to increase by \$3788 dollars to keep happiness constant.

Table 2.13 calculates the net benefit from growth in income per capita since 1970 by accounting for the negative effect of the rising income inequality. This table does not take into consideration the trade-off between economic growth and market inequality. It simply looks at the actual change in the level of market inequality, measured by the change in the Gini coefficient, which is reported in column (6) and calculates the amount of personal income which is necessary to offset the adverse effect associated with the increase in income inequality. This is reported offset GDP in column (7). The net benefit for each year is calculated in column (8) and column (9) reports the cumulative gain since 1970. For example, in 1984 the Gini coefficient increased by 0.2 percentage points. Such an increase in the level of inequality could

have been offset by $832 increase in the level of personal income. Since personal income for the average American increased by $1625 in the same year, the net gain in terms of subjective well-being was $794. Table 2.13 presents evidence that growth in average income per capita in the US since 1970 has not been sufficient to offset the undesirable effect from increases in market inequality. Indeed, the average American has been made worse off. This is consistent with the observation that happiness levels have stagnated since the 1970s. In fact, according to the data from the Gallup poll, average life satisfaction actually decreased from 7.86 to 7.25 points which is more consistent with the predictions of the model.

2.6.2 Accounting for the Trade-off

The rise of income inequality in the past three decades has not been the result of economic growth alone. Rent-seeking, neo-liberal tax policies, globalization, immigration, the growing income gap between earners with higher education and those who have never attended college, the rapid increase of the female labor force since the 1970's, skill-based technological change, and the lack of corporate governance are all factors identified in Section 2.2.3 as having contributed to the growing gap between the rich and the poor.

Table 2.14 reports four different models, which estimate the trade-off between economic growth and the level of income inequality. All models estimate the effect of log GDP per capita, unemployment, female labor force participation, education, the KOF index of globalization, and immigration on income inequality. Model (1) uses an OLS with robust standard errors. Model (2) estimates the same model, but uses an alternative dependent variable – the share of income that goes to the top 1 percent of income earners. Model (3) uses a three stage least squares estimation. And, finally, model (4) transforms the Gini coefficient to its logarithmic form.

In all models, the log GDP per capita is significantly and positively correlated

with income inequality (with the exception of model (1) where the variable has the expected sign, but is not significant at the .1 level). The results are suggestive of a small positive trade-off between economic growth and income inequality. For every one percent increase in economic growth model (3) predicts that the Gini coefficient will increase with .024 percentage points.

Instead of looking at the actual increase in the Gini coefficient, Table 2.15 calculates its expected change, shown in column (6), using the estimates from the second stage of model (3) in Table 2.14. Thus, the offset income that is reported reflects only the portion of inequality that is generated by the growth in the economy. The results from Table 2.15 indicate that growth in per capita income has been sufficient to compensate for the adverse effect of inequality on individual happiness for the average American.

2.6.3 Decomposing the Effect by Each Income Quintile

Finally, Table 2.16 provides a summary of the same analysis for each income quintile. The table reports the mean income for each quintile of income earners and the cumulative gain experienced from economic growth since 1970 while discounting the negative effect from the increase in the general level of inequality. The calculations in the table suggest that the top two income quintiles have experienced a net benefit from economic growth. However, the bottom two quintiles of income earners have been made modestly worse off from the growing income inequality. The results imply that a subsidy of $31 per year for the lowest income quintile and $42 per year for the second lowest income quintile would be sufficient to compensate for the undesirable effect of inequality growth. Since the data is gross income, the net effect from income redistribution is not reflected in these calculations.

2.7 Conclusion

Economic growth in the United State since the 1970's has not benefited all income classes equally. Most income gains have gone to the top income quintile while the real wages of the majority of Americans have stagnated and, in the case of the poorest 40 percent, declined. This study shows that the rising level of income inequality can explain the stagnating happiness of Americans in the past several decades.

A neo-utilitarian framework of analysis is used to evaluate the equality-efficiency trade-off in the United States since the 1970s. Using SWB data from the GSS, the parameter of inequality aversion, ε , is estimated, which allows the precise calculation of the Atkinson index of inequality. Although the estimates suggest that Americans have become increasingly more inequality averse over time, the results suggest that the concavity of the utility function cannot alone explain the stagnating happiness of Americans.

Yet, a large literature in the past 30 years suggests that the cost of inequality goes beyond the direct negative effect from inequality aversion. High levels of income inequality are associated with increase in the consumption of status goods, deterioration of mental and physical health, corrosion of social capital, and the decay of political and democratic structures each of which may cause a loss of personal and economic freedom. The empirical estimation provides support for these observations, i.e., inequality has an adverse effect on SWB even beyond the negative cost associated with inequality aversion. This effect is diminishing with personal income which confirms the hypothesis that concentration of power allows the richest to extract rents from the political system for their own benefit and to make sure that the legislature will be highly sensitive to their welfare.

Once these negative external costs are taken into consideration, it is found that economic growth in the United States over the past several decades has not been sufficient to compensate for the loss of subjective well-being associated with the rising

level of income inequality. This is consistent with the observation that happiness levels in the United States have stagnated since the 1970s (and even declined by some measures).

Finally, the trade-off between economic growth and market equality in the United States is evaluated. I find that for every one percentage point increase in the rate of growth of real GDP per capita, the Gini coefficient increases by 2.13 percentage points. Such a trade-off indicates that the growth of average income per capita has been sufficient to compensate for the loss in happiness associated with the more unequal distribution of market income which was generated as a result of this growth. However, while the top two income quintiles of the population have been made better off from economic growth, the income gains experienced by the bottom two quintiles of income earners have not been sufficient to offset the rising level of market inequality, and the subjective well-being of middle class Americans has stagnated.

2.8   Appendix
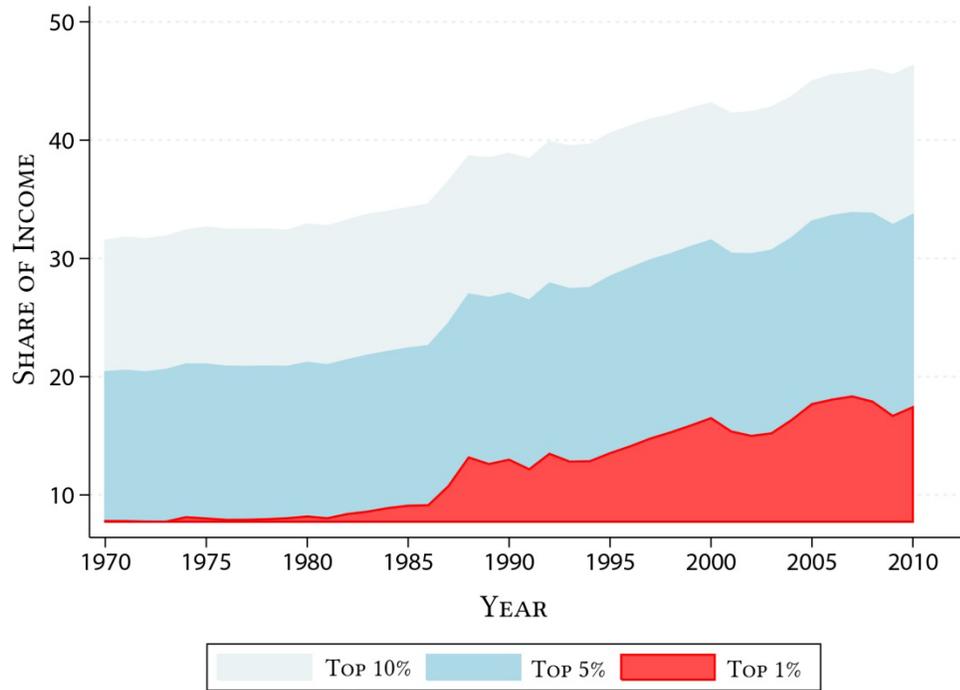
Figure 2.1: Evolution of Top Income Shares in the US, 1970-2010

Source: Picketty and Saez (2003). Updated data series covering the period 1920-2010 can be found on the website of Emanuel Saez, Table A.3. Website: http://elsa.berkeley.edu/~saez/#income
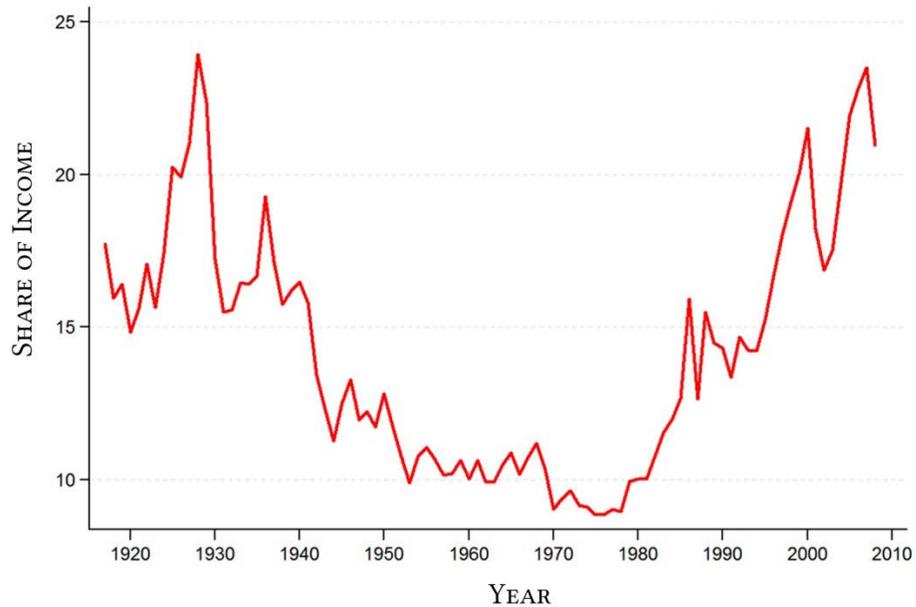
Figure 2.2: Share of Income by Top 1 % of Income Earners, 1920-2010
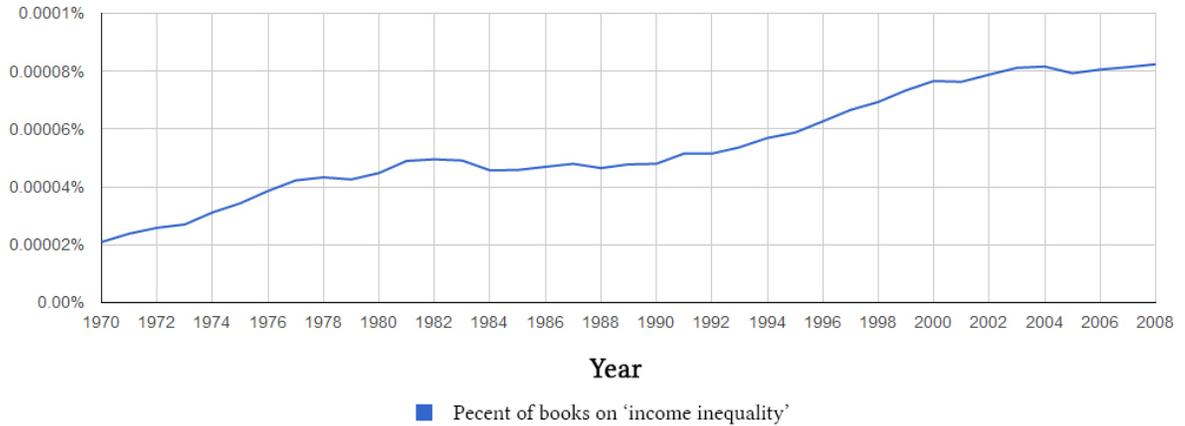
Figure 2.3: Percent of Books on Income Inequality, 1970-2008

Note: Data was obtained from google NGram viewer: http://books.google.com/ngrams/
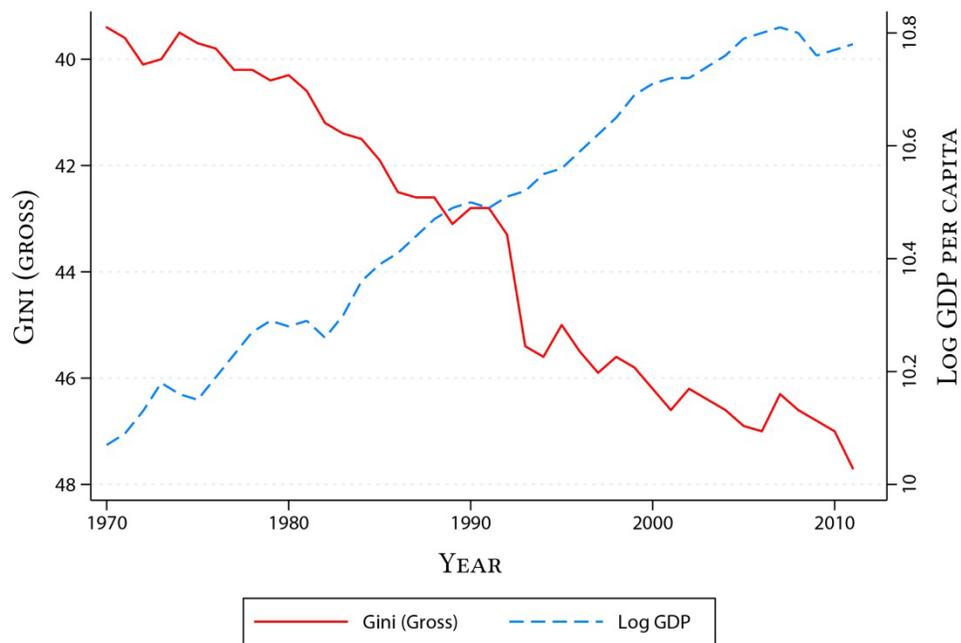
Figure 2.4: The Gini Coefficient and the Log of GDP per capita, 1970-2010

Note: Gini represents gross gini ratios for households (all races). Data was obtained from the U.S. Department of Commerce: http://www.census.gov/hhes/www/income/data/historical/inequality/ Table H-4). Data on GDP per capita was obtained from the Bureau of Labor Statistics and represents constant 2011 dollars. I reverse the right vertical axis Gini (gross) to emphasize the trend that as economic equality has decreased average real incomes have kept raising.
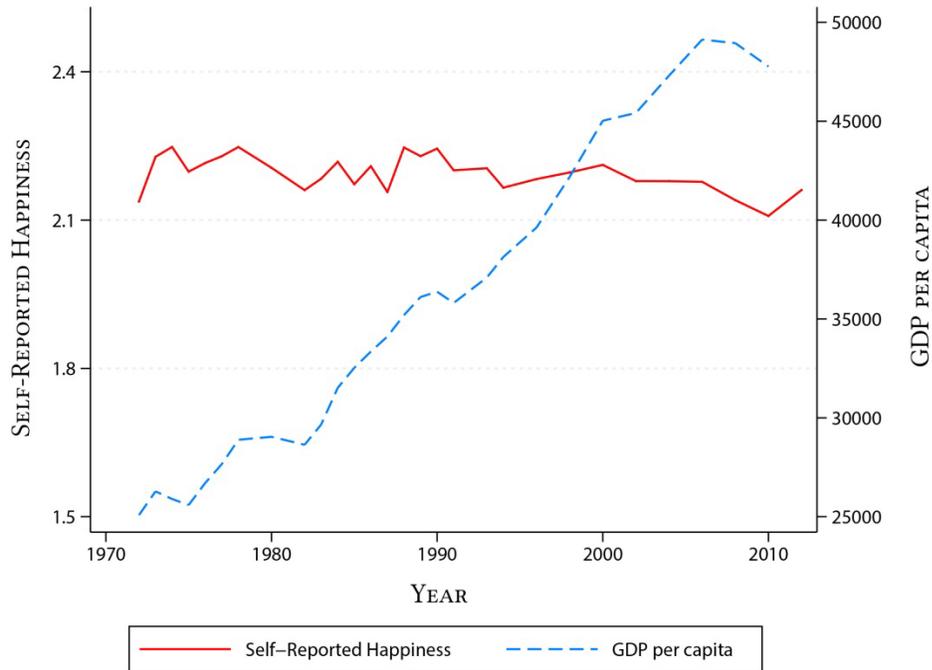
Figure 2.5: Self-Reported Level of Happiness and GDP per capita in the US, 1970-2010

Note: Data on self-reported level of happiness came from the General Social Survey (GSS variable: *happy*). Self-reported happiness represent yearly averages to the question: "Taken all together, how would you say things are these days would you say that you are very happy [3], pretty happy [2], or not too happy [1]?" Data on GDP per capita was obtained from the Bureau of Labor Statistics and represents constant 2011 dollars.
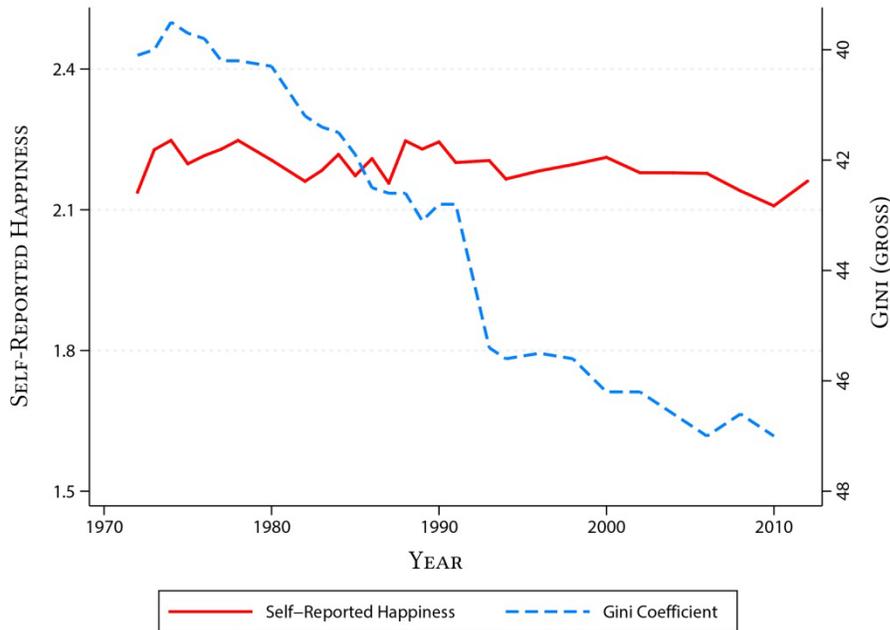
Figure 2.6: Self-Reported Level of Happiness and Inequality in the US, 1970-2010

Note: Data on self-reported level of happiness came from the General Social Survey (GSS variable: *happy*). Self-reported happiness represent yearly averages to the question: "Taken all together, how would you say things are these days would you say that you are very happy [3], pretty happy [2], or not too happy [1]?" Data on GDP per capita was obtained from the Bureau of Labor Statistics and represents constant 2011 dollars. Gini represents gross gini ratios for households (all races). Data was obtained from the U.S. Department of Commerce: http://www.census.gov/hhes/www/income/data/historical/inequality/ Table H-4).
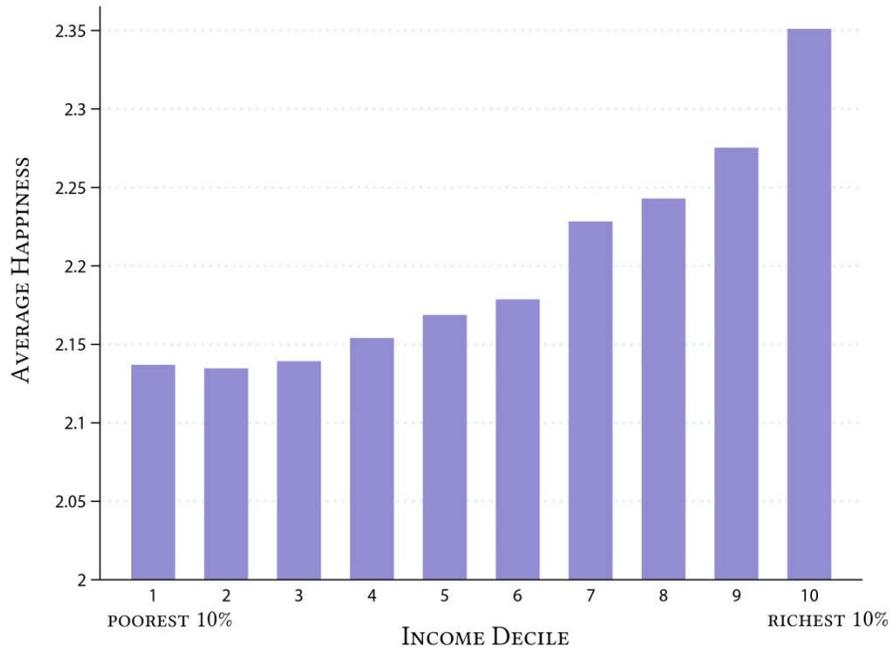
Figure 2.7: Self-Reported Happiness by Income Quintile, GSS

Note: Data on self-reported level of happiness came from the General Social Survey (GSS variable: *happy*). Self-reported happiness represents averages to the question: "Taken all together, how would you say things are these days would you say that you are very happy [3], pretty happy [2], or not too happy [1]?" for each income decile (GSS variable: *conrinc*)
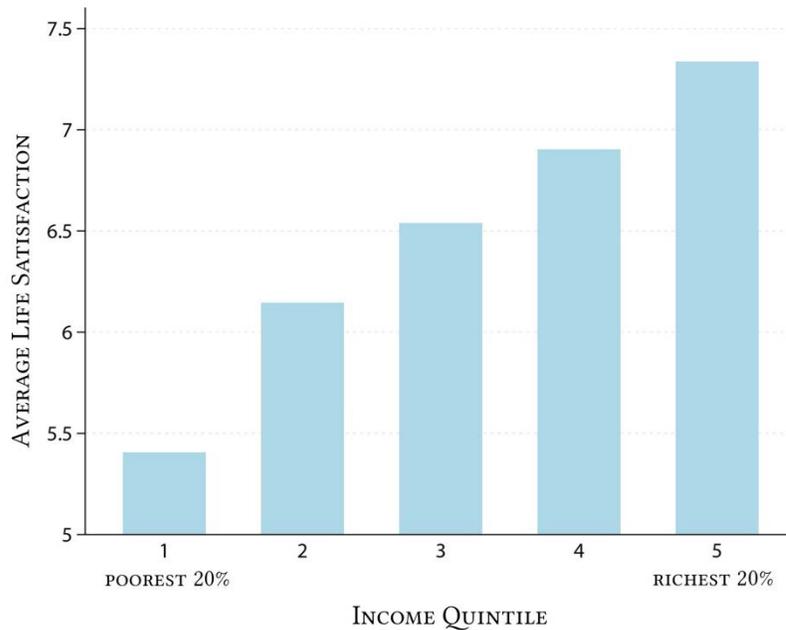
Figure 2.8: Life Satisfaction by Income Quintile, WVS

Note: Data on life satisfaction was obtained from the World Value Survey and represents country averages to the question: "All things considered, how satisfied are you with your life as a whole these days? Please use this card to help with your answer.[range of 1-10 with 1 labelled "Very dissatisfied" and 10 labelled "Very Satisfied"]" The plot represents a pooled sample from the last three waves of the WVS from 2000-2010. Data on GDP per capita (2005 constant dollars) was used to divide countries by income quintile and was obtained from the Penn World Tables.
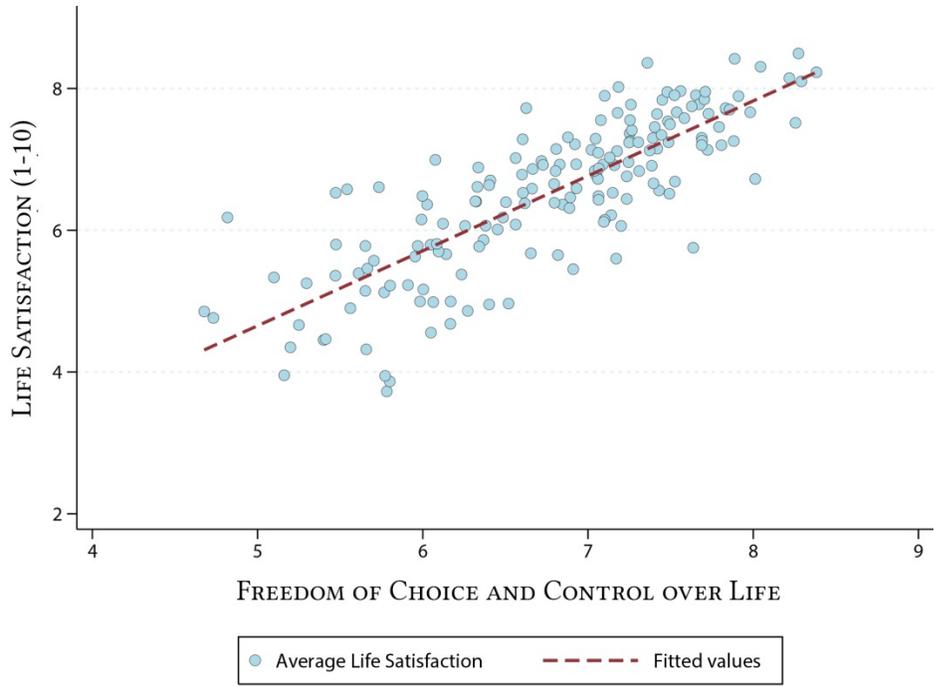
Figure 2.9: Life Satisfaction and Freedom of Choice

Note: The freedom of choice variable came from the World Value Survey survey and represents country averages to the question: "How much freedom of choice and control you feel you have over the way your life turns out." ['1' means 'none at all' and '10' means a 'great deal']. The plot represents a pooled sample from the five waves of the WVS from 1981-2010.
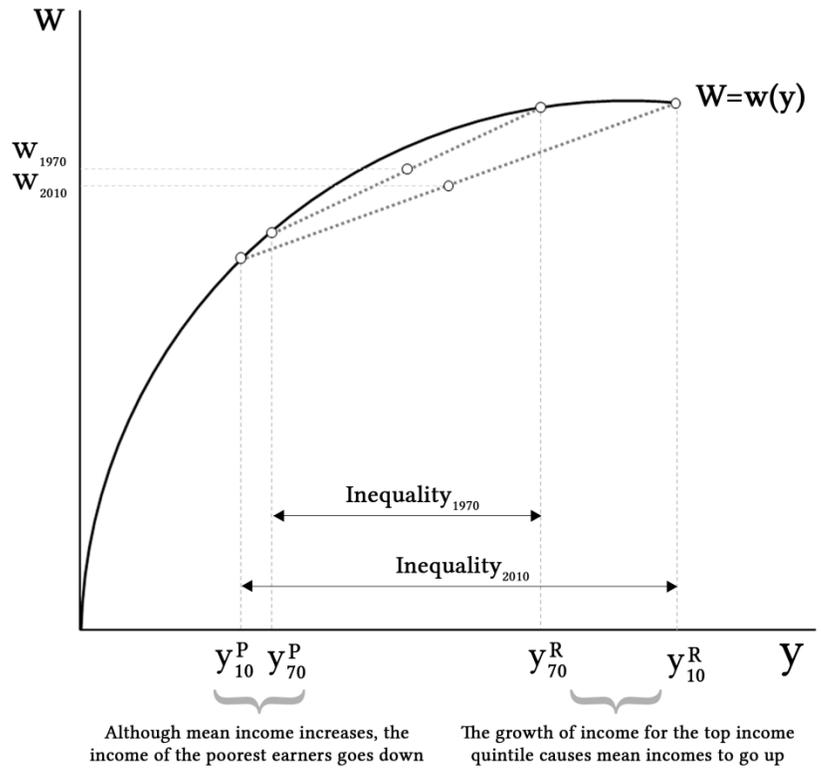
Figure 2.10: Mean Income, Income Inequality and Social Welfare
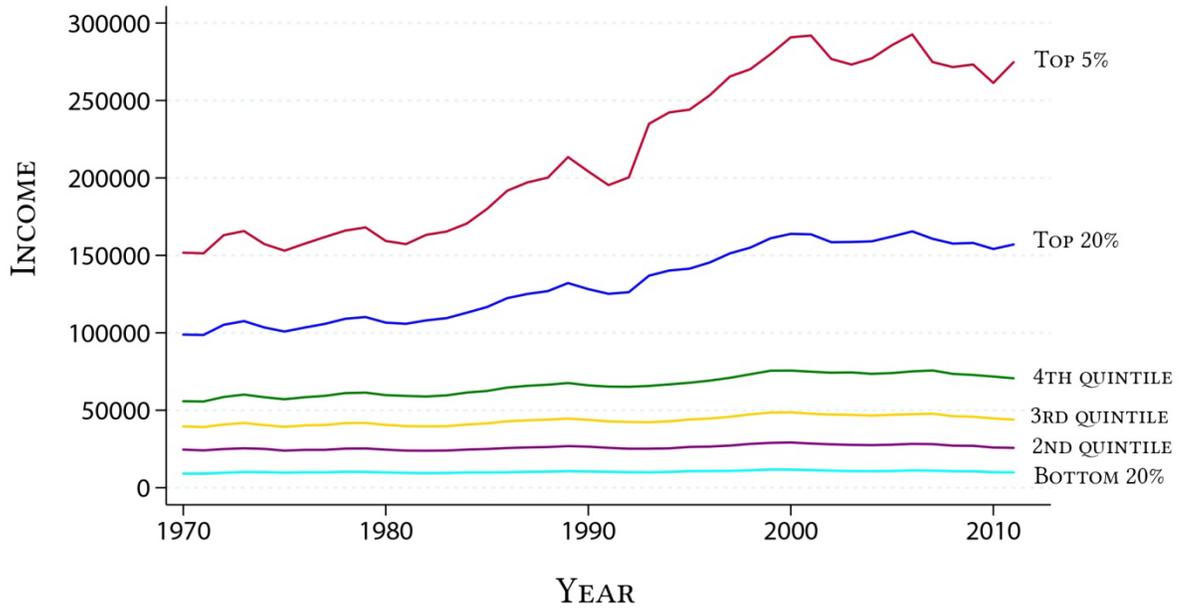
Figure 2.11: Mean Household Income Received by Each Quintile and the Top Five Percent

Note: "Income" represents mean quintile income. Data was obtained from the U.S. Department of Commerce: http://www.census.gov/hhes/www/income/data/historical/inequality/ Table H-3:All Races).
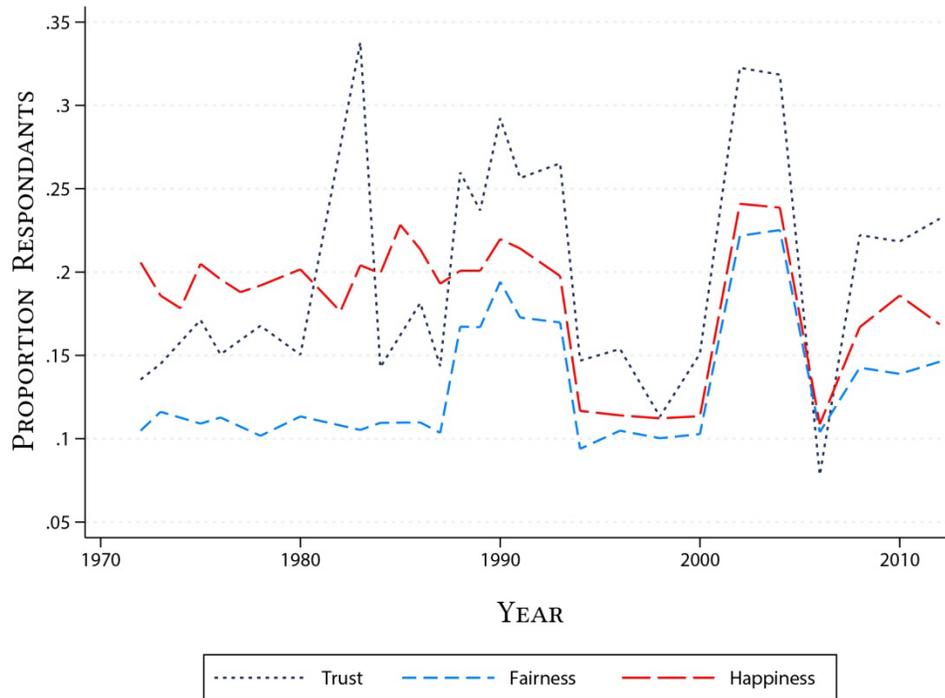
Figure 2.12: Trust, Fairness and Happiness, 1970-2010

Note: Data on all variables came from the General Social Survey (GSS). Fairness (GSS variable: *fair*) in the figure above represents the proportion of people that think other people are fair to them. Trust (GSS variable: *trust*) shows the proportion of subjects answering that people can be trusted. Happiness depicts the percent of people choosing the highest happiness category "very happy" to the 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?"
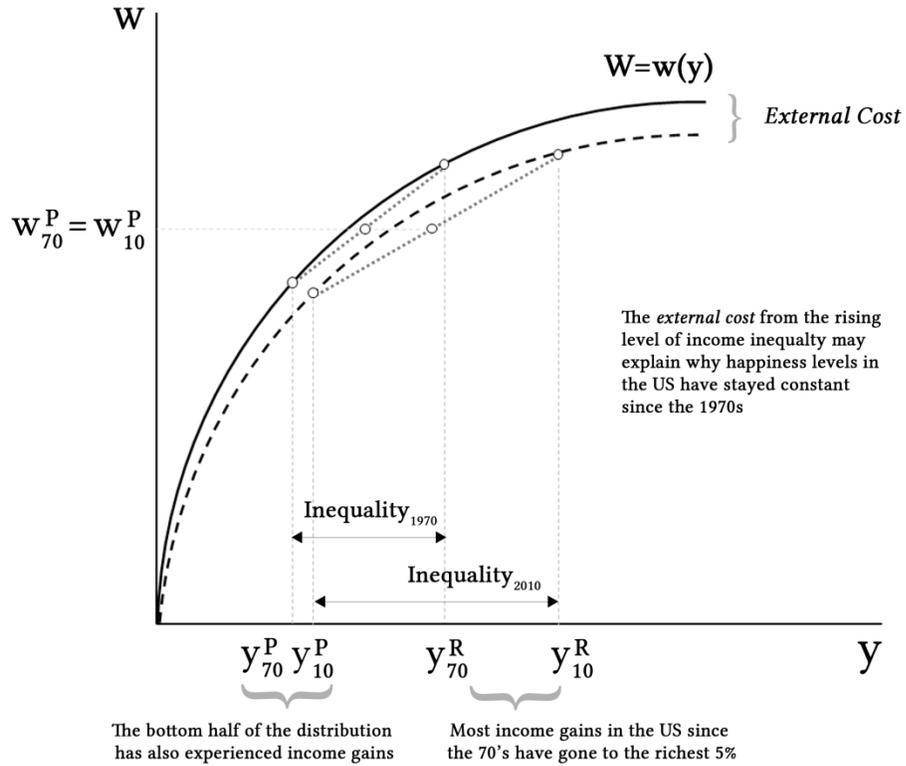
Figure 2.13: Economic Growth and the External Cost of Income Inequality
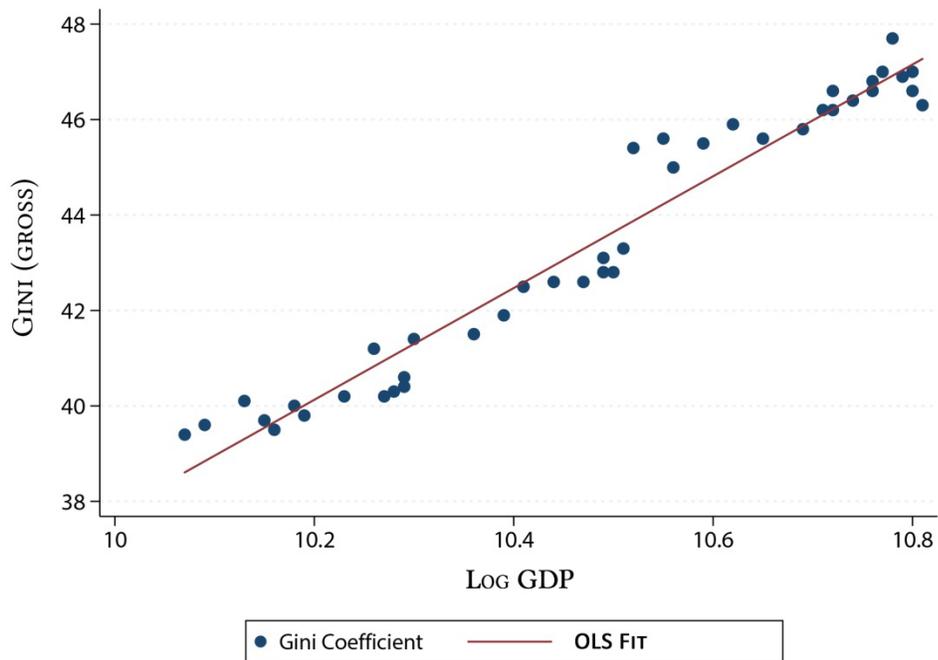
Figure 2.14: Partial Correlation Plot: Gini vs Log GDP per capita

Note: Gini represents gross gini ratios for households (all races). Data was obtained from the U.S. Department of Commerce: http://www.census.gov/hhes/www/income/data/historical/inequality/ Table H-4). Data on GDP per capita was obtained from the Bureau of Labor Statistics and represents constant 2011 dollars.
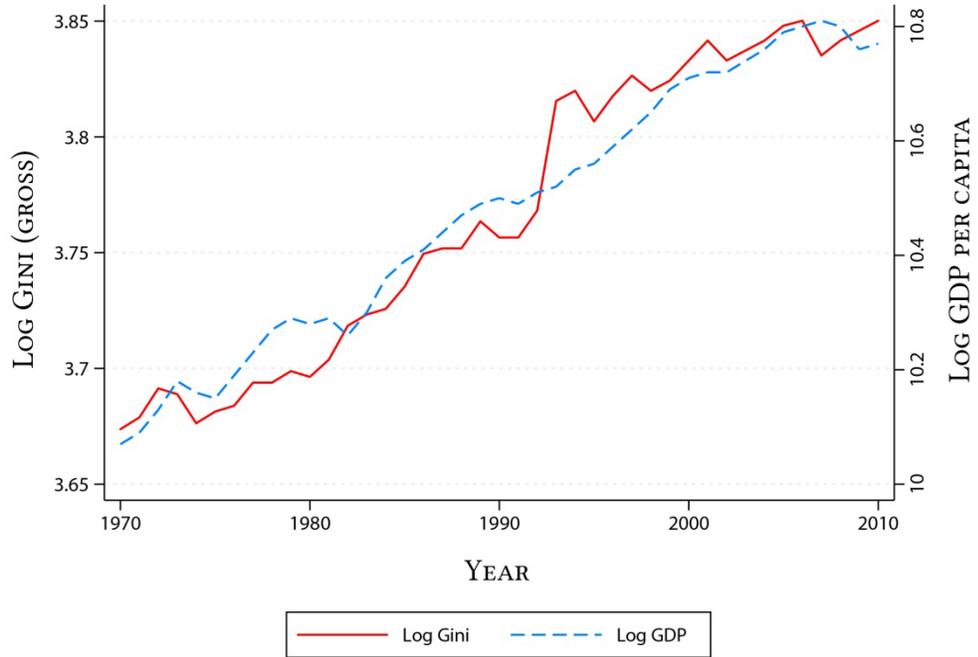
Figure 2.15: Log Gini and Log GDP, 1970-2010

Note: Gini represents gross gini ratios for households (all races). Data was obtained from the U.S. Department of Commerce: http://www.census.gov/hhes/www/income/data/historical/inequality/ Table H-4). Data on GDP per capita was obtained from the Bureau of Labor Statistics and represents constant 2011 dollars.
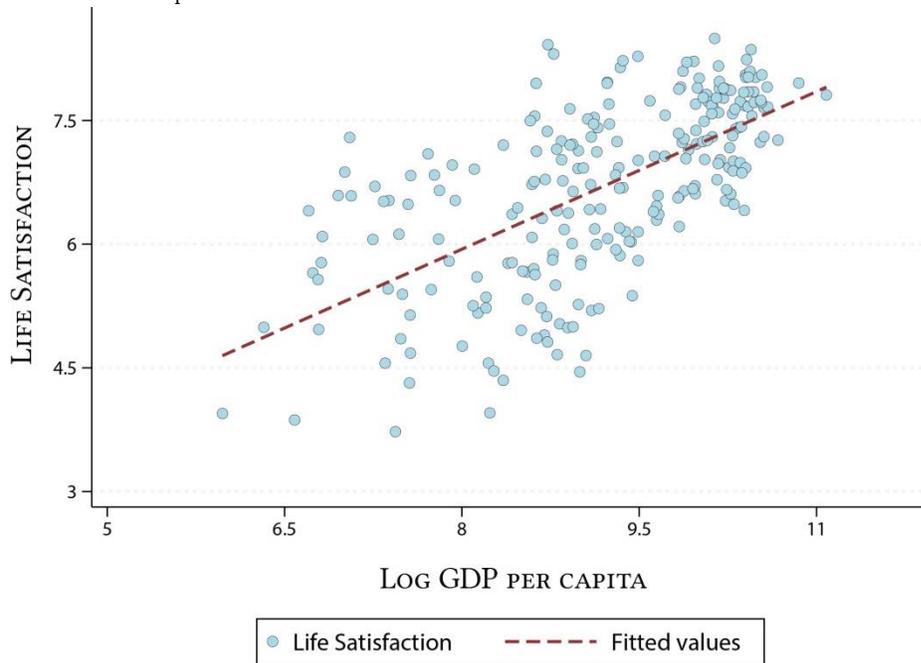
Figure 2.16: Life Satisfaction and Log GDP per capita

Note: Data on life satisfaction and was obtained from the World Value Survey and represents averages to the question: "All things considered, how satisfied are you with your life as a whole these days? Please use this card to help with your answer.[range of 1-10 with 1 labelled "Very dissatisfied" and 10 labelled "Very Satisfied"]" The plot represents a pooled sample from the last three waves of the WVS from 2000-2010. Data on GDP per capita (2005 constant dollars) was obtained from the Penn World Tables and was transformed to its logarithmic form.

Figure 2.17:

y_B

y_1^B — A — **Iso-elastic SWF $(0<\varepsilon<\infty)$**
convexity reflects *inequality* aversion

C

E

ξ

y_2^B — B — no *inequality* aversion
Utilitarian SWF $(\varepsilon=0)$

O $\quad y_1^A \quad \xi \quad\quad y_2^A \quad\quad y_A$

equivalently
distributed income
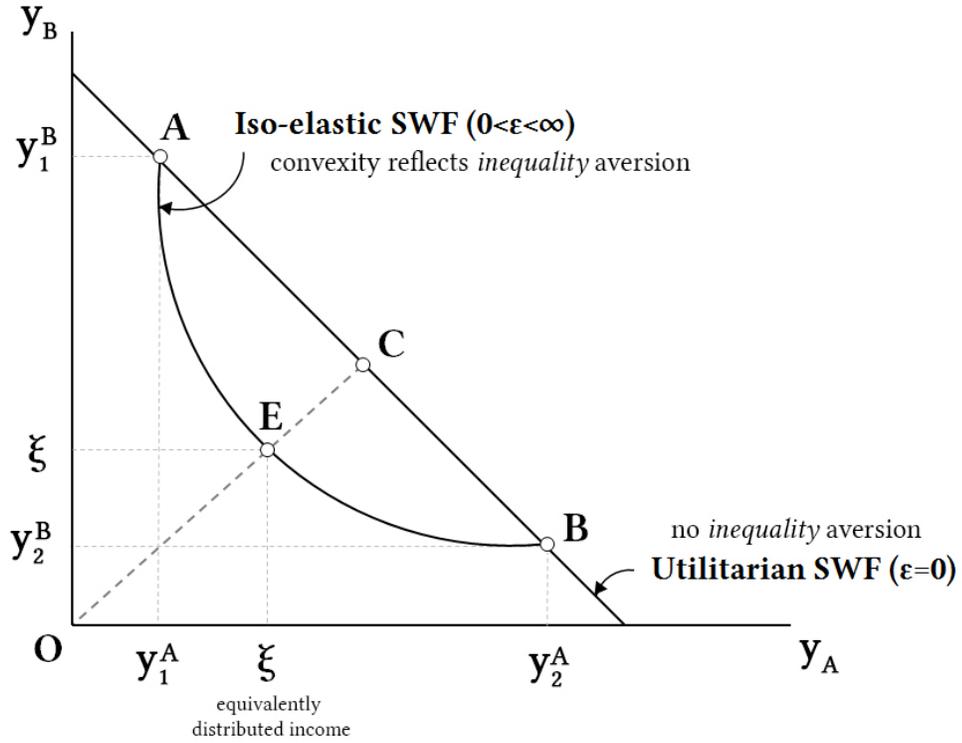
Figure 2.17: The Trade-off between Equality and Mean Income

Figure 2.18:

W

$W=f(y)$ $\begin{cases} W'(y)>0 \\ W''(y)<0 \end{cases}$

$\triangle W \begin{cases} W_{10}^P \\ W_{70}^P \end{cases}$

$\triangle W$ will depend on
the concavity of the
welfare function

Inequality$_{1970}$

Inequality$_{2010}$

$y_{70}^P \; y_{10}^P \quad\quad y_{70}^R \quad\quad y_{10}^R \quad\quad y$

The poorest 20% are earning less
today than they did in the 70s.

Most income gains in the US since
the 70's have gone to the richest 5%
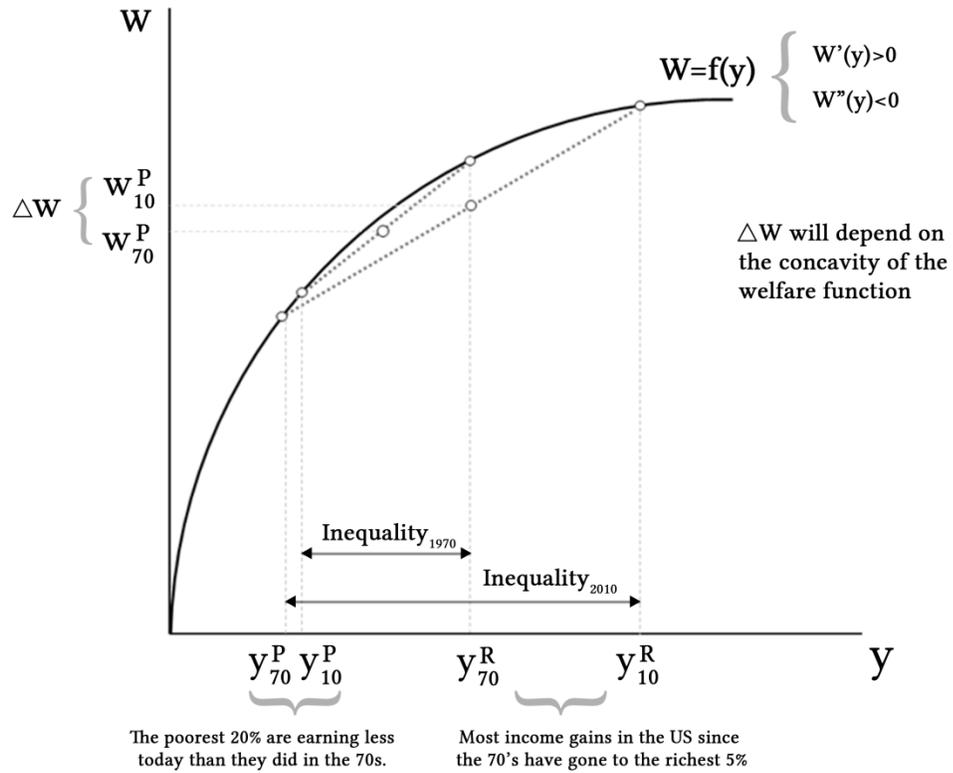
Figure 2.18: Economic Growth and Income Inequality

Table 2.1: Description and Sources of Main Variables

Macro Variables	Description	Source
GDP per capita	Real GDP per capita (billions of chained 2005 dollars)	Penn World Tables https://pwt.sas.upenn.edu/
Gini (Gross)	Gini coefficient measured on a scale from 0 'perfect equality' to 100 'perfect inequality'	U.S. Census, Historical Income Tables http://www.census.gov/hhes/www/income/data/historical/inequality/ Table H-4
Top Income Shares	Concentration of Income to the top 10 (1) percent of income earners	Picketty and Saez (2003) http://elsa.berkeley.edu/~saez/#income
Gini (Net)	Gini coefficient measured on a scale from 0 'perfect equality' to 100 'perfect inequality' net of taxes	Standardized World Income Inequality Database (Solt, 2009) http://myweb.uiowa.edu/fsolt/swiid/swiid.html
% Reduction Gini	[Gini (Gross)-Gini(Net)]/Gini(Gross)	Standardized World Income Inequality Database (Solt, 2009) http://myweb.uiowa.edu/fsolt/swiid/swiid.html
Quintile Income	Mean income received by each fifth and top five percent of households	U.S. Census, Historical Income Tables http://www.census.gov/hhes/www/income/data/historical/inequality/ Table H-3:All Races
Ratio Top/Bottom	Ratio of mean income earned by the top 5 percent of income earners to mean income of the bottom 20 percent of income earners	Own calculation based on quintile income above
Government Size	Total government current expenditures as a percentage of GDP.	U.S. Department of Commerce: Bureau of Economic Analysis
Unemployment Rate	Civilian unemployment rate: persons 16 years and older.	U.S. Department of Labor: Bureau of Labor Statistics
Log Gross Capital	Logarithmic transformation of gross fixed capital Formation (in billions of 2005 dollars)	OECD http://dx.doi.org/10.1787/na-data-en
Education	Percent of population (25 years of older) who have completed college	U.S. Census, Historical Time Series Tables http://www.census.gov/hhes/socdemo/education/data/cps/historical/index.html
Female Labor Force	Civilian labor force: females in the US (in thousands of persons)	US Department of Labor
KOF Globalization	Globalization index from 0 'least globalization' to 100 'most globalization'	KOF Index of Globalization http://globalization.kof.ethz.ch/
Immigration	Annual number of legal immigrants	Migration Policy Institute http://www.migrationinformation.org/datahub/historicaltrends.cfm

Micro Variables		
Happy	Data was collected with the 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?*" (1 'not too happy', 2 'pretty happy', 3 'very happy')	General Social Survey (GSS variable: *happy*) http://www3.norc.org/gss+website/
Income	Respondent's income (in 2005 constant dollars)	GSS variable: *conrinc*
Relative Income	y_i/y^* where y^* is median income for sample (by year)	Own calculations
Relative Position	Calculated using the following formula $(y_i-y^*)^2$ where y^* is	Own calculations

	median income for sample for each year	
Trust	Data was collected with the question: "*Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people*?" (0 'can trust', 1 'cannot trust')	GSS variable: *trust*
Fairness	*"Do you think most people would try to take advantage of you if they got a chance, or would they try to be fair?* (0 'take advantage' and 1 'fair')	GSS variable: *fair*
Age	Age in years	GSS variable: *age*
Sex	Gender dummy with 0 'male' and 1 'female'	GSS variable: *sex*
Race	Race dummy with 0 'white' and 1 'black'	GSS variable: *race*
Marital Status	Dummies for divorced, separated, and widowed (married is the base category)	GSS variable: *marital*
Educational Level	Dummies for high school, college, graduate school (less than high school is the base category)	GSS variable: *degree*
Employment Status	Dummy for unemployed	GSS variable: *wrkstat*

Table 2.2: Summary Statistics for Macroeconomic Variables

Macro Variables	Observations	Mean	St. Dev.	Min	Max
GDP per capita	41	36381	8306	23585	49571
Log GDP per capita	41	10.48	0.23	10.07	10.81
Gini (Gross)	41	43.34	2.76	39.40	47.00
Log Gini (Gross)	41	3.77	0.06	3.67	3.85
Gini (Net)	41	33.96	2.55	30.10	37.20
% Reduction Gini	36	22.40	1.12	20.54	25.92
Share Top 10%	41	38.11	5.08	31.51	46.26
Share Top 1%	41	12.15	3.75	7.74	18.33
Ratio Top/Bottom	41	20.63	3.97	16.00	26.00
Unemployment Rate	41	6.29	1.51	4.00	9.70
Percent College	41	21.00	5.53	11.00	29.90
KOF index	41	69.67	6.29	59.59	77.54
Government Size	41	0.20	0.02	0.18	0.25
Log Gross Capital	41	5.48	0.78	3.88	6.52
Female Labor Force	41	54.81	5.49	43.40	60.00
Immigration	41	770977	335371	370478	1826595

Table 2.3: Summary Statistics for Microeconomic Variables

Micro Variables	Observations	Mean	St. Dev.	Min	Max
Happiness	52321	2.19	0.64	1	3
Income	33365	31770	32367	383	434612
Log Income	33365	9.92	1.09	5.95	12.98
Relative Income (y/y^*)	33365	1.27	1.29	0.02	17.38
Relative Position $(y-y^*)^2$	33365	1.09E+09	6.63E+09	0.00E+00	1.66E+11
Age	56859	45.70	17.47	18.00	89.00
Age squared	56859	2394	1761	324	7921
Female (Male is base)	57061	0.56	0.50	0	1
Black (White is base)	57061	0.14	0.35	0	1
Marital (Married is base)					
Widowed	57041	0.10	0.30	0	1
Divorced	57041	0.12	0.33	0	1
Separated	57041	0.03	0.18	0	1
Never Married	57041	0.20	0.40	0	1
Education (Less than HS is base)					
High School	56896	0.51	0.50	0	1
Junior High	56896	0.05	0.23	0	1
College	56896	0.14	0.35	0	1
Graduate School	56896	0.07	0.25	0	1
Trust	37493	0.58	0.49	0	1
Fairness	35713	0.56	0.50	0	1

Note: y^* represents the median income in the sample by year.

Table 2.4: Estimates for ε using a Box-Cox transformation

Subgroup	λ			Observations	ε
All subjects	0.50	(.0791)	***	30398	0.50
Women	0.49	(.0913)	***	15473	0.51
Men	0.44	(.1783)	**	14925	0.56
White	0.49	(.0791)	***	24882	0.51
Black	0.60	(.3060)	**	3965	0.40
Strong Democrats	0.50	(.1425)	***	6554	0.50
Strong Republicans	0.71	(.2427)	***	444	0.29
Age>40	0.47	(.1176)	***	13822	0.53
Married	0.43	(.1074)	***	16687	0.57
Divorced	0.59	(.1741)	***	4300	0.41
Protestant	0.47	(.0767)	***	17216	0.53
No Religion	0.65	(.1589)	***	3697	0.35
High School	0.64	(.1137)	***	16366	0.36
College	0.66	(.1753)	***	5139	0.34
Graduate School	0.03	(.1991)	***	2549	0.97
Year ≤1980	0.81	(.1917)	***	5293	0.19
1980 <Year ≤1990	0.61	(.1306)	***	8782	0.39
1990 <Year ≤2000	0.52	(.1297)	***	9427	0.48
Year > 2000	0.35	(.0928)	***	6934	0.65

Table 2.5: Atkinson Inequality, Equivalent Income, and Social Welfare for selected values of ε, 1974-2010

(1) Year	(2) Mean Income	(3) Gini	(4) A (ε=.5)	(5) ξ (ε=.5)	(6) W (ε=.5)	(7) A (ε=1)	(8) ξ (ε=1)	(9) W (ε=1)
1974	$29,852	0.43	0.16	$24,977	316	0.34	$19,757	9.89
1975	$25,522	0.42	0.16	$21,407	293	0.34	$16,773	9.73
1976	$27,567	0.42	0.16	$23,208	305	0.33	$18,489	9.82
1977	$29,580	0.44	0.17	$24,492	313	0.34	$19,495	9.88
1978	$27,927	0.45	0.18	$22,997	303	0.36	$17,773	9.79
1980	$31,868	0.45	0.17	$26,317	324	0.35	$20,590	9.93
1982	$26,095	0.43	0.16	$21,903	296	0.34	$17,290	9.76
1983	$27,604	0.43	0.16	$23,175	304	0.34	$18,205	9.81
1984	$27,528	0.44	0.17	$22,911	303	0.35	$17,850	9.79
1985	$29,997	0.45	0.18	$24,727	314	0.36	$19,081	9.86
1986	$28,475	0.43	0.17	$23,744	308	0.35	$18,505	9.83
1987	$28,389	0.43	0.16	$23,757	308	0.35	$18,532	9.83
1988	$29,001	0.42	0.16	$24,461	313	0.33	$19,287	9.87
1989	$29,476	0.41	0.15	$24,987	316	0.33	$19,790	9.89
1990	$29,386	0.43	0.16	$24,686	314	0.33	$19,613	9.88
1991	$28,896	0.42	0.16	$24,242	311	0.34	$18,962	9.85
1993	$32,663	0.44	0.17	$27,067	329	0.35	$21,237	9.96
1994	$30,347	0.41	0.15	$25,776	321	0.32	$20,636	9.93
1996	$31,592	0.41	0.15	$26,923	328	0.31	$21,787	9.99
1998	$32,877	0.43	0.16	$27,633	332	0.33	$22,152	10.01
2000	$33,188	0.43	0.16	$27,781	333	0.34	$22,016	10.00
2002	$37,350	0.49	0.21	$29,345	343	0.41	$22,035	10.00
2004	$37,610	0.46	0.18	$30,807	351	0.37	$23,681	10.07
2006	$35,212	0.45	0.18	$28,889	340	0.36	$22,366	10.02
2008	$41,897	0.55	0.27	$30,740	351	0.47	$22,389	10.02
2010	$31,632	0.47	0.19	$25,523	320	0.40	$18,966	9.85
2012	$36,692	0.55	0.26	$27,060	329	0.47	$19,399	9.87

Table 2.6: Main Results

	(1)			(2)			(3)			(4)		
Log Income	0.0530	(.0036)	***	0.0365	(.0043)	***	0.0220	(.0066)	***	0.0322	(.0051)	***
Gini	-0.0033	(.0018)	*	-0.0054	(.0017)	***	-0.0062	(.0017)	***	-0.0063	(.0022)	**
Gini*Income							1.72E-08	(.0000)	**			
Trust										-0.0696	(.0070)	***
Fairness										0.0675	(.0066)	***
Unemployment Rate	-0.0138	(.0030)	***	-0.0124	(.0030)	***	-0.0125	(.0030)	***	-0.0157	(.0036)	***
Personal Characteristics												
Age	-0.0183	(.0016)	***	-0.0187	(.0016)	***	-0.0186	(.0016)	***	-0.0191	(.0017)	***
Age squared	0.0002	(.0000)	***	0.0002	(.0000)	***	0.0002	(.0000)	***	0.0002	(.0000)	***
Female	0.0784	(.0119)	***	0.0610	(.0114)	***	0.0641	(.0119)	***	0.0497	(.0108)	***
Black	-0.1318	(.0152)	***	-0.1184	(.0154)	***	-0.1175	(.0154)	***	-0.0948	(.0185)	***
Widowed	-0.3402	(.0135)	***	-0.3272	(.0139)	***	-0.3255	(.0140)	***	-0.3164	(.0229)	***
Divorced	-0.2854	(.0104)	***	-0.2764	(.0104)	***	-0.2747	(.0103)	***	-0.2812	(.0153)	***
Separated	-0.3505	(.0216)	***	-0.3365	(.0219)	***	-0.3360	(.0219)	***	-0.3251	(.0319)	***
Never Married	-0.2300	(.0187)	***	-0.2308	(.0184)	***	-0.2288	(.0186)	***	-0.2456	(.0209)	***
Unemployed				-0.2126	(.0236)	***	-0.2130	(.0235)	***	-0.2157	(.0278)	***
High School				0.0482	(.0116)	***	0.0482	(.0117)	***	0.0272	(.0156)	*
Junior College				0.0773	(.0192)	***	0.0770	(.0193)	***	0.0424	(.0223)	*
Bachelor Degree				0.1215	(.0125)	***	0.1168	(.0129)	***	0.0754	(.0203)	***
Graduate Degree				0.1235	(.0184)	***	0.1119	(.0191)	***	0.0580	(.0267)	**
R-Squared	0.0687			0.0767			0.0773			0.0869		
Observations	29298			29260			29260			18783		

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. Since the regressions include aggregated variables over time, the standard errors are clustered around year. All estimates are pooled OLS. The categories 'male', 'white', 'married', and 'less than high school' were omitted because they are used as a base in their respective category.

Table 2.7: Alternative Measures of Inequality

	(1)			(2)			(3)			(4)		
Log Income	0.0366	(.0043)	***	0.0365	(.0043)	***	0.0365	(.0043)	***	0.0366	(.0043)	***
Gini (Net)	-0.0066	(.0017)	***									
Top 1%				-0.0038	(.0011)	***						
Top 10%							-0.0030	(.0008)	***			
Ratio										-0.0038	(.0011)	***
Controls	YES			YES			YES			YES		
R-Squared	0.0767			0.0766			0.0767			0.0767		
Observations	29260			29260			29260			29260		

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. Since the regressions include aggregated variables over time, the standard errors are clustered around year. All estimates are pooled OLS, and include controls for age, quadratic age, sex, race, marital status, unemployment rate, education level, and a dummy whether the person is unemployed. The categories 'male', 'white', 'married', and 'less than high school' were omitted because they are used as the base in their respective category. Gini (net) came from the World Inequality Standardized Dataset (Solt, 2008). The variable Top 1% (10%) represents the share of income that goes to the top one (ten) percent of income earners, and was collected from Picketty & Saez (2003). Updated data series covering the period 1920-2010 can be found on the website of Emanuel Saez, Table A.3. Website: http://elsa.berkeley.edu/~saez/#income. The variable Ratio measures the ratio between the average income of the top five percent of income earners and the bottom twenty percent. Data was obtained from the U.S. Department of Commerce: http://www.census.gov/hhes/www/income/data/historical/inequality/ Table H-3:All Races).

Table 2.8: The Effect of Inequality for Selected Subgroups

	Sex				Race			
	Male		Female		White		Black	
Log Income	0.0503	***	0.0272	***	0.0387	***	0.0388	***
	(.0065)		(.0060)		(.0043)		(.0127)	
Gini	-0.0020		-0.0091	***	-0.0062	***	0.0098	
	(.0033)		(.0021)		(.0021)		(.0064)	
	Education				**Political Affiliation**			
	Low Education		High Education		Democrats		Republicans	
Log Income	0.0342	***	0.0635	***	0.0347	***	0.0315	***
	(.0045)		(.0142)		(.0091)		(.0060)	
Gini	-0.0062	***	-0.0113	***	-0.0076	*	-0.0047	*
	(.0020)		(.0051)		(.0042)		(.0025)	

Note: ***(**)[*] indicate significance at p<.00(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. Since the regressions include aggregated variables over time, the standard errors are clustered around year. All estimates are pooled OLS, and include controls for age, quadratic age, sex, race, marital status, unemployment rate, education level, and a dummy whether the person is unemployed. The categories 'male', 'white', 'married', and 'less than high school' were omitted because they are used as the base in their respective category. The regressions estimate the effect of inequality and income for various subsamples. 'Low Education' depicts subjects with high school degree or lower and 'High Education' includes subjects with college degree or higher. 'Democrats' represents people who consider themselves 'strong democrats' (GSS variable: *partyid*), and 'Republicans' represent those who think of themselves as 'strong republicans.'

Table 2.9: The Effect of Inequality over Time

	≤ 80			80 < Year ≤ 90			90 < Year ≤ 00			Year > 00		
Log Income	0.0167	(.0082)	*	0.0476	(.0092)	***	0.0301	(.0039)	***	0.0462	(.0071)	***
Gini (Net)	0.0738	(.0033)	***	-0.0495	(.0030)	***	-0.0186	(.0008)	***	-0.0466	(.0074)	***
Controls	YES			YES			YES			YES		
R-Squared	0.0799			0.0716			0.08			0.0935		
Observations	5286			7905			8493			7576		

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. Since the regressions include aggregated variables over time, the standard errors are clustered around year. All estimates are pooled OLS, and include controls for age, quadratic age, sex, race, marital status, unemployment rate, education level, and a dummy whether the person is unemployed. The categories 'male', 'white', 'married', and 'less than high school' were omitted because they are used as the base in their respective category. The regressions estimate the effect of inequality and income for four time periods in the sample: (1) '1974-1980', (2) '1981-1990', (3) '1991-2000', and (4) '2001-present'.

Table 2.10: Attitudes over Time, General Social Survey

	< 80	80 < Year < 90	90 < Year < 00	Year > 00
Most people 'cannot be trusted'	0.15	0.22	0.20	0.22
Most people 'would take advantage of you'	0.11	0.13	0.14	0.15
Taxes on rich are 'too low'	n/a	0.58	0.39	0.49
'Hardly any' confidence in government	0.26	0.29	0.34	0.36
Government should 'reduce differences'	3.66	3.65	3.73	3.72

Note: Data on all variables were obtained from the General Social Survey (GSS variables: *trust*, *fair*, *taxrich*, *confed*, and *eqwlth*). The first four rows represent proportion of respondents. The last row shows averages with 1 'strongly agree' that government should reduce income difference, and 7 'no action'.

Table 2.11: Robustness Check

	(1)			(2)			(3)			(4)		
Log Income	0.0710	(.0075)	***	0.0387	(.0043)	***	0.0366	(.0044)	***	0.0003	(126.08)	***
Gini	-0.0088	(.0032)	***	-0.0063	(.0018)	***	-0.0037	(.0007)	***	-0.0057	(12.87)	***
Unemployment Rate	-0.0246	(.0049)	***	-0.0137	(.0028)	***	-0.0094	(.0003)	***	-0.0124	(24.75)	***
Personal Characteristics												
Age	-0.0368	(.0033)	***	-0.0221	(.0019)	***	-0.0188	(.0016)	***	-0.0190	(125.15)	***
Age squared	0.0004	(.0000)	***	0.0003	(.0000)	***	0.0002	(.0000)	***	0.0002	(143.47)	***
Female	0.1183	(.0146)	***	0.0687	(.0084)	***	0.0606	(.0114)	***	0.0677	(80.17)	***
Black	-0.2360	(.0206)	***	-0.1197	(.0118)	***	-0.1185	(.0156)	***	-0.1171	(124.26)	***
Widowed	-0.6362	(.0379)	***	-0.3613	(.0218)	***	-0.3289	(.0143)	***	-0.3247	(278.90)	***
Divorced	-0.5376	(.0206)	***	-0.2975	(.0118)	***	-0.2775	(.0105)	***	-0.2744	(678.78)	***
Separated	-0.6485	(.0371)	***	-0.3587	(.0214)	***	-0.3367	(.0220)	***	-0.3351	(308.66)	***
Never Married	-0.4483	(.0191)	***	-0.2561	(.0109)	***	-0.2306	(.0186)	***	-0.2280	(545.79)	***
Unemployed	-0.4073	(.0363)	***	-0.2299	(.0210)	***	-0.2118	(.0236)	***	-0.2117	(128.68)	***
High School	0.0885	(.0207)	***	0.0420	(.0119)	***	0.0473	(.0116)	***	-0.0464	(19.16)	***
Junior College	0.1454	(.0331)	***	0.0716	(.0190)	***	0.0762	(.0194)	***	0.0279	(3.73)	***
Bachelor Degree	0.2334	(.0260)	***	0.1136	(.0149)	***	0.1210	(.0125)	***	0.0658	(43.65)	***
Graduate Degree	0.2390	(.0314)	***	0.1226	(.0180)	***	0.1231	(.0185)	***	0.0591	(18.70)	***
λ										0.5000	(0.08)	***
/cut1	-1.9438	0.1707										
/cut2	-0.1106	0.1704										
Year dummies							YES					
R-Squared	0.0434			0.0767			0.0778			0.0869		
Observations	29260			29260			29260			18783		

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. Since the regressions include aggregated variables over time, the standard errors are clustered around year. Model (1) estimates an ordered probit model. Model (2) estimates robust regression using iteratively reweighted least squares. Model (3) is an OLS regression with robust standard errors and includes dummies for each year. Model (4) uses a maximum likelihood procedure and a Box-Cox transformation on the income variable (χ^2 values are reported in parenthesis). The categories 'male', 'white', 'married', and 'less than high school' were omitted because they are used as the base in their respective category.

Table 2.12: Additional Robustness, Relative Income

	(1)			(2)			(3)			(4)		
Log Income	0.0255	0.0050	***	0.0374	0.0040	***	0.0369	0.0041	***	0.0249	0.0052	***
Gini (Net)							-0.0059	0.0016	***	-0.0061	0.0016	***
Relative Income (y/y*)	0.0200	0.0039	***							0.0198	0.0044	***
Relative Position				8.68E-12	(2.09E-12)	***	8.31E-12	(2.34E-12)	***			
Rel Position*Income				-2.05E-17	(5.19E-18)	***	-1.97E-17	(5.59E-18)	***			
Controls	YES			YES			YES			YES		
R-Squared	0.0767			0.0766			0.0767			0.0767		
Observations	30398			30398			29260			29260		

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. Since the regressions include aggregated variables over time, the standard errors are clustered around year. Relative income is defined as y_i/y^* where y^* is median income for each year. Relative position is defined as $(y_{it}- y_t^*)^2$ where y^* is median income for each year. All estimates include controls for age, quadratic age, sex, race, marital status, unemployment rate, education level, and a dummy = 1 if the person is unemployed. The categories 'male', 'white', 'married', and 'less than high school' were omitted because they are used as the base in their respective category.

Table 2.13: Net Gain from Economic Growth, 1974-2010

Year	mean Y	Ψ	actual Δ ($)	actual GINI	actual Δ GINI	Offset GDP	Net Gain Year	Cumulative Gain
1975	22433	3788	-267	32.7	0.1	379	-646	-646
1976	23408	3876	975	32.8	0.1	388	587	-58
1977	24239	3933	832	33.2	0.4	1573	-741	-799
1978	25323	4021	1083	33.3	0.1	402	681	-118
1979	25827	4053	504	33.5	0.2	811	-306	-425
1980	25459	4042	-368	33.1	-0.4	-1617	1249	824
1981	25847	4059	388	33.4	0.3	1218	-830	-6
1982	25104	3969	-743	34	0.6	2382	-3125	-3131
1983	26001	4043	897	34	0	0	897	-2234
1984	27626	4158	1625	34.2	0.2	832	794	-1440
1985	28514	4191	888	34.8	0.6	2514	-1626	-3066
1986	29236	4203	722	35.5	0.7	2942	-2221	-5287
1987	29903	4258	667	35.3	-0.2	-852	1519	-3768
1988	30850	4307	947	35.5	0.2	861	86	-3682
1989	31651	4317	801	36.2	0.7	3022	-2220	-5903
1990	31886	4348	235	35.9	-0.3	-1304	1539	-4364
1991	31391	4341	-495	35.5	-0.4	-1736	1241	-3123
1992	32027	4350	637	36	0.5	2175	-1538	-4661
1993	32515	4216	488	38.9	2.9	12227	-11739	-16400
1994	33432	4230	917	39.5	0.6	2538	-1621	-18021
1995	33871	4291	439	38.8	-0.7	-3003	3442	-14579
1996	34730	4304	859	39.3	0.5	2152	-1293	-15872
1997	35847	4349	1117	39.4	0.1	435	683	-15190
1998	36975	4404	1128	39.3	-0.1	-440	1569	-13621
1999	38319	4423	1344	39.9	0.6	2654	-1310	-14931
2000	39469	4429	1150	40.5	0.6	2658	-1508	-16439
2001	39487	4406	18	40.9	0.4	1762	-1744	-18183
2002	39813	4442	326	40.5	-0.4	-1777	2103	-16081
2003	40444	4489	631	40.1	-0.4	-1796	2427	-13654
2004	41467	4498	1023	40.5	0.4	1799	-776	-14430
2005	42347	4501	880	40.9	0.4	1801	-920	-15350
2006	43063	4511	715	41.1	0.2	902	-187	-15537
2007	43454	4634	391	39.4	-1.7	-7877	8269	-7268
2008	42909	4557	-545	40.3	0.9	4102	-4647	-11915
2009	41056	4491	-1853	40.4	0.1	449	-2302	-14217
2010	41943	4565	886	39.7	-0.7	-3196	4082	-10135

Note: ψ represents the marginal rate of substitution between personal income and the general level of inequality measured by the gross Gini coefficient. The calculations in this table are based on model (3) in Table 2.6 (Main Results). The table tests the hypothesis that ε=1, i.e., the relationship between happiness and income is log-linear, i.e. linear in u=log(y).

Table 2.14: Equality-Efficiency Trade-off in the US, 1970-2010

	(1)			(2)			(3)			(4)		
Log GDP	2.6724	(3.6621)		15.2132	(6.1006)	**	2.3657	(.2258)	***	0.3550	(.0066)	***
Education	0.1736	(.1237)		-0.0449	(.1916)		0.1822	(.0539)	***	-0.0060	(.0014)	***
KOF index	0.3384	(.0756)	***	0.3422	(.1222)	***	0.3442	(.0524)	***	0.0033	(.0016)	**
Female Labor Force	-0.1604	(.0556)	***	-0.3842	(.0785)	***	-0.1625	(.0473)	***	-0.0008	(.0014)	
Immigration	-5.11E-07	(2.60E-07)	**	8.81E-07	(5.53E-07)		-5.11E-07	(2.45E-07)	**	-1.31E-08	(5.03E-09)	***
Observations	40			40			40			40		
R squared	0.9692			0.9655			0.9692			0.9956		

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. Model (1) presents an OLS estimates with clustered errors around year. Model (2) uses the same specification as model (1) but for the dependent variable uses the concentration of income in the top 1 percent of income earners. Model (3) presents a two stage least squares estimate. Only the second stage is reported. In the first stage, log GDP per capita is regressed on gross fixed capital formation, mean years of schooling, share of total government expenditure (% of GDP) and its quadratic. Finally, model (4) uses a two stage least squares estimation but for the dependent variable log Gini.

Table 2.15: Net Gain from Economic Growth, 1974-2010 (accounting for trade-off)

Year	Mean Y	Ψ	Actual Δ ($)	Actual GINI	Exp. Δ GINI	Offset GDP	Net Gain Year	Cumulative Gain
1975	22433	3788	-267	32.7	-0.03	-107	-160	-160
1976	23408	3876	975	32.8	0.10	382	593	433
1977	24239	3933	832	33.2	0.08	319	513	945
1978	25323	4021	1083	33.3	0.10	407	676	1622
1979	25827	4053	504	33.5	0.05	187	317	1939
1980	25459	4042	-368	33.1	-0.03	-138	-230	1709
1981	25847	4059	388	33.4	0.04	144	244	1953
1982	25104	3969	-743	34	-0.07	-278	-465	1488
1983	26001	4043	897	34	0.08	330	567	2055
1984	27626	4158	1625	34.2	0.14	579	1046	3101
1985	28514	4191	888	34.8	0.07	309	579	3681
1986	29236	4203	722	35.5	0.06	245	476	4157
1987	29903	4258	667	35.3	0.05	225	442	4599
1988	30850	4307	947	35.5	0.07	313	634	5233
1989	31651	4317	801	36.2	0.06	259	543	5776
1990	31886	4348	235	35.9	0.02	76	159	5935
1991	31391	4341	-495	35.5	-0.04	-162	-333	5602
1992	32027	4350	637	36	0.05	205	432	6034
1993	32515	4216	488	38.9	0.04	150	338	6372
1994	33432	4230	917	39.5	0.06	274	642	7015
1995	33871	4291	439	38.8	0.03	131	307	7322
1996	34730	4304	859	39.3	0.06	252	607	7929
1997	35847	4349	1117	39.4	0.07	321	797	8726
1998	36975	4404	1128	39.3	0.07	318	810	9536
1999	38319	4423	1344	39.9	0.08	367	977	10513
2000	39469	4429	1150	40.5	0.07	305	844	11357
2001	39487	4406	18	40.9	0.00	5	13	11371
2002	39813	4442	326	40.5	0.02	86	240	11610
2003	40444	4489	631	40.1	0.04	166	465	12076
2004	41467	4498	1023	40.5	0.06	263	761	12837
2005	42347	4501	880	40.9	0.05	221	659	13496
2006	43063	4511	715	41.1	0.04	177	538	14034
2007	43454	4634	391	39.4	0.02	99	293	14326
2008	42909	4557	-545	40.3	-0.03	-137	-408	13918
2009	41056	4491	-1853	40.4	-0.11	-479	-1373	12545
2010	41943	4565	886	39.7	0.05	228	658	13203

Note: ψ represents the marginal rate of substitution between personal income and the general level of inequality measured by the gross Gini coefficient. The calculations in this table are based on model (3) in Table 2.6: Main Results. The table tests the hypothesis that ε=1, i.e., the relationship between happiness and income is log-linear. Expected Δ GINI is estimated using the results from model (3) in Table 14: Equality and Efficiency Trade-off in the US, 1970-2010.

Table 2.16: Net Gain by Income Quintile, 1974-2010 (accounting for possible trade-off)

Year	q1	Gain q1	q2	Gain q2	q3	Gain q3	q4	Gain q4	q5	Gain q5
1975	10553	-161	25924	-916	42532	-1149	61803	-1521	109117	-3345
1976	10811	-16	26468	-573	43527	-431	63211	-411	111876	-917
1977	10743	-79	26444	-588	43742	-276	64091	287	114293	1220
1978	11029	75	27086	-179	44724	439	65516	1422	116968	3595
1979	10777	-120	26806	-358	44196	55	64857	898	116394	3085
1980	10216	-396	25426	-1219	41956	-1548	61811	-1497	110209	-2351
1981	9882	-561	24617	-1720	40781	-2385	60790	-2298	108588	-3773
1982	9689	-734	24518	-1782	40585	-2524	60360	-2635	110706	-1905
1983	9908	-591	24889	-1550	41150	-2119	61751	-1537	113374	457
1984	10213	-399	25439	-1204	42156	-1394	63473	-168	116712	3426
1985	10188	-500	25818	-964	42855	-885	64464	624	120414	6741
1986	10279	-532	26440	-564	44245	138	66654	2394	126160	11929
1987	10539	-340	26783	-344	44779	531	67685	3229	128721	14246
1988	10673	-236	26939	-244	45056	736	68109	3573	130028	15431
1989	11019	15	27415	66	45570	1119	68932	4244	134748	19739
1990	10710	-202	26946	-237	44507	333	67104	2763	130225	15633
1991	10362	-364	26028	-824	43233	-599	65904	1795	126376	12157
1992	10098	-481	25303	-1285	42629	-1040	65439	1421	126798	12538
1993	9946	-616	25215	-1341	42266	-1309	65685	1621	136850	21777
1994	10162	-422	25325	-1270	42663	-1014	66389	2199	139569	24285
1995	10693	-54	26137	-739	43704	-237	67184	2851	140202	24868
1996	10700	-73	26263	-657	44175	117	68370	3830	143799	28197
1997	10752	-141	26881	-249	45223	908	70044	5217	149333	33342
1998	11048	-40	27897	429	46679	2014	72193	7007	152767	36541
1999	11622	410	28537	860	47767	2848	74344	8812	158539	41947
2000	11518	263	28760	1011	47893	2945	74451	8903	161334	44572
2001	11179	52	28090	559	47017	2273	73720	8287	160996	44255
2002	10845	-184	27575	214	46467	1853	73090	7760	156050	39626
2003	10608	-360	27250	-2	46257	1693	73219	7867	156084	39658
2004	10589	-349	27094	-106	45906	1426	72383	7168	156536	40081
2005	10655	-333	27357	70	46301	1728	72825	7539	159583	42941
2006	10998	-89	27879	422	46718	2048	73947	8483	162921	46081
2007	10878	-179	27727	321	47058	2306	74503	8950	158187	41652
2008	10574	-300	26776	-310	45477	1107	72354	7152	155173	38834
2009	10513	-332	26626	-410	45079	805	71616	6536	155478	39119
2010	9880	-776	25640	-1054	44150	107	70770	5833	151884	35771
Δ Y	-6.38%		-1.10%		3.80%		14.51%		39.19%	
Gain per Year		-31		-42		4		233		1431

The calculations in this table are based on model (3) in Table 2.6: Main Results. The table tests the hypothesis that ε=1, i.e., the relationship between happiness and income is log-linear, u=log(y). Expected Δ GINI is estimated using the results from model (3) in Table 14: Equality and Efficiency Trade-off in the US, 1970-2010. Data on mean quintile income was obtained from the U.S. Department of Commerce: http://www.census.gov/hhes/www/income/data/historical/inequality/ Table H-3:All Races).

Chapter 3

Estimating the Non-monetary Returns from Higher Education

3.1 Introduction

Education is widely acknowledged by economists as one of the most important investments in human capital that helps individuals acquire knowledge, cognitive skills, intellectual disposition, and practical competences that allow them to participate actively and more productively in social and economic life. Hundreds of academic studies show that more educated people have better job opportunities, greater labor force flexibility, are less likely to be affected by unemployment trends, live longer and healthier lives, and ultimately receive higher salaries and lifetime earnings. Over the last century, massive public and private investment has transformed the educational system in the United States from an institution serving the privileged elite to an institution that is universally available. In 1940, for example, less than five percent of the US population had a bachelor's degree and less than a quarter of all Americans finished high school. Today more than a third of all Americans are university educated, and high school is considered a minimum credential to find a job.

In the past few years, however, the value of higher education has been increasingly questioned. One of the reasons for this skepticism is the unprecedented increase in college tuition.[1] The popular press attributes this dynamic growth in the price of higher education to a speculative bubble.[2] More and more students are taking on an increasing amount of debt to pay inflated tuition because of the belief that education will provide them with a better life. Yet, amidst the worst economic crisis since the 1930s, many Americans find themselves without the jobs and salaries necessary to justify paying the ever increasing price of college tuition (Vedder, 2011).[3]

Research in happiness economics has also produced mixed results on the relationship between higher education and subjective well-being with some studies suggesting that the relationship is strictly negative. One possible explanation is that education makes people more ambitious which might reduce life satisfaction since higher aspirations are more difficult to fulfill. College graduates, for instance, are known to experience higher levels of stress related to unemployment than their less educated counterparts.

In the past several decades, however, a countless number of studies in psychology, sociology, economics, and even epidemiology have recognized that education helps students develop a multitude of skills that provide many tangible and intangible benefits that go beyond the higher earning capacity of individuals. The list of these non-monetary benefits is generally related to greater enjoyment from learning and

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[1] Just in the past three decades the cost to attend a private university has climbed by more than 650 percent. This number is even more staggering for public institutions – a rise of 850 percent. As a comparison, the average sales price of a new home increased by 280 percent between 1980 and the peak of the housing bubble in 2007.

[2] For example, see Schumpeter (2010), Harris (2011), Vedder (2010), and French (2011).

[3] For the first time in history, student loan debt has now surpassed credit card debt reaching close to $1 trillion. And while more than 45 percent of all students that start college never graduate, the ones that do have on average $24,000 in student loans. This is more than twice the amount of debt in 1992 when the Higher Education Act increased access to federal funding. In addition, of the 3.6 million borrowers who began repaying their loans in the fiscal year 2009, 8.8 percent defaulted within 2 years.

working, better health, marriage, and parenting outcomes, higher quality of interpersonal relationships, a stronger social network, and greater engagement in community and civic life. Throughout this chapter, I refer to these effects as the indirect non-monetary returns to higher education. I call the financial return from a higher degree the indirect monetary return.

Although this literature is vast, it is rather scattered and fragmented and at best most studies only suggest possible relationships and outcomes. The results are always uncertain because it is difficult to isolate the effect of education from other factors such as socioeconomic background, native ability, or the natural process of maturation. In addition, an important question that is often neglected is how large are the non-monetary returns from education and at what level of educational attainment they are realized. Usually studies report the outcomes in terms of standard deviations or probabilities, which is less intuitive for policy analysis.[4]

My goal in this study is to provide some rough estimates of the magnitude of the direct and indirect non-monetary benefits from education and to suggest some possible channels through which higher education may improve the quality of life of individuals beyond higher earning potential. My approach differs from previous studies in several ways. First, the backbone of my analysis is based on subjective well-being data which has become more accepted in the economic literature in recent years (see Chapter 1 for a thorough discussion). Second, I estimate the effect for four different levels of educational attainment – less than high school, high school, college, and graduate school. Since an increasing number of Americans pursue advanced degrees today (beyond a college diploma), it is important to understand the incremental

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[4]For example a typical study on the effect of educational attainment on life satisfaction reports the beta coefficients from an ordered probit (or logit) model which are interpreted as the change in the probability of "the event" (e.g. reporting oneself in the highest happiness category "very happy") for every 1-unit increase in X (e.g. additional year of schooling) where the probability is determined by a z-score for a cumulative normal distribution (e.g., $Pr(z < 1.645) = .55$). While such results are informative about the general relationship, they provide little advice to policy makers who may want to compare different policy alternatives using more straightforward measures.

non-monetary benefits associated with each level of educational attainment and not just the return from a college degree as in most previous studies. Third, instead of concentrating on particular outcomes, I take a more holistic approach and try to present a large amount of evidence that, in its totality, will hopefully be convincing. Fourth, I investigate how the relative strengths of these indirect effects vary across different subgroups of the population (e.g., between males and females) and over time. Finally, my goal is to suggest some possible ways in which education works. That is, not only to show what education achieves, but also to suggest how such outcomes are reached. For example, education leads to greater job satisfaction, perhaps by changing students' attitudes toward work, making them more goal oriented or hard working. Such questions are largely under researched in the economic literature which often treats education as a black box: "individuals enter, something happens, and productivity (usually one dimensional skill) increases" (Oreopoulos and Salvanes, 2011, p.1).

As I argue in this paper, an important way in which education works is to equip students with critical thinking, congitive disposition, and interpersonal skills that help them adapt faster to the ever changing environment around them and to build a strong social network. Education changes people's values and interests in a way that makes them more open-minded for alternative ideas and lifestyles, more moderate in their expectations, and less likely to engage in damaging personal habits. Education may also change individuals' values in a way that helps people get greater satisfaction from friendships, hobbies, accomplishment at work, and participating in community life.

Using subjective well-being data from the General Social Survey (GSS), I first confirm that higher education is associated with large non-monetary benefits that go beyond the financial return from a better paid job. In fact, more education is positively and significantly correlated with happiness even after controlling for a large

set of individual characteristics including condition of health, marital status, and personal unemployment. I argue that the remaining portion of the non-pecuniary return is associated with improvement of social networks – from volunteering and trusting others to hosting a dinner party and having more hobbies.

The monetary equivalent of these non-pecuniary returns in terms of higher subjective well-being is substantial and, in many cases, is much larger than the financial one. A person with only a high-school degree, for instance, would have to earn \$41,683 more a year to be equally as happy as a person with a college degree that has a similar socioeconomic background. These returns vary across the different subgroups of the population. For example, the effect of education on subjective well-being is three times as strong for women as it is for men. The evidence also suggests that the non-monetary return has increased over the past several decades, which may explain, at least partially, the rapid increase in the demand for college education that has driven college tuition up to unprecedented levels.

The lion's share of these large non-monetary benefits is earned in college while most of the return from attending graduate school is associated with higher income. In fact, the empirical analysis suggests that pursuing a graduate degree, and earning a potentially higher salary, may come at the expense of some non-monetary benefits, especially those associated with stronger community ties – greater civic engagement and balancing social and work life.

Previous criticisms that education lowers subjective well-being by raising aspirational levels and expectations for future job outcomes are found to be controversial. Although a direct measure of aspirations is difficult to find, I show that a more optimistic outlook toward life is positively correlated with happiness. Further, survey data show that more educated people tend to be less pessimistic and more moderate when answering questions about their future. This is consistent with the results of previous studies which find that more educated people tend to display less myopic

behavior.

To provide additional evidence, I estimate non-parametrically the concavity of the utility function for different levels of educational attainment. This allows me to make inferences about the marginal value of an additional dollar of income and the measures of inequality and risk aversion of people with different levels of educational attainment. I find that more educated people tend to value income less, and are more inequality and risk averse than are less educated people. In particular, people with graduate degrees tend to show extreme risk and inequality aversion. This is consistent with survey data which shows that people with higher educational attainment are willing to sacrifice a higher share of their income to create a more equal society, are less likely to engage in risky behaviors such as smoking, and value friends, hobbies, and achievement at work more than monetary rewards.

A structural equation model provides further confidence in the results from the main analytical part of this study and confirms that the direct effect of higher education on subjective well-being is positive, although statistically insignificant, while the indirect effect of education through better health, more stable marriages, lower likelihoods of unemployment, more enjoyable jobs, and stronger social networks is much larger and significant. This indirect effect of education on happiness is found to be thirteen times larger than the direct one and should not be neglected by economists. It is also larger than the combined direct and indirect effect of higher earnings associated with a higher degree that allow people to live a more productive, healthier, and happier life through maximizing free choice in many realms of life.

I further investigate the effects of social mobility on happiness. I find that education is a strong predictor of social mobility although social mobility, once I control for the current level of income, does not seem to be significantly correlated with subjective well-being. People who start from a lower social class tend to benefit far more from formal education than those with a better start in life. In addition, rela-

tive income and socioeconomic status, which are strongly correlated with educational attainment, tend to be an important determinant of subjective well-being.

Finally, I compare the effect of educational attainment on subjective well-being between the United States and Europe. Although similar patterns are discovered, the non-monetary benefits from education are found to be much smaller in Europe. Higher educational attainment in Europe tends to have a stronger direct effect on subjective well-being and an almost negligent indirect effect. On the contrary, higher education in the United States is associated with large non-pecuniary benefits in and outside of the labor market and a positive but insignificant direct effect. A possible explanation of this result is the larger welfare state in the majority of European countries which narrows the income and educational gap between individuals. Moreover, schools and universities in the United States function more as centers for building stronger social networks than do those in Europe.

3.2   Theoretical Considerations

The role of education in promoting individual well-being has been extensively investigated in the academic literature. Most of the earlier studies examine the indirect effect of education on happiness through the income channel. Starting with Becker (1964), the emphasis of economic analysis has been on the financial return from schooling.[5] The basic assumption is that higher income leads to greater consumption which increases individual utility. A large number of studies using different estimation techniques and considering factors such as intelligence, ability, and family background find that, on average, an additional year of schooling increases personal income from 7 to 12 percent (Card, 1999). Figure 3.1 in the Appendix to this chapter shows that, on average, people with college degrees earn almost twice as much

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[5]Almost all of these studies are indebted in the human capital earnings model first developed by Mincer (1974). For a review of this literature, see Card (1999).

as people with only a high school degree. The differences are even more staggering between those with less than a high school education and people who finish graduate school.

Not surprisingly, more educated people tend to report higher levels of happiness than do their less educated counterparts, but much of this effect is also due to their financial success of which college education is a strong determinant. Panel A of Figure 3.2 in the Appendix shows that as income goes up, self-reported happiness increases. Panel B of the same figure also shows that better educated people are more likely to report higher level of happiness.

More recently, economists have started investigating the effect of education on a variety of other, non-pecuniary outcomes, such as enjoyment from work, health, marriage, and parenting decisions that are also linked to subjective well-being. In a recent study, Oreopoulos and Salvanes (2011) conclude that these non-pecuniary returns from education are as large as the pecuniary ones. In this section, I review the literature on the non-pecuniary benefits which are realized directly by the student.[6]

3.2.1 Non-monetary Returns in the Labor Force

An obvious benefit of education is that it facilitates students in the process of self-discovery and helps them find careers that are a better match for their talents, interests, and aspirations. Another form of non-pecuniary benefit in the labor force is that education provides individuals with the option to obtain even higher education. Higher educational credentials usually come with more employment choices. A third

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[6]In this study, I discuss the private return from education. There is a large literature that is dedicated to the external benefits of education to society. Higher education, for example, is positively correlated with economic growth and development (Brist & Caplan, 1999; Barro, 1991) which are also known to promote higher levels of individual happiness (Inglehart *et al.* 2008, Sacks *et al.* 2010). Educated communities are also less likely to experience violent conflicts, and better education is linked with less violent criminal behavior (Witte, 1997; Yamada, 1991). Finally, educated people tend to do more volunteer work for their communities and make more charitable donations than do less educated people, which, in the long run, also contributes to reduce social inequalities (Dee, 2004; Oreopoulos & Salvanes, 2009). All of these macroeconomic factors are also known to determine the level of self-reported happiness (for example, see a seminal study by Di Tella *et al.*, 2003).

benefit is the increased ability to adjust to changing job opportunities (for example, due to rapid technological change).[7] In this case, adaptability is seen as an output from obtaining a higher degree.

Having a good education, then, increases the likelihood of finding a job and earning higher income and decreases the reliance on social assistance. The long-term and negative effect of unemployment on subjective well-being is well-established in the economic literature (e.g., see Di Tella *et al.*, 2003, and Sheeran *et al.*, 1995). But more education can also increase the likelihood of finding not just a job, but a job that is more interesting, less stressful, safer, more prestigious, and ultimately more enjoyable. Lower relative income, for example, is associated with higher levels of stress and deterioration of mental and physical health (Pickett & Wilkinson, 2011).

Panels A, B, and C in Figure 3.3 suggest that people with more education are less vulnerable to unemployment trends, experience less stress at work, and are treated with more respect in their workplace. And although better educated people work, on average, more hours (Panel D, Fig.3.3), they ultimately report much higher satisfaction with their job (Panel E, Fig.3.3). Panels E and F of Figure 3.2 further show that job satisfaction and stress at work tend to be strongly correlated to overall happiness from life. Several recent studies find that people with more education are also more likely to find a more meaningful and satisfying job (Blanchflower and Oswald, 1994, Oreopoulos and Salvanes, 2011; Rivera-Batiz, 1992), and have greater autonomy and independence at work (Albert and Davia, 2005). Similarly, Oreopoulos and Salvanes (2011) show that workers with similar backgrounds, but more schooling, have jobs that offer a greater sense of accomplishment and are more prestigious.

These observations may also be a reflection of the fact that more educated people have different attitudes towards working. An important aspect of education is to help students realize that learning and work are intrinsically valuable and to help them

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[7]See Weisbrod (1962) for a more detailed discussion of these non-monetary benefits

find a career path that will be more enjoyable and rewarding in the future. Figure 3.3 provides evidence that more educated people consider "interesting job" and "feeling a sense of accomplishment at work" to be more important than monetary rewards (Panels G and H). Furthermore, better educated people are less likely to put forth the "minimum amount of effort" at work (Panel F, Figure 3.3). Virtually no one with a graduate degree displays such behavior while close to one fifth of all workers with less than a high school education do. Finally, a greater proportion of the respondents with higher degrees report that even if they become rich, they will continue working (Panel I, Figure 3.3).

These observations suggest that a crucial way in which education may increase life satisfaction is not only by providing more educated people with an opportunity to find a better job that pays more, but also, and perhaps more importantly, by allowing them to enjoy their work more – by having more autonomy and feeling a greater sense of accomplishment and purpose. As an added economic benefit, mastery, autonomy, and a sense of purpose at work are known to lead to greater productivity, especially for tasks that involve more sophisticated cognitive skills (for a summary see Pink, 2010).

3.2.2   Non-monetary Returns Outside of the Labor Force

So far we have discussed the private benefits of education in terms of better employment conditions and attitudes toward work. But some of the value of education is realized in terms of better choices and opportunities outside of the labor market. Again, an important way in which education works is by teaching students critical thinking [8] and social skills that allow them to respond more effectively to new

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[8]Critical thinking has been defined in many different ways. Richard Paul (1988, 49), for example, describes it as the ability to reach sound conclusions based on the available information. Barry Beyer (1983) relates it to assessing the authenticity, accuracy and worth of knowledge claims, beliefs, or arguments. Stephen Norris (1985, 40-45) says it helps students to "apply everything they already know and feel, to evaluate their own thinking, and especially to change their behavior."

information and problems in all spheres of social and economic life.

Although the education literature has not yet provided conclusive explanations of how students acquire critical thinking skills, there are good reasons to believe that such skills are not something that necessarily develops with maturity and could be taught. In other words, unlike intelligence that can be genetically determined, critical thinking is a skill that can be improved over time (Walsh and Paul, 1988). Since more schooling tends to be strongly correlated with critical thinking and social skills, college may provide a necessary platform for the development of such skills (Cascio and Lewis, 2006; Heckman, 2006; Green and Riddell, 2003).

A more technical explanation of how education may improve performance comes from Grossman (2006) who outlines two separate models to describe how cognitive development generates returns to students through productive and allocative efficiency. For example, the productive efficiency model suggests that education teaches students time and resource management skills that allow them to achieve better outcomes with less resources – more educated people are able to do more with less. On the other hand, the allocative efficiency model suggests that education helps people make better choices which allows them to achieve superior outcomes with the same level of resources.

3.2.2.1   Health

A key non-monetary benefit from additional education is improvement in physical and mental health. For example, respondents in the GSS with less than a high school degree report twice as many days of poor mental and physical health when asked to evaluate their health condition in the past month. On the contrary, almost half of those with graduate and undergraduate degrees describe their health as "excellent" compared to less than one fifth of the least educated. Health is one of the strongest determinants of subjective well-being (Fig 3.2, Panel D).

Good health has many benefits, the most obvious one is reduced health care costs and longer life which may translate into higher productivity and lifetime earnings. But good health can also increase access to education, jobs, and improve social relations which may also enhance economic opportunities. Panels A through C in Figure 3.4 further show that better educated people are far more likely to report better health.

Although the positive association between higher education and health is well-established in the literature (e.g., see Cutler and Lleras-Muney, 2006; Mirowsky and Ross, 2003), the explanations for this relationship differ. Some studies suggest that higher education affects health indirectly through better work and economic conditions. Compared to the poorly educated, well educated respondents are more likely to earn higher incomes and have more fulfilling jobs and less likely to be unemployed and experience economic hardship which in turn can significantly improve their health. But even beyond the effect of higher income and better jobs, people with higher education are still more likely to have a strong social network and to experience a greater sense of control over their life which is associated with better health. More importantly, the better educated are less likely to engage in risky personal habits such as smoking and drinking and are more likely to exercise and get a regular health check-up (Ross and Wu, 1995).

3.2.2.2 Marriage

Another non-pecuniary benefit from higher education is that well-educated people, perhaps due to their higher earning potential and higher socio-economic ranking, are more attractive on the competitive marriage market (Chiappori *et al.* 2009; Becker, 1973). Some economists have even concluded that the sole purpose of going to college for women in the mid-twentieth century has been to attract more educated husbands (Oreopoulos and Salvanes, 2011). Panel D of Figure 3.4 shows that more educated people are more likely to have partners with higher education. This relationship is

also well-established in the economic literature (Rockwell, 1976; Chadwick and Solon, 2002).

In addition, education may lead to more stable marriages. Panels E and F in Figure 3.4 show that people with higher education are more likely to be married and far less likely to be separated or divorced. Panel C of Figure 3.2 further shows that marital status tends to be a strong determinant of self-reported happiness with those who are 'separated' or 'divorced' reporting significantly lower subjective well-being than do married couples. Qari (2010), for example, argues that individuals do not fully adapt to the positive spike in happiness from marriage. He estimates the monetary equivalent of these long-term non-pecuniary benefits to be 85,000 Euros per year for men.

3.2.2.3 Parenting Decisions

There is also abundant evidence that women with more education have fewer children (see Jones and Tertilt, 2008). Fewer children are associated with higher life satisfaction. This negative correlation is often explained by differences in family structure (see White *et al.*, 1986). For example, having more children is often associated with lower interaction, more financial dissatisfaction, and more traditionalism in the division of labor. More importantly, educated people tend to be better parents (Leigh, 1998; Grogger, 1997) and parental education is one of the strongest determinants of child development. Recent research, for example, suggests that parental education is correlated with a myriad of positive outcomes – from children's cognitive development in early life to their educational attainment and job prospects later in life (e.g., see Cunha and Heckman, 2009).

One explanation of these findings is that more educated people differ in their parenting styles. For example, better educated parents not only spend more time with their children, but they are also less likely to discipline them and more likely

to encourage them to pursue new knowledge and to think independently. Data from the GSS point to similar conclusions: well educated people are less likely to favor spanking to discipline their children (Panel G, Figure 3.4), more likely to be in favor of their kids learning a second language in high school (Panel H, Figure 3.4), and less likely to agree that obedience and respect for authority are important virtues that children should learn (Panel I, Figure 3.4). Finally, the higher socio-economic status of more educated people and their better work ethic and personal habits may teach their children similar virtues by example and motivate them to excel even further.

3.2.2.4   Social Capital and Civic Engagement

Education is often described as one of the most robust predictors of social capital and civic engagement (Helliwell and Putnam, 2007). Social capital reflects the idea that social connections – friendships, volunteering, and other relationships – generate value beyond the intrinsic pleasure that people derive from interacting with others.[9] Although definitions vary, most sociologists agree that social capital consists of the social networks and the shared values and norms they generate such as interpersonal trust, tolerance of diversity, reciprocity, and mutual support.

Figure 3.5 presents several different indicators of social capital from the GSS and how they relate with educational attainment. First, well educated people tend to place more importance on friendships and hobbies, and to report, on average, having more close friends (Panels A through C, Figure 3.5). Similar patterns are also revealed in panels D through L which show that respondents with better education are also more likely to influence the decisions of others and less likely to be influenced by network TV. They are also more likely to share the belief that helping others who are worse off in the rest of the world is important as is protecting the rights of minorities.

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[9]The Organization of Economic Development and Cooperation(OECD), for example, defines social capital as the "networks together with shared norms, values, and understandings that facilitate cooperation within and across groups" (OECD, 2001).

Higher education also tends to be strongly correlated with social trust (Panel G) and perception of fairness (Panel H). Almost twice as many of the respondents with a college degree, for example, report that other people 'can be trusted' compared to the respondents with the lowest educational attainment. Finally, more educated people place greater importance on understanding the reasoning of others (Panel D) which reveals that they are more open-minded. Tolerance for alternative ideologies and lifestyles is an important virtue that higher education promotes. Such personal traits also makes individuals more approachable and friendly.

Recent studies show that spending time with family, friends, and colleagues is associated with higher average levels of positive feelings (Kahneman and Krueger, 2006). But even beyond the intrinsic pleasure that people derive from spending time with others, social connections have a positive external effect on individuals and society. Social networks, for example, provide both material and emotional support in good and bad times. As a consequence, people with strong social networks tend to report better mental and physical health (Veenstra, 2000), are more likely to be employed and earn a higher salary (Goldthorpe *et al.*, 1987), more successfully recover from health shocks such as heart attacks (Case *et al.*, 1992), are less affected by stress (Williams *et al.*,1981), and ultimately report higher levels of life satisfaction. Helliwell and Putnam (2004) find that social capital (measured by the strength of family, neighborhood, religious, and community ties) is independently and robustly positively correlated with life satisfaction, both directly and through their impact on health. On the other hand, people with weak social networks have limited contact with others, less economic opportunities, and are more likely to feel socially isolated.

People also derive pleasure from helping others. There is a large literature in experimental economics, for example, on trust and ultimatum games that finds that people are surprisingly altruistic and often willing to sacrifice some of their payoffs to achieve a more equal distribution of outcomes. Well educated people are also more

likely to volunteer and people who volunteer are more satisfied with their life than are non-volunteers (Meier and Stutzer, 2007). Time spent volunteering also helps create a more healthy civil society. Figure 3.6 shows that more educated people volunteer more than do their less educated counterparts. The data, however, suggests that people with graduate degrees are less likely to volunteer than college graduates in several different areas.

Thus, an important non-pecuniary benefit from education may come from the effect of education on social capital – improving the quality of personal relationships, strengthening social networks, and increasing social interaction such as civic engagement and volunteering. This effect may be increasing but at a decreasing rate with educational attainment.

3.2.3 Negative Returns from Education

Of course education comes with some negative non-pecuniary returns. For example, better paid jobs also come with more responsibilities and expectations for improved performance which may lead to longer work hours and more stress at work. Figure 3.3, however, shows that although people with higher degrees work, on average, more hours than people with lower education (Panel D), they also experience less stress at work (Panel B), have safer jobs (Panel L), feel a greater sense of accomplishment at work (Panel H), and are more likely to enjoy their job (Panel E). Several studies in epidemiology find that better education and higher occupational status are associated with lower levels of stress hormones such as cortisol (see Cohen *et al.*, 2006; and Steptoe *et al.*, 2003). Socio-economic status has been recognized as one of the most important determinants of stress in numerous other studies as well (Pickett & Wilkinson, 2010). This observation is also consistent with Panel J of Figure 3.3 which shows that a smaller proportion of people with higher degrees report 'I always feel rushed' compared to those who are less well educated.

Employees that work longer hours, however, may find it challenging to balance their work and daily living. Using data from the GSS, Oreopoulos and Salvanes (2011) point out the tendency for college graduates to report wanting to spend more time with friends and family. Yet, this result could be because more educated people value family, friendships, and hobbies more than those who are less educated (Fig 3.5, Panels A and B). Panel K of Figure 3.3 shows that people with higher degrees are more likely to also derive higher satisfaction from family life.

Another negative effect from higher education is the price of unemployment. People with higher degrees have better jobs and earn higher incomes and obviously losing a job has a higher economic cost to them. Not surprisingly, Clark and Oswald (1994) find that better educated people tend to cope with unemployment less successfully than do those who have lower degrees.

Unlike the numerous studies that find a positive association between education and happiness,[10] Clark and Oswald (1996) show that more educated people report lower levels of life satisfaction. One possible explanation of their findings is that education raises job expectations, which are more difficult to fulfill. Another explanation is that inequality of income increases with social class, and relative income tends to play an important role in determining individual happiness.[11] Although the authors provide these explanations for their findings, explanations that have become commonly accepted among economists, even they urge that these results be taken with caution (Clark and Oswald, 1996, p.14). Perhaps, these findings are unique to the limited data sample of 5000 British workers in the early 1990s. Thus, the relationship between education, aspirations, and happiness is not as clear.

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[10]See Cuñado and de Garcia (2011) for a summary of this literature.

[11]Several other studies also find a negative association between education and life satisfaction or the absence of a significant relationship between the two (e.g., see Klein and Maher, 1966; Warr, 1992; and Blanchflower and Oswald, 1992)

3.2.4 Direct Relationship between Education and Happiness

Several studies explore the direct link between education and happiness and find a positive correlation between the two even after accounting for some of the indirect channels through which better education may positively affect well-being such as income, marriage, and health. For example, Cuñado and de Garcia (2011) study the impact of education on happiness in Spain using individual level data from the European Social Survey and discover that education has a positive (and direct) effect on happiness. The authors attribute this result to greater self-confidence and self-estimation which, as they argue, is a result from acquiring knowledge.

Oreopoulous and Salvanes (2011) find that more schooling leads individuals to make better decisions about health, marriage, and parenting. The authors argue that an important way in which school works is to make individuals more patient, goal-oriented, and less likely to engage in more risky behaviors.

Using individual data on more than 118,000 individuals from the World Bank's World Value Survey, Castriota (2006) reports a similar effect of education on happiness. The author argues that low education not only reduces the chances that an individual will acquire a high-paying job, but also to have a culturally stimulating life. Other studies also report a positive link between educational attainment and happiness (for example, see Layard, 2005; Albert and Davia, 2005, and Di Tella *et al.*, 2003).

3.2.5 Summary of the Relationship

To summarize, education is not only intrinsically valuable because it fulfills one of the most basic human needs, the need to learn, but also because it improves the material and emotional well-being of humans through a variety of indirect and direct channels. Higher education provides the platform for students to acquire new skills and knowledge that allows them to manage their time and resources more efficiently.

It helps students develop critical thinking skills and practical competencies that help them adapt faster to the ever changing world around them. It also influences students' preferences and values. College educated people, for example, tend to live healthier lifestyles and engage in less risky behaviors – they exercise more and smoke less. They also tend to value learning and work for their own sake – they are less likely to see their job as a burden and are more likely to work with a sense of purpose, which can provide them with a greater sense of accomplishment and enjoyment. Finally, education has an effect on the formation of personal identity – better educated people are more open minded towards new ideas and lifestyles, less swayed by tradition and societal dogmas, more autonomous, less authoritative, and more tolerant toward minorities. They are also more likely to show sympathy toward fellow human beings.

All of this can lead to large non-monetary returns in and outside of the labor market. For example, better educated people are more likely to be employed and to report higher satisfaction from their work although they tend to work longer hours and hold more responsible positions. Higher education is also associated with better health, marriage and parenting outcomes. Finally, more educated people tend to have stronger social networks and participate more in community life.

3.3   Data

Data for the main analytical part of this study were collected from the nationally representative General Social Survey (GSS) conducted by the National Opinion Research Center at the University of Chicago. The GSS is a cross-national survey that covers the period from 1972-2010 and with more than 5,000 variables and 65,000 observations, it is often regarded as the single best source of data on societal trends. Table 3.1 in the Appendix provides descriptions and sources for the main variables in this study. Table 3.2 shows summary statistics. Additional data for the estimations

in section 3.5.12 were obtained from the European Value Study (EVS) which is a large-scale, cross national, and longitudinal survey on how Europeans think about family, work, politics and society. The EVS includes four waves from 1981 to 2008 in 49 countries and regions.[12]

3.3.1   Subjective Well-being

While traditionally data on the self-reported level of happiness (or subjective well-being) has been viewed with suspicion by economists, in the past two decades such data has become more widely accepted in economic research.[13] Thus, the dependent variable in this study is the self-reported level of happiness which came from the GSS (GSS variable: *happy*) and was collected using the following 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?*"[14] The data was then recoded so that the answers correspond to the following numerical values: (1) 'not too happy', (2) 'pretty happy', and (3) 'very happy'.

3.3.2   Educational Attainment

The variable on educational attainment (GSS variable: *degree*) is a categorical one that measures the highest level of education attained by the respondent: 'less than high school', 'high school', 'college', and 'graduate school'. Each level of educational attainment enters the regression as a dummy variable ('less than high school' is used as the base).

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[12]I use the longitudinal data file 1981-2008, which is available at: http://zacat.gesis.org/

[13]For justification of using subjective well-being data see: Frey & Stutzer (2002), Kahneman & Kruger (2006), and Di Tella & McCulloch (2003). These studies argue that subjective well-being data passes different validation tests and moves predictably with other external variables (such as income or growth in GDP) and is thus valid, reliable, and comparable.

[14]A small fraction of responses "Don't know" and "No answer" are ignored by the analysis.

3.3.3 Personal Income

The independent variable on income (GSS variable: *conrinc*), is constructed from categorical data and represents inflation adjusted annual personal income before taxes (in constant 2005 dollars).[15] This variable has been widely used in the social sciences and previous research, for example, has successfully applied it in estimating the return from college education with results that do not deviate significantly from what hundreds of other studies on this topic discover (see Card, 1999).

3.3.4 Job Satisfaction and Socio-economic Status

The measure of job satisfaction (GSS variable: *satjob*) is a straightforward one. Respondents were asked to answer the question: *"On the whole, how satisfied are you with the work you do?"* Responses were evaluated on a scale from 0 'very dissatisfied' to 10 'very satisfied'. To evaluate the relative position of a person in society, I create a dummy variable on 'relative income' which indicates whether individual income is lower than the median income in the sample for any given year (0) or higher (1). The GSS also provides a measure of socio-economic status (GSS variable: *sei*), which is derived from prestige scores based on levels of income and education within occupations.[16]

3.3.5 Marital Status, Subjective Health, and Social Capital

Marital status (GSS variable: *marital*) was obtained with the following question: *"Are you currently – married, widowed, divorced, separated, or have you never been married?"* Data on self-reported health (GSS variable: *health*) were collected with

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[15]For details refer to GSS Methodological Report No. 101 (Holt, 2004)

[16]See Nakao, Keiko and Treas, Judith, "The 1989 Socioeconomic Index of Occupations: Construction from the 1989 Occupational Prestige Scores," GSS Methodological Report No. 74. Chicago: NORC, 1992.

the question: "*Would you say your own health, in general, is excellent, good, fair, or poor?*"

Although a universal measure of social capital is difficult to find, most sociologists and economists agree that measures of interpersonal trust and norms of reciprocity can be used as a reliable proxy. Helliwell and Putnam (2004), for example, argue that norms of reciprocity and trustworthiness are a nearly universal concomitant of dense social networks so that the belief that others around you can be trusted is one of the strongest predictors of social capital at the aggregate level. High levels of social trust in the context of dense social networks provide the crucial mechanism through which social capital affects aggregate outcomes.

Thus, the main variable used to measure social capital in this study is social trust, which was collected with the question: "*Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?*" (0 'can trust', 1 'cannot trust'). In addition, to evaluate the strength of social networks I use variables that measure the importance of friendships and non-work activities. The former is collected with the question: "*[H]ow much satisfaction you get from your friendships?*" (0 'none' to 7 'very great deal'). And the latter comes from responses to the question: "*[H]ow much satisfaction do you get from non-work activities?*' (0 'none' to 7 'very great deal')

3.3.6 Optimism and Aspirations

Even though direct measures of aspirations do not exist, I use several different variables in different specifications which evaluate the attitudes and expectations of people about their future. The first variable, optimism (*GSS variable:optimist*), is constructed from responses to the statement: "*I'm always optimistic about my future*" (from 1 'strongly disagree' to 4 'strongly agree'). The second variable, pessimism (*GSS variable: pessimst*), is collected from responses to the statement: "I hardly ever

expect things to go my way" (from 1 'strongly disagree' to 4 'strongly agree'). One can also view this variable as an indirect measure of the sense of control that people have over their lives.

3.3.7   Background Variables

The GSS dataset also provides a number of background variables on the individual level. The ones that are used as controls in this study are well known to affect the individual level of happiness and include: age, gender, race, marital status, personal unemployment, number of children, intelligence, and number of siblings.

To test the robustness of the model, and to make my case stronger, I also refer to several other variables from the GSS. These variables are described either in the footnotes or in the Appendix to Chapter 3. I provide the original GSS labels of the variables in parenthesis to facilitate replication of my results.[17]

3.4   Empirical Model

To examine the relationship between educational attainment, personal income, and happiness, I use a reduced form model which is common in the happiness literature (e.g., see Di Tella *et al.*, 2003):[18]

$$u_i = \alpha log y_i + \sum^{j} \beta_j Educational Attainment_i + \gamma' \mathbf{X} + \nu_i \qquad (3.1)$$

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[17]The GSS dataset can be downloaded at: http://www3.norc.org/gss+website/.

[18]One can think of this model as a Constant Relative Risk Aversion utility function such that:

$$u_i = \begin{cases} \dfrac{y_i^{1-\varepsilon} - 1}{1 - \varepsilon} & \text{if} \quad \varepsilon \neq 1 \\ log y_i & \text{if} \quad \varepsilon = 1 \end{cases}$$

In this specification, ε is the parameter of risk aversion, or the negative elasticity of marginal income (Layard, 2008). As shown in Chapter 2, ε is closer to .5, in this study I make the assumption that $\varepsilon = 1$, so that the relationship between income and happiness takes the log-liner form. This is a common assumption in the happiness literature and allows for easier comparison with previous studies.

where y_i is individual income (before taxes and measured in 2005 constant dollars),[19] **X** is a vector of personal characteristics that includes age, age squared, sex, race, marital status, and condition of health. Other variables such as job satisfaction and social capital are also included as controls in various stages of the study. Educational attainment is a vector of dummy variables that measure four levels of educational attainment – 'less than high school', 'high school', 'college', and 'graduate school'. 'Less than high school' is used as a base category. Finally, ν_i is the idiosyncratic error.

Since true utility is not observed, I follow Layard *et al.* (2008) and make the following assumptions:

1. Reported happiness, h_i, is linked to true utility, u_i via a fixed transformation such that:

$$h_i = f_i(u_i) = f(u_i) + \mu_i \tag{3.2}$$

2. In addition, the transformation is assumed to be linear:

$$h_i = u_i + \mu_i \tag{3.3}$$

Thus, my final model estimates:

$$h_i = \alpha log y_i + \sum^{j} \beta_j Educational\,Attainment_i + \gamma'\mathbf{X} + \epsilon_i \tag{3.4}$$

where $\epsilon = \nu_i + \mu_i$

A significant body of literature exists to justify the assumptions above. First, reports on happiness tend to be consistent with other measures of well-being. For example, Diener & Suh (1995) show that the level of self-reported happiness is correlated with reports made by a third-party (e.g., a friend of the subject). Second, happiness

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[19]For details on how the income variable was calculated refer to GSS Methodological Report No. 101 (Holt, 2004).

data tends to move in a predictable way with external factors such as unemployment and marriage. For example, income increases predicted happiness, unemployment decreases it, etc. (Kahneman, 1999). Finally, studies in neuropsychology suggest that answers to happiness reports are correlated in a consistent manner with the activity in different areas of the brain associated with positive and negative experiences (Davidson, 1992, 2000). This literature is thoroughly described in Chapter 1 of this dissertation.

It is expected that higher educational attainment will contribute to one's subjective well-being not only indirectly by affecting income, health, marriage, parenting outcomes, job satisfaction, and social networks, but also directly by providing individuals with more meaningful goals, enriching their cultural and social experience, and creating a sense of control over future events. Consequently, people with college degrees may have a more optimistic outlook and less stressful life.[20]

I report the coefficients from an OLS estimation in the main analytical part of this Chapter. There are two reasons for this approach. First, Ferrer-i-Carbonell (2004) provide extensive evidence that the results from OLS and ordered probit regressions hardly differ in the context of happiness research. I find that this is true in the context of this study too. Second, I am interested in estimating the marginal effects on the interaction between inequality and income on happiness. Ai and Norton (2003) show that the interaction terms in ordered probit regressions are more difficult to interpret than commonly assumed. Thus, using an OLS approach better fits the goals of my line of inquiry.

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[20]Such rationale comes from Michalos (1991, pp. 20-28) who provides a summary of a profile of a happy person: "A happy person is likely to have low levels of fear, high level of self-esteem, and an emotionally stable personality; a strong social orientation; healthy satisfying, warm love and social relationships; an active lifestyle with meaningful work; and to be relatively optimistic, worry free, present-oriented, and well-directed."

3.5 Estimation Results

3.5.1 Main Results

Table 3.3 presents the results from four different OLS models. Each model builds from the previous one by including additional control variables and examining the corresponding changes in the magnitude and significance of the variable on educational attainment. Models 2 and 3 include variables on marital and health status (respectively). Model 4 adds additional microeconomic controls such as intelligence which is used as a proxy for ability. In the absence of a structural model, such an approach allows one to estimate the overall effect of educational attainment on subjective well-being and to more clearly assess the direct and indirect channels through which this relationship works. For example, if higher education is associated with better health and marriage decision which also affect one's level of subjective well-being, then in the absence of these controls the coefficients on educational attainment should capture both the direct and indirect effect of education on subjective well-being through these channels. On the other hand, once the model controls for health and marital status, the effect of education on happiness will diminish.

Model 1 in Table 3.3 presents the most basic specification that includes controls for age, age squared, sex, race, and personal unemployment. The base for all dummies is an employed white male with less than high school education and who is married. All of the coefficients have the expected signs and are statistically significant which provides confidence in the foundations of the theoretical model. First, the coefficient on the log of personal income is statistically significant and indicates that money can buy happiness, but at a diminishing rate. Next, as expected, the relationship between happiness and age is found to be non-linear with the least happy years occurring around the age of 40. The coefficient of gender and race confirms the findings of previous studies: women report themselves happier than men and blacks

report themselves less happy than whites. The level of self-reported happiness is also found to be inversely associated with personal unemployment.

The coefficients on the dummy variables of educational attainment reveal that after controlling for income and some personal characteristics, people with a higher degree, on average, report higher levels of happiness than people with lower degrees. A college degree, for instance, is associated with approximately 0.06 points higher happiness score (on a scale from 1-3) relative to a high school degree. This corresponds to approximately one tenth of a standard deviation in happiness. Obtaining a graduate degree, however, is associated with only .02 points happiness premium relative to a college degree. This suggests that most of the non-monetary benefits are obtained in college while the marginal benefit from obtaining a graduate degree, once we control for the level of personal income, is significantly lower.

3.5.2 Accounting for Marriage and Health

Following Becker (1973) and Chiappori *et al.* (2009), Model 2 in Table 3.3 adds additional controls for marital status and the number of children. Marriage appears to be one of the strongest determinants of happiness. Married people, for instance, report .3 points higher happiness relative to divorced and separated couples and the coefficients on educational attainment remain almost unchanged. The only change is in the variable on 'graduate school' which slightly decreases in magnitude indicating that a very small portion of the happiness premium associated with obtaining a graduate degree is linked to better marriage choices.

Based on the findings of Cutler and Lleras-Muney (2006) and Mirowsky and Ross (2003), Model 3 adds variables to control for the effect of health. As expected, health is one of strongest determinants of happiness. People with 'excellent health', for instance, report, on average, .5 points higher happiness than people with 'poor health' which is equal to almost one standard deviation (.64) in the happiness variable. This

effect is almost ten times stronger than the effect of obtaining even the highest level of education possible and about twice as large as the effect associated with marriage. In addition, including health in the happiness regression decreases the magnitude on the coefficient of college degree and graduate degree by more than a half. These results suggest that a large portion of the the happiness gains associated with a higher degree are because of better health. Perhaps, this result is a reflection of the observation that more educated people have healthier lifestyles and engage in less risky personal habits – they smoke less, drink alcohol less often, and are more likely to exercise regularly.

Finally, Model 4 in Table 3.3 examines the effect of intelligence and the number of siblings on happiness. Although good measures of intelligence and ability are difficult to find, I use the variable *wordsum* from the GSS, which is a ten word vocabulary subtest from the Wechsler Adult Intelligence Scale (WAIS). While the *wordsum* subtest is not a direct test of intelligence, but rather a test of knowledge, vocabulary knowledge correlates very highly with tests of general intelligence (Zhu & Weiss, 2005, Alwin, 1991). The results suggest that more intelligent people are also less happy, perhaps providing evidence for the popular saying that "ignorance is bliss." Controlling for intelligence makes the coefficient on graduate degree smaller than the coefficient on college degree. This suggests that some of the non-monetary effects associated with better health and marriage choices as a result of better education could be because of the knowledge that is acquired in graduate school.

3.5.3   Job Satisfaction and Prestige

Next, I examine the effect of job satisfaction and socio-economic status on subjective well-being. I conjecture that much of the non-pecuniary benefits from educational attainment are related to better job opportunities, and more flexibility in the labor market which allow well-educated people to find more fulfilling and prestigious jobs.

Table 3.4 presents the estimations from four different models. All models include the basic controls used in model 4 of Table 3.3.

Model 1 starts by estimating the effect of hours worked on subjective well-being. More time spent at work comes at the expense of time spent with family, friends, and non-work activities such as hobbies which people also value. Surprisingly, however, the number of hours worked is found to be positively correlated with subjective well-being although the coefficient is statistically insignificant. One possible explanation for this result is that what matters to people is not how much they work, but what kind of work they do, and how fulfilling their job is.

Model 2 controls for job satisfaction. As expected, job satisfaction is strongly and positively correlated with happiness. People that are more satisfied with their work are also far more likely to be happier in general. But even beyond the effect of a more fulfilling job, education has a positive and substantial effect on subjective well-being. Interestingly, however, the marginal effect from obtaining a graduate degree (beyond a college one) is negative (column 4 of Table 3.4). This suggests that the majority of the non-pecuniary benefits from attending a graduate school are associated with a better job.

Model 3 adds an additional variable on relative income which is used as a proxy for economic status. The results do not change substantially. In fact, the coefficient on graduate school remains the same while the coefficients on college and high school degree increase slightly in magnitude. This suggests that more educated people from the same social class tend to experience higher levels of happiness.

Finally, Model 4 uses an alternative measure of socio-economic status which comes directly from the GSS. This variable accounts not only for the economic position of a person in society, but also for the prestige of their job. Once this additional regressor is included, the coefficients on educational attainment decrease substantially in magnitude and lose their significance with only the coefficient on college degree

significant at the .1 level. This result, however, could be driven by the fact that the variable on socio-economic status is highly correlated with personal income, educational attainment, and job prestige – variables that are used to create it in the first place.

3.5.4   Social Capital

I next turn to analyzing the effect of social capital on subjective well-being. Table 3.5 reports four models which add several control variables that measure the strength of social networks and the shared values and norms they generate such as interpersonal trust and sense of fairness. All models include the standard personal variables, marital and health status, and also control for job satisfaction.

I start by including a variable that measures the satisfaction that respondents get from friendships on a scale from '1'(none) to '10'(very great deal). I use this variable as a proxy for the strength of social networks. Although the satisfaction that one derives from friendships is not a perfect measure of social networks, this variable tends to be strongly correlated with the number of close friends that respondents report as well as the number of people that respondents can call for advice when making important decisions. As expected, satisfaction from friendships has a strong positive and significant effect on happiness – people that derive more pleasure from interacting with their friends are happier. Adding this additional variable does not change significantly the strength of the coefficients on educational attainment, although the variable on graduate degree becomes insignificant.

Model 2 uses an alternative measure of social trust – whether the respondent owns a gun. Owning a gun may represent general sense of trust and feeling of safety in society. Again, the results do not change the magnitude and significance of the variables on educational attainment. Owning a gun, on the other hand, is associated with a higher level of happiness. Perhaps, owning a gun provides a sense of security,

which then translates into higher subjective well-being.

Model 3 further examines the effect of satisfaction that people derive from activities outside of their work on subjective well-being. Interestingly, the direct effect from satisfaction with hobbies tends to be stronger than the effect associated with friendships. Once I control for hobbies, the strength of the coefficient on college declines significantly relative to the coefficient on graduate school. This may indicate that a large non-pecuniary benefit from pursuing a college degree is related to developing a sense for the importance of non-work activities and civic engagement. For example, people with college degrees are far more likely to volunteer, and in many cases, they engage in more civic activities than even those with graduate degrees.

Model 4 examines how shared norms such as social trust and a sense of fairness affect subjective well-being. As expected, both of these variables have a positive effect on the self-reported level of happiness – people that trust those around them and perceive the world as more fair are also more likely to be happier. Including these controls in the regression, however, substantially decreases the magnitude and significance of the coefficients on educational attainment. The coefficient on college, for instance, declines by more than 70 percent and the one on graduate school decrease by a little less than 25 percent. Neither of the coefficients on educational attainment remain significant. These results suggest that a large share of the non-pecuniary returns from attending college are associated with social capital – stronger social networks and developing a sense of trust and fairness.

Finally, Table 3.6 provides preliminary evidence that educational attainment is a strong determinant of social capital. I report the results from OLS and ordered probit estimations of educational attainment on the four measures used as a proxy for social capital in Table 3.5–the importance of friendships, social trust, the importance of hobbies and owning a gun.[21] The results confirm that higher education is a strong

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[21]A detailed description of the dependent variables is provided in the footnote to the table.

determinant of social capital. Model 1, for example, suggests that better educated people are more likely to place higher importance on friendships than less educated people. Model 2 shows that obtaining a higher education also increases the sense of trust that one has towards other members of society. Model 3 further suggests that people with higher education tend to value non-work activities more. Finally, model 4 shows that education is correlated with the likelihood that one will own a gun.

3.5.5 Optimism and Aspirations

A common explanation for the negative effect of education on subjective well-being is that more educated people have higher aspirations which are more difficult to fulfill. This is the reason why, for instance, the negative effect of personal unemployment on subjective well-being tends to be much stronger for the well-educated. Panel B of Figure 3.8 further suggests that more educated people are less likely to be pessimistic about their future. An important role of education is to improve students' knowledge and skills that allow them to understand and master the world around them. This leads to economic and social opportunities that improve the sense of control that people feel over their lives. Such a relationship is also suggested by Panel I of Figure 3.8 which shows that better educated people are more likely to disagree with the statement: "*I have little control over the bad things that happen to me.*" The results for optimism, however, are mixed. Panel A of Figure 3.8 shows that a smaller proportion of the better educated people 'strongly agree' with the statement *"I am always optimistic about the future"*. But a lot fewer people with higher degrees also disagree with this statement. This suggests that more educated people are more moderate when it comes to their expectations about the future. Perhaps the multi-disciplinary curriculum at most universities provides students with a broader perspective about the world and teaches them to be more skeptical and moderate in their expectations about future events.

In this section, I address these arguments by providing evidence that a more optimistic outlook on life generally increases subjective well-being. Table 3.7 presents the basic results from four different models which include several proxies for expectations about the future. Data on these variables is available for 2004 and came from a special topical module on "Genes" from the General Social Survey. Thus, the models include only the basic variables – age, age squared, sex, race, and personal income – and are far less robust than the evidence presented so far.

Model 1 includes a variable that measures responses to the statement: "*I am always optimistic about my future*" from '1' (strongly disagree) to '4' (strongly agree). The results suggest that people with similar income who have a more optimistic outlook about the future also tend to be happier. Although the coefficients on educational attainment show the same pattern as before – better educated people are more likely to report higher levels of happiness – they are no longer statistically significant. These results, of course, could be driven by the smaller sample size.

Models 2 and 3 present the results from the same regressions using two alternative proxies for aspirations. Model 2, for example, examines the effect of pessimism. This variable was collected using responses to the statement "*I hardly ever expect things to go my way*" from '1' (strongly disagree) to '4' (strongly agree). And model 3 examines whether the main results change if optimism is measured with the statement: "*Overall, I expect more good things to happen to me than bad*" from '1' (strongly disagree) to '4' (strongly agree). Both models show that less pessimistic people and more optimistic ones are more likely to be happier.

Finally, in model 4, I use an alternative measure collected with the question: "*How much confidence do you have in the scientific community*" from '1' (hardly any) to '3' (a great deal). This variable is strongly correlated with the other three variables used so far and at the same allows me to expand the data set to more than 20,000 observations. I obtain similar results: people that have greater confidence in science,

and hence are more optimistic about the future, are also more likely to be happier. In addition, all of the coefficients on educational attainment have the expected signs and are statistically significant.

3.5.6 Estimating the Monetary Equivalent

To be able to obtain a more intuitive interpretation of these results, I combine the coefficients on income and educational attainment to obtain the marginal rate of substitution between educational attainment and income, so that:

$$MRS_{Education,Income} = \frac{MU_{education}}{MU_{income}} = \frac{\beta_j}{\alpha} * y = \psi_j \tag{3.5}$$

where β_j is the coefficient on the dummy variable for each educational attainment. One difficulty in doing this is that income is subject to diminishing marginal returns. Since more educated people are more likely to earn higher salaries, they are also more likely to value an additional dollar of income less. One way to produce more comparable and meaningful results is to calculate the marginal rate of substitution for the different educational levels while holding income constant. One can think of a situation in which a recent college graduate is not able to find a high paying job, but starts at the level of income similar to a person with a high school degree. The model predicts that even though the person with a college degree will be earning a similar salary to that of a high-school graduate, the person with the higher degree will have a significant happiness premium. The marginal rate of substitution in this case elicits the monetary equivalent of this higher level of subjective well-being. Table 3.8 presents one such possible scenario evaluating the mean income for high school graduates in the sample which is reported in column 2. Column 3 shows the marginal rate of substitution between educational attainment and income, ψ. This number is calculated using the coefficients on log of income and educational attainments from

model (3) in Table 3.3. Column 4 presents the marginal non-monetary benefit from an additional level of educational attainment. Finally, column (5) reports the present value of the lifetime premium calculated for a hypothetical 40-year working life and discounted at a rate of 7 percent. A typical work-life is defined by the Census Bureau as the period between 25 and 65.

The calculations in Table 3.8 suggest a number of interesting observations. First, the difference in the marginal non-monetary benefit between a person with "less than high school" degree and a "high school" diploma is substantial. Next, it seems that most of the non-pecuniary returns are obtained in college. A person with a high school degree, for instance, will have to earn $41,683 more per year to be equally as happy as a person with a college degree with the same socio-economic background (column 4). A person with a college degree, however, will have to earn only $1,600 more a year to be equally as happy as someone with a graduate degree that has similar personal characteristics. In addition, Column 5 of Table 3.8 calculates the lifetime happiness premium (in dollar terms) associated with different levels of education. The calculations show that the happiness premium alone is sufficient to pay for the cost of a college education that students at both the undergraduate and graduate levels incur. For example, the lifetime monetary equivalent associated with a college degree is close to $1.66 million relative to a high school degree, and the lifetime happiness premium for graduate school is slightly higher, $1.73 million.

Table 3.9 reports the marginal rate of substitution at the mean level of income for the four different levels of educational attainment. One must be careful in comparing the results from Table 3.8 with the results from Table 3.9. Since income is allowed to vary in the second case, the marginal rate of substitution does not reveal how much more income per year a person with a high school degree would have to earn to be equally as happy as a person with a higher degree. Instead it shows the happiness premium (in dollar terms) that the typical person from the four different educational

groups will receive. For example, the happiness premium associated with a college degree (relative to a high school diploma) is approximately $88,772 (column 4). The additional happiness premium for obtaining a graduate degree is $51,598. This result is driven by the diminishing marginal returns from income. In other words, as income increases, the value of additional dollar goes down and it becomes increasingly costly for individuals (in terms of the opportunity cost associated with the non-pecuniary benefits from education) not to pursue a higher degree.

Table 3.10 calculates the marginal rate of substitution using the results from Model 3 in Table 3.3. As expected, the happiness premium from a college degree decreases, although even after controlling for health and marital status, the non-monetary return is substantial. Finally, Table 3.11 shows the marginal rate of substitution between educational attainment and income once the model takes into account the positive effect of social capital. As expected, the monetary equivalent from higher education substantially decreases. The steepest decline is associated with the return from obtaining a graduate degree. It appears that once the model accounts for social capital there is a large negative return associated with pursuing a graduate degree. Interestingly, the monetary equivalent of the loss in non-pecuniary benefits associated with a graduate degree is very close to the mean difference in earnings between people with college and graduate degrees, which is close to $18,000.[22]

3.5.7 Robustness Test

Table 3.12 estimates the same models but using an ordered probit model as a robustness test. The main conclusions from the previous table are virtually the same which provides confidence in the strategy to use an OLS procedure for the main analytical part of the study. In all of the regressions educational attainment has the expected sign and is statistically significant. However, interpretation of the marginal

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[22]See Table 3.5 which reports the mean income in the sample at different levels of educational attainment.

effects is not as straightforward. For example, the coefficient on "college," 0.22, implies that the probability of a college graduate reporting themselves in the top happiness category, "very happy," will be close to 5 percentage points higher compared to a person with only a high school diploma.[23] Similarly, obtaining a graduate degree increases the likelihood that a person will report themselves in the top happiness category by 6 percentage points relative to a person with a high school degree. The likelihood that the same person will report themselves in the bottom category goes down by 2.7 percentage points. Additional support for the validity of the results in this study comes from the different specifications used throughout this section, which test the effect of a large number of variables.

3.5.8 Inequality and Risk Aversion

There are many possible ways in which education might affect the moral, social, family, and work values of individuals. One important way is by making people more patient, risk-averse, open-minded, tolerant, and more altruistic. Well educated people, for instance, are less likely to engage in risky behaviors such as smoking, drinking, and crime, and more likely to be tolerant of alternative lifestyles and minorities. Better educated people also tend to believe that helping others who are worse off is important, to volunteer more often, and to be willing to pay higher taxes to reduce social inequalities (Panels G through I, Figure 3.7).

In this section I estimate non-parametrically the coefficient on inequality (risk) aversion for different subgroups of the sample that are based on the level of educational attainment. I follow Chapter 2 and use a neo-utilitarian framework of social welfare

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[23]This is calculated using the following formula: $\triangle Prob(veryhapy) = F(H + \triangle H - c_2)F(H - c_2)$ where the change in the probability of someone reporting themselves in the highest happiness category "very happy" is determined by the change in the happiness score of the individual, H, due to the change in one of the determinants of happiness in the regression, and where $F(.)$ is the cumulative standard normal distribution and c_2 is the cut-off point that the happiness score has to pass in order for someone to call themselves "very happy." Cut-off points are reported in the bottom of Table 3.12

analysis which was developed by Atkinson (1970). Consider the following additive social welfare function:

$$W = \frac{1}{n} \sum u_i(y_i) \tag{3.6}$$

where social welfare, W, is determined by average utility, which is a function of personal income, y_i.[24] To incorporate the idea that additional income may bring greater utility to poorer people, I employ an iso-elastic utility function which assigns weights to different levels of income:

$$u_i = \begin{cases} \dfrac{y_i^{1-\varepsilon} - 1}{1 - \varepsilon} & \text{if } \varepsilon \neq 1 \\ log y_i & \text{if } \varepsilon = 1 \end{cases} \tag{3.7}$$

In this specification, ε is the parameter of inequality (risk) aversion or the negative elasticity of marginal income (Layard, 2008). Conceptually this function is equivalent to a constant relative risk aversion function (CRRA). When $\varepsilon = 0$, individuals show no inequality and risk aversion. On the other hand, when $\varepsilon \to \infty$ then individuals are infinitely averse to inequality. Section 2.4.1 of chapter 2 provides a detailed discussion of the theoretical model.

To estimate, ε, I use a Box-Cox transformation on the income variable so that:

$$u_i = \alpha \left(\frac{y_i^{\lambda} - 1}{\lambda} \right) + \sum \beta' \mathbf{X} + \nu_i \tag{3.8}$$

where $\lambda = 1 - \varepsilon$

Table 3.13 presents the main results from a maximum likelihood procedure. As expected, the inequality (risk) aversion parameter, ε, is found to be increasing with

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[24]Deaton (1997) provides a useful definition of the social welfare function: "The social welfare function should be seen as a statistical 'aggregator' that turns distribution into a single number that provides overall judgment on that distribution and that forces us to think coherently about welfare and its distribution. Whatever out view of the policy making process, it is always useful to think about policy in terms of its effects on efficiency and equity, and the social welfare function should be though of as a tool for organizing our thoughts in a coherent way."

educational attainment. People with graduate degrees, for instance, are found to be extremely inequality and risk averse. These results are consistent with the patterns suggested in Figure 3.7. Interestingly, the parameter of inequality (risk) aversion has also significantly increased over time for all levels of educational attainment. This might be a reflection of the growing public resentment over inequality that has recently culminated with the Occupy Wall Street movement. Finally, although interpretation of ε as a parameter of risk or inequality aversion is debatable, in reality the concavity of the utility function is determined by both.

3.5.9 The Interaction of Education and Income

In this section, I test for possible interaction between the variables of income and educational attainment. This allows me to answer questions such as: Are richer people more likely to value higher educational attainment and do well-educated people enjoy an additional dollar of income more than their less educated counterparts? Figure 3.9 in the Appendix provides some preliminary evidence that people with the same income tend to report higher levels of happiness if they are college educated. Moreover, income seems to have the greatest incremental effect on happiness for the least educated.

I modify the main model by including an interaction term between income and educational attainment, so that:

$$h_i = \alpha log y_i + \sum^{j} \beta_j Education_i + \sum^{j} \delta_j (Education_i * y_i) + \gamma' \mathbf{X} + \epsilon_i \qquad (3.9)$$

Table 3.14 presents the main results. The interaction terms in all models have a positive sign suggesting that people with the same socio-economic status but more education will derive greater satisfaction from additional income. Similarly, as income

goes up, the value of obtaining additional education increases too. These results are consistent with economic theory. First, the value of additional education should go up as income increases and becomes subject to diminishing returns. In addition, education may also be seen as a status good (Veblen, 1899; Frank, 2001) so that people with higher income rank would be increasingly willing to pay a higher price to obtain it.

We have seen that, on average, individuals with higher education engage in less risky behaviors and have more healthy personal habits. Their consumption patterns, then, will reflect this behavior. More income will be spent on products and services that maximize their long-run happiness such as membership in a gym, and less income will be spent on destructive personal habits such as smoking and drinking. One explanation comes from Becker and Mulligan (1997, pp.735-736) who note: "Schooling focuses students attention on the future. Schooling can communicate images of the situations and difficulties of adult life, which are the future of childhood and adolescence. In addition, through repeated practice at problem solving, schooling helps children learn the art of scenario simulation. Thus educated people should be more productive at reducing the remoteness of future pleasures." In other words, education reduces myopia (Oreopoulos and Salvanes, 2011). People who are myopic are more likely to engage in immediate gratification and underestimate the future cost of their action, and are thus more likely to make behavioral mistakes at the expense of their lifetime happiness. Figure 3.7, for instance, shows that respondents in the GSS who have higher degrees are less likely to report that they smoke (Panel A), have a drinking problem (Panel B), exercise more (Panel C), have been arrested in the past (Panel D), are more prone to violence (Panel E), and have used illegal drugs such as cocaine and marijuana in the past year (Panel F). Finally, educated people are also more likely to negotiate prices so they can extract higher personal benefit from trade transactions.

3.5.10 The Non-Monetary Returns for Different Sub-Groups

In this section, I return to the basic model in Table 3.3 and estimate the non-pecuniary returns for different subgroups of the population. Table 3.15 presents the basic results for four different groups based on sex, race, marital status, and political affiliation. All models include the controls used in the basic model in this study and are thus comparable to the results from Table 3.3.

The results suggest that the non-pecuniary benefits from education are more than three times larger for women than for men. This observation might help explain the difference in educational attainment between genders that has shifted over the past few decades. In 1980, for example, there was virtually no difference in the high school completion rate between females (86 percent) and males (86 percent), but in 2011 the percentage of females with a high school diploma (91 percent) was higher by four percentage points than males (87 percent). Similarly, in 1980 the percentage of females (21 percent) with a college degree was three percentage points lower than males (24 percent), but by 2011 significantly more females (36 percent) were graduating college than males (28 percent). Across the OECD countries, for examples, women with university level degrees are also twice as likely to find a job as are men. (OECD Factbook, 2011)

The non-pecuniary benefits from education are also found to be larger for white people relative to African Americans. This is not a surprising result since African Americans have traditionally been discriminated in and outside of the labor market. The effect of educational attainment is also larger for never married people than for married ones. This is also an expected result since education might provide single people with an outlet to expand and strengthen their social network which may naturally be better developed for people who are married and have families. The last model in Table 3.15 suggests that the effect of education on subjective well-being is much stronger for people who identify as Republicans than for those who think of

themselves as Democrats. Perhaps, this difference can be explained by the typical values associated with democratic beliefs which are based on community and social responsibility. Even without formal education, Democrats may already have stronger social networks and share community values to a greater extent than do Republicans.

Table 3.16 presents one more estimation by separating the sample into two time periods – prior to 1995 and after 1995. The results show that the effect of education on subjective well-being was much stronger after 1995. This is especially pronounced in the case of a college degree – the coefficient increases in magnitude by more than a half. This might be an indication that the non-pecuniary return from a college degree has substantially increased over time. This could explain, at least partially, the growing demand for college education, which has lead to an unprecedented increase in the price of college tuition over the past several decades. It can also mean that college education has gradually become the educational norm in the US.

3.5.11 The Direct and Indirect Effects of Education

So far the analysis has relied primarily on the estimation of reduced form models. In this section, I present additional evidence by estimating a structural equation model (SEM) using a maximum likelihood procedure. This allows me to more clearly distinguish between the direct and indirect channels through which education affects subjective well-being and to make inferences about the strength of the relationship. A map of the structural model is presented in Figure 3.10. Higher educational attainment is assumed to affect subjective well-being directly but also indirectly through (1) increasing income, (2) decreasing the likelihood of unemployment, (3) decreasing the likelihood of divorce and separation, (4) improving health, (5) by enhancing social trust, and (6) increasing job-satisfaction. Table 3.17 presents the main findings. Part 1 of the table decomposes the total effect of educational attainment on subjective well-being into direct and indirect effects. Part 2 of the table provides auxiliary

regressions that show how educational attainment affects happiness through the indirect channels. For example, educational attainment increases the log of income by .4557 points (model 1 in part 2) and the log of income then is associated with increase in happiness of .0155 points. Thus, the indirect effect of educational attainment on happiness through the income channel is .0071 (.4557*.0155) which is the product of the direct effect of education on income and the direct effect of income on subjective well-being.

All coefficients in the regression which estimates the direct effect of educational attainment on subjective well-being in Part 1 of Table 3.17 have the expected signs and are statistically significant at the .01 level. The only exception is the variable on educational attainment, which has the expected sign but is statistically insignificant. This suggests that education does not affect happiness directly. This result is consistent with the most complete model in Table 3.9, which controls for a large number of personal characteristics, including health and marital status, job satisfaction, personal unemployment, and social capital.

The indirect effect of education on subjective well-being, however, is substantial. It is 13 times larger than the direct effec, and is slightly larger than the overall (direct and indirect) effect of income. The non-pecuniary benefits outside of the labor market associated with better health, marriage, and higher level of social trust are estimated to be three times larger than the non-pecuniary benefits associated with higher income, lower likelihood of being unemployed, and greater job satisfaction. About half of the non-pecuniary benefits are related to better health and about one fifth comes from greater social capital. In fact, the indirect effect through the income channel corresponds to only one tenth of the total indirect effect. This suggests that the majority of the non-pecuniary benefits from education lies outside of a better paid job.

3.5.12   Are Europeans Different from Americans?

As a final test, I compare the effect of higher education on subjective well-being in the United States to that in Europe. Subjective well-being data for Europe were collected from the European Value Study (EVS) using a similar question to that of the GSS and was recoded into the following scale: 'not at all happy' (1), 'not very happy' (2), 'quite happy' (3), and 'very happy'(4). The income variable from the EVS was constructed from categorical data [25] and represents inflation adjusted household income in 2005 dollars.

The EVS, however, does not have a variable for educational attainment that is comparable to the GSS variable. Since data on education attainment is collected using the International Standard Classification of Education (ISCED) system, I recode the data into four separate categories: 'less than high school' (primary education or lower, ISCED codes 0 and 1), 'high school'(lower and upper secondary education, ISCED code 3), 'technical school'(post-secondary, but not tertiary education such as vocational and technical schools beyond high school education, ISCED code 4), and 'bachelor degree or higher'(tertiary education, ISCED codes 5 and 6). Comparable data on personal characteristics, unemployment, health and marital status, as well as social trust and fairness are also used. Table 3.18 presents the main findings.

The results are consistent with the findings for the United States – better educated people are also more likely to report higher levels of happiness. This effect is increasing with the level of educational attainment, but appears to be much weaker than in the United States. On the other hand, this effect is still positive and statistically

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[25]To construct a linear income variable I follow the methodology used in the EVS: The mid-points of the country specific categories were taken; for the first category, the mid-point is its upper bound minus half the range of the second category, e.g., if (1) < 500 Euro and (2) 500-800 Euro, then the mid-point of the first category is: 500-(800-500)/2=350 Euro. To compute the mid-point of the last category, an equal range for the last and the penultimate category was assumed, e.g., if (one but last category) 7.500-10.000 Euro and (last category) >10,000 Euro, then the mid-point of the last category is: 10,000+(2,500/2)=11,250 Euro. The variable was then multiplied by 12 and converted to US dollars using exchange rates taken from OANDA-Forex Trading and Exchange Rates Services.

significant even after controlling for job satisfaction, marital and health status, and social capital. In fact, including many of these additional variables has almost no effect on the coefficient of educational attainment. This suggests that the direct effect of higher education in Europe is much stronger than the indirect one. Interestingly, obtaining a technical education tends to have a negative effect on happiness. Perhaps this is related to the more mechanical nature of the jobs that people with vocational training do.

In Table 3.19 I calculate the marginal rate of substitution, ψ, between educational attainment and income for Europe using the results obtained in Model 1 of Table 3.18. Column 4 shows that the monetary equivalent of the non-pecuniary benefits from higher education is only \$1,629 compared to \$41,683 for the United States. This premium almost entirely comes from the direct effect of educational attainment on happiness and is almost as strong even after controlling for possible indirect non-pecuniary benefits of education in and outside of the labor market.

To obtain more comparable results, I rerun the regressions for the US using total family income from the GSS and combining the categories 'college degree' and 'graduate degree' into a single one. Table 3.20 reports the coefficients on the educational variables from the new regressions and compares them to the coefficients for Europe. While the educational variables in the United States lose their significance and become negative once I control for social capital, the educational variables in Europe are positively related to subjective well-being and statistically significant at .01 level after controls are added. The findings suggest that educational attainment in Europe tends to have a stronger direct effect on subjective well-being and almost negligent indirect effects contrary to higher education in the United States which is associated with large non-pecuniary benefits in and outside of the labor market and a positive but insignificant direct effect.

Figure 3.11 suggests some possible explanations for these observations. Although

higher educational attainment in Europe is associated with higher self-reported happiness, the relationship between educational attainment and other personal outcomes does not appear as strong as the one in the United States. For example, an average American with a university degree or higher earns more than twice as much as an American with a high school diploma. In Europe the mean household income for the college educated is only 20 percent higher than the income of the less educated (Panel A, Fig. 3.11). And while people with higher degrees in the United States are less likely to experience personal unemployment, this is not so in Europe (Panel B). For example, people with less than high school degrees are less likely to be unemployed than both people with high school and vocational degrees. Similarly, while people with higher education are more likely to be married in the United States, this relationship runs in the opposite direction in Europe (Panel C). Overall, the differences between respondents with college degrees and lower degrees are much less pronounced in Europe than in the United States when it comes to other variables such as social trust, subjective health, importance of work, and one's sense of control over their life. In general, higher education tends to have a much stronger and positive effect on a variety of personal outcomes in the United States than it does in Europe.

What can explain these differences between the United States and Europe is a potential topic for future research. One possible explanation however, might be that most countries in Europe have larger welfare states than does the United States which narrows educational and income differences and make the impact of educational attainment less valuable on the individual level. Another possible explanation is that universities in the United States might play a more important role in helping social networks to develop.

3.6   Concluding Remarks

This study argues that formal education has large individual benefits that go beyond the monetary return from a better paid job. Using data from the General Social Survey from 1974-2010, we found that educational attainment is positively correlated with the level of happiness that individuals report even after controlling for a large set of personal variables such as income, personal unemployment, job satisfaction, health and marital status. The effect is strong, statistically significant, and increasing, although at a decreasing rate with the level of educational attainment. We conjecture that the remaining portion of the non-pecuniary return from a higher degree is associated with improved social capital – stronger interpersonal networks, a greater sense of trust and fairness, and more civic engagement. The monetary equivalent of these non-pecuniary returns is found to be substantial and slightly higher than the financial one. Most of these non-pecuniary benefits are earned in college while the majority of the return from attending a graduate school is purely financial. In fact, pursuing a graduate degree may come at the expense of some non-monetary benefits, especially those related to stronger social networks and civic engagement.

These non-monetary returns vary across the different subgroups of the population. It is three times as strong for women as it is for men. Blacks benefit less from higher education than whites. More importantly, the non-monetary returns have increased over the past several decades which may help to explain the rapid increase in the demand for college education.

Previous criticisms that education lowers subjective well-being by raising ambition are found to be questionable. A more optimistic (and less pessimistic) outlook on life is found to be positively correlated with happiness. The results further suggest that more educated people tend to be less pessimistic than their less educated counterparts. This is consistent with the results of previous studies which find that more educated people tend to be less myopic.

A structural equation model provides further confidence in the results from the main analytical part of this study and confirms that there are large indirect effects of better education on well-being through better health, more stable marriages, lower likelihood of unemployment, a more enjoyable job, and stronger social networks. This indirect effect is found to be thirteen times larger than the direct one and slightly larger than the combined direct and indirect effect of higher income associated with better education. The direct effect of higher education on subjective well-being, however, is found to be statistically insignificant in the structural equation model.

As an additional robustness test, the concavity of the utility function is estimated non-parametrically for different levels of educational attainment which reveals behavioral patterns related to inequality and risk aversion. It is found that more educated people are more inequality and risk averse. People with graduate degrees are found to display extreme inequality and risk aversion.

Finally, the effect of education on subjective well-being in the United States is compared to that in Europe. Similar patterns are discovered – educational attainment tends to be significantly and positively correlated with subjective well-being even after controlling for a large set of variables. Nevertheless, the non-monetary benefits from education in Europe tend to be much smaller than the non-monetary benefits in the United States.

3.7   Appendix

INCOME LEVEL
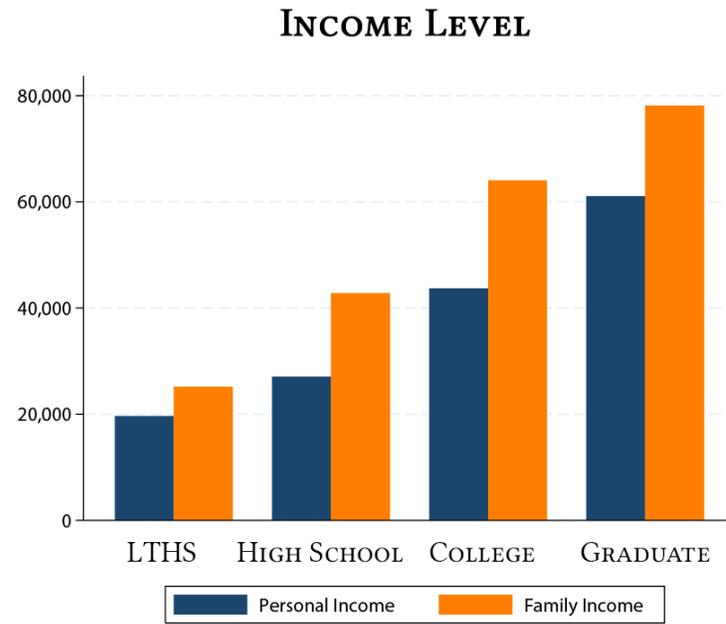
Figure 3.1: Educational Attainment, Personal and Family Income

A: Income Quintile

B: Education

C: Marital Status

D: Self-Reported Health

E: Job Satisfaction

F: Stress at Work

G: Importance of Friendships

H: Importance of Hobbies

I: Trust & Fairness
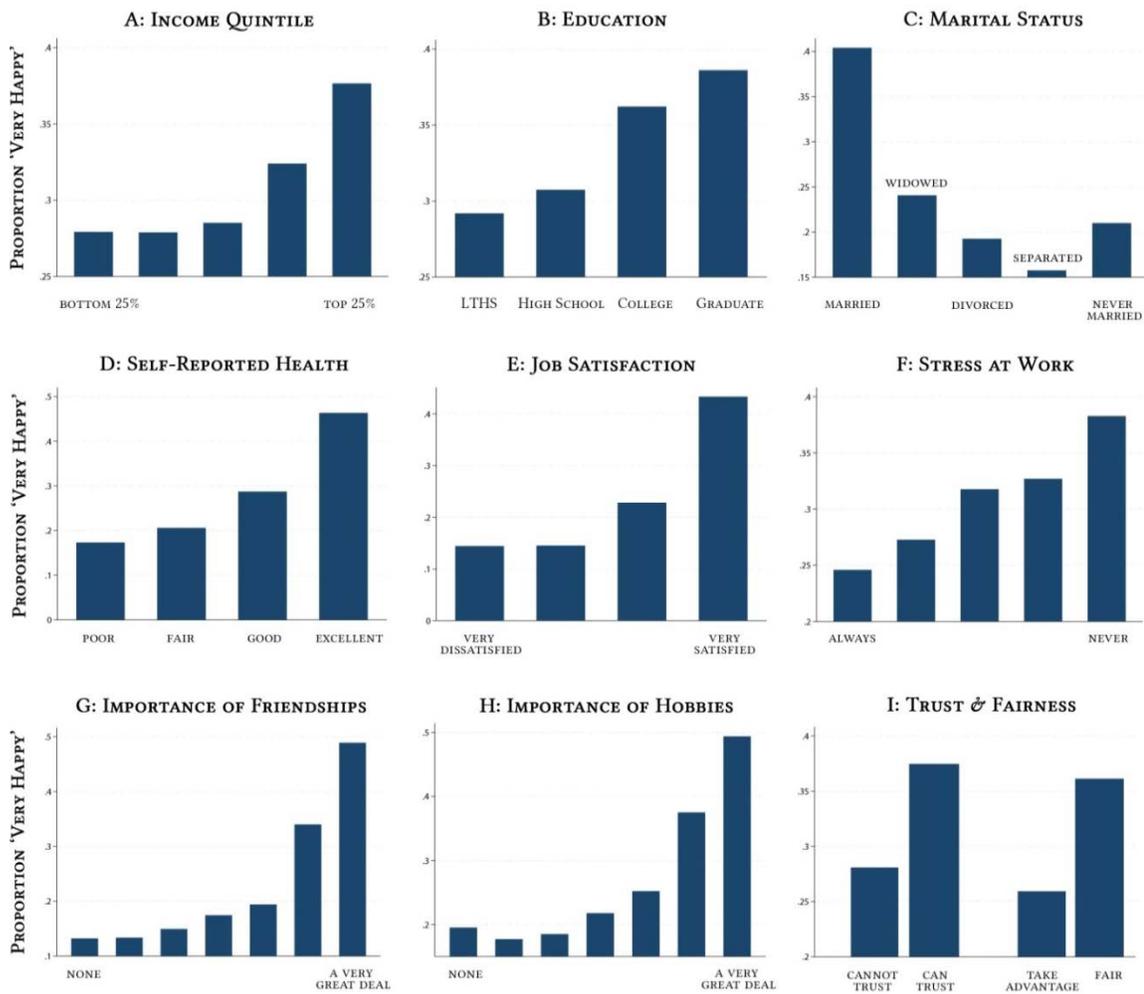
Figure 3.2: Happiness by Income and Educational Attainment

132
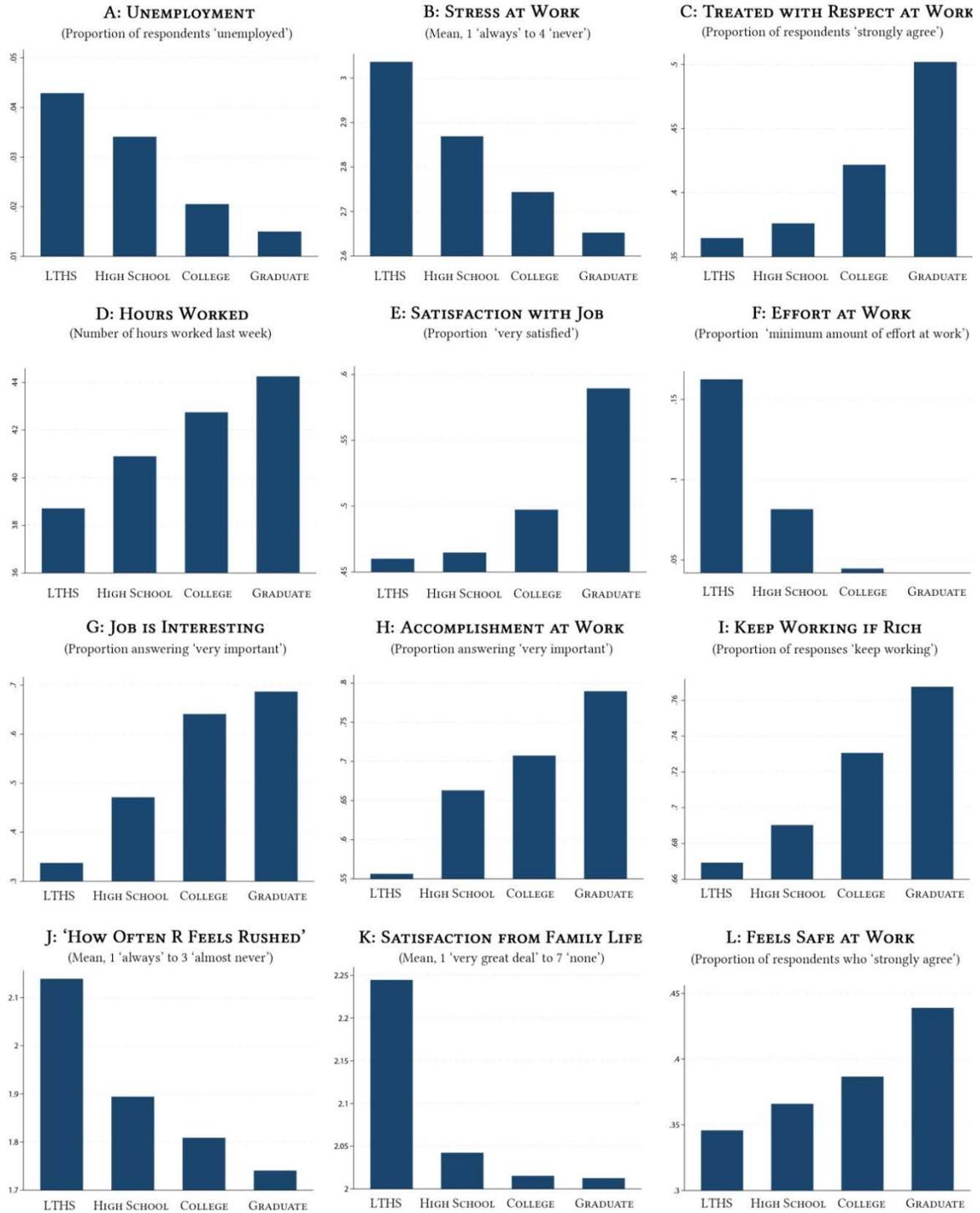
Figure 3.3: Labor Force Outcomes by Educational Attainment

A: Mental Health
(days with poor mental health in the past 30 days)

B: Physical Health
(days with poor physcial health in the past 30 days)

C: Self-Reported Health
(Proportion of respondents with 'excellent health')

D: 'Spouse Has a Higher Degree'
(Proportion of respondents)

E: Percent Married
(Proportion of respondents who are 'married')

F: Ever Separated or Divorced
(Proportion of respondents)

G: 'Favor Spanking of Child'
(Proportion of respondents who 'strongly disagree')

H: Learn Other Languages in HS
(Proportion of respondents who 'strongly agree')

I: 'Children Should Be Obedient'
(Proportion of respondents)

Figure 3.4: Marriage, Health, and Parenting Outcomes by Educational Attainment

134
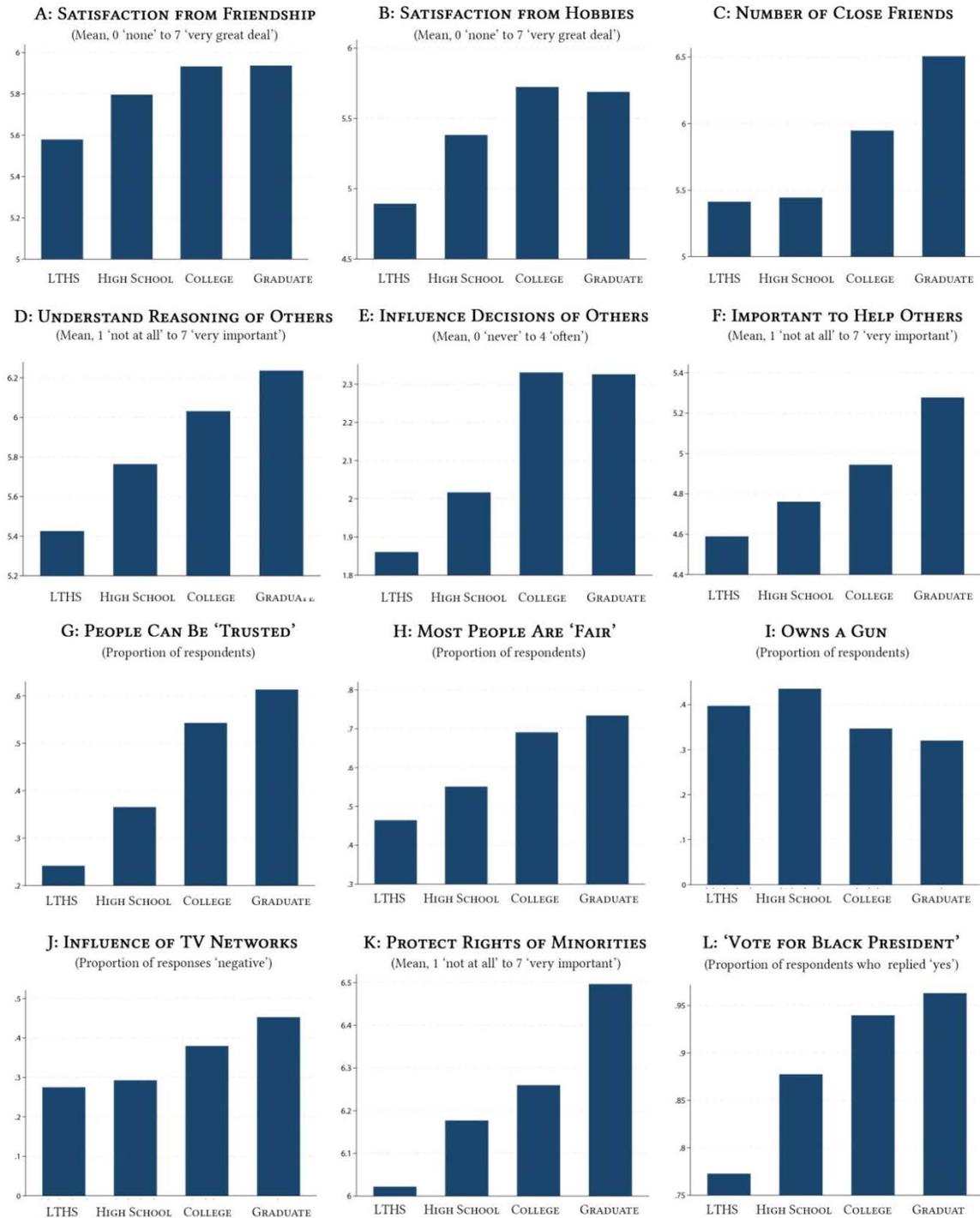
Figure 3.5: Social Capital Outcomes by Educational Attainment
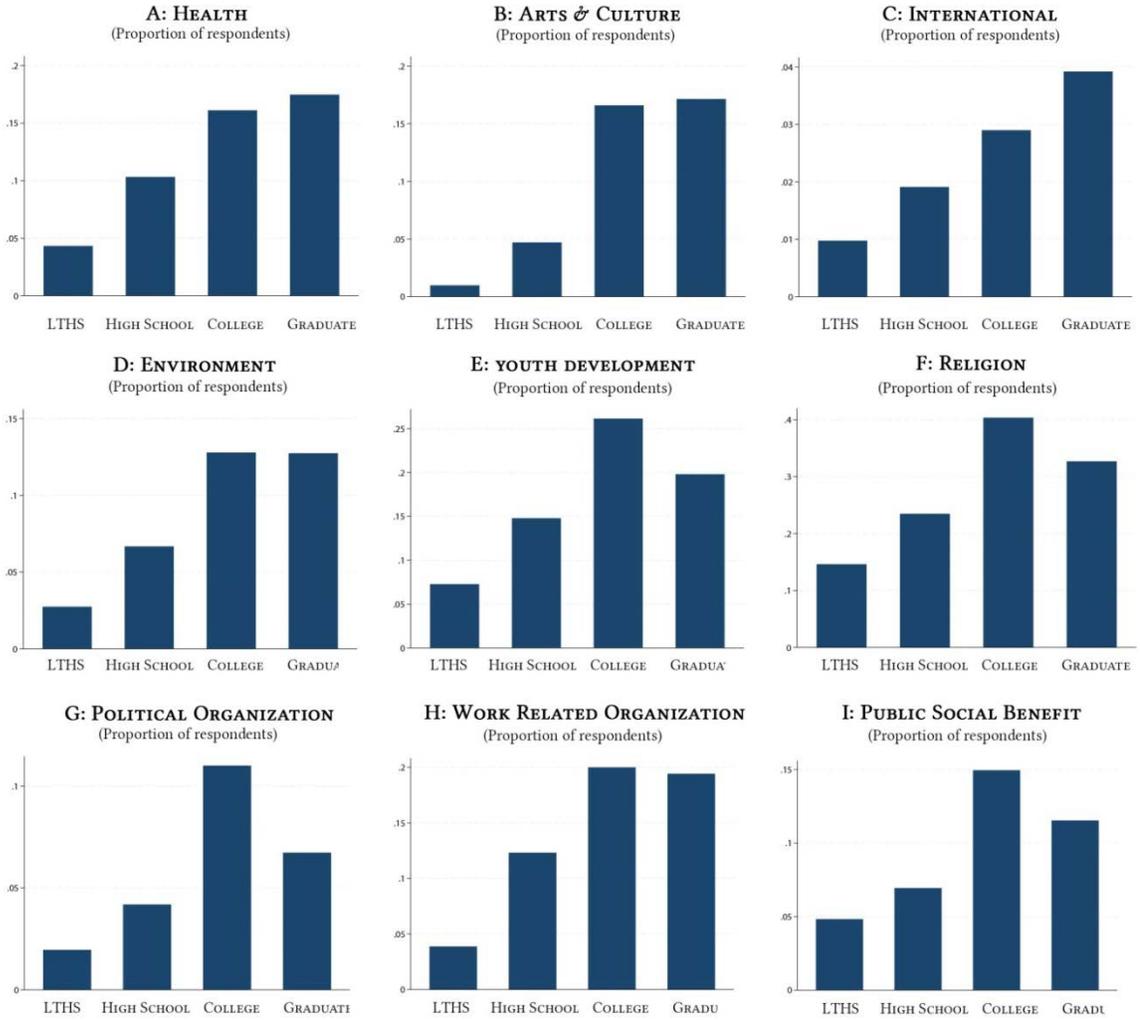
Figure 3.6: Types of Volunteering and Educational Attainment
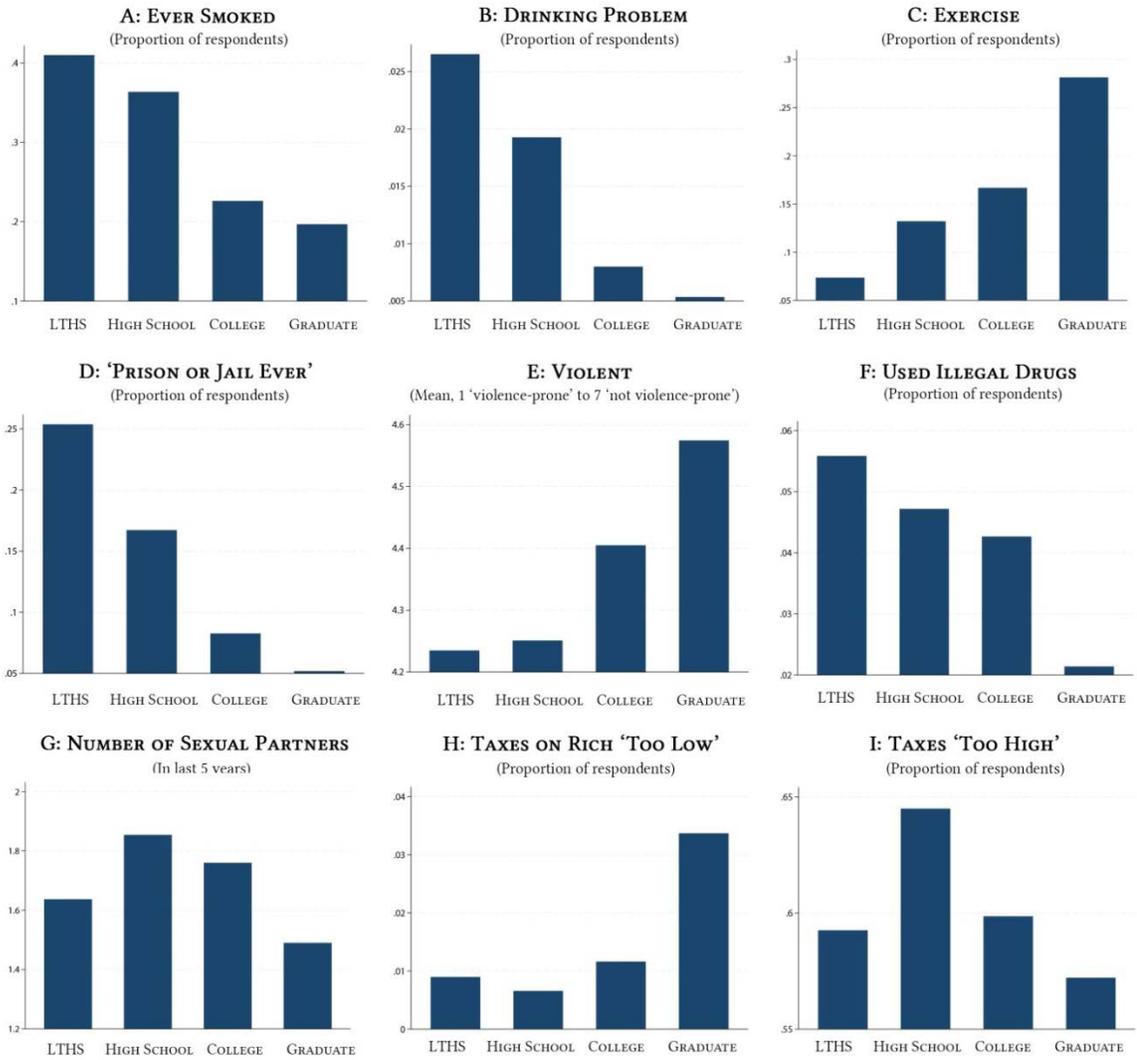
Figure 3.7: Risk and Inequality Aversion by Educational Attainment
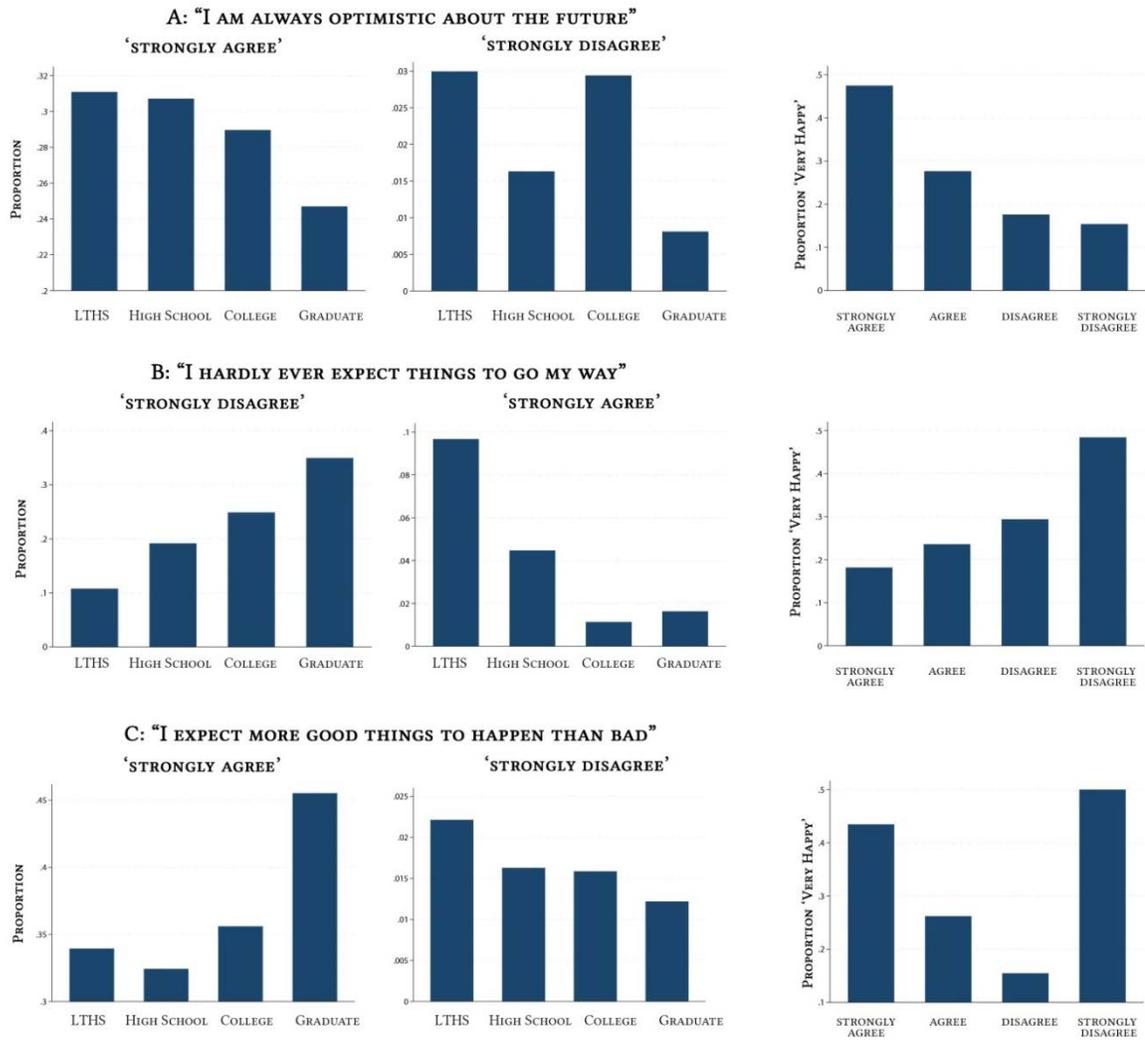
Figure 3.8: Optimism, Educational Attainment and Self-Reported Happiness
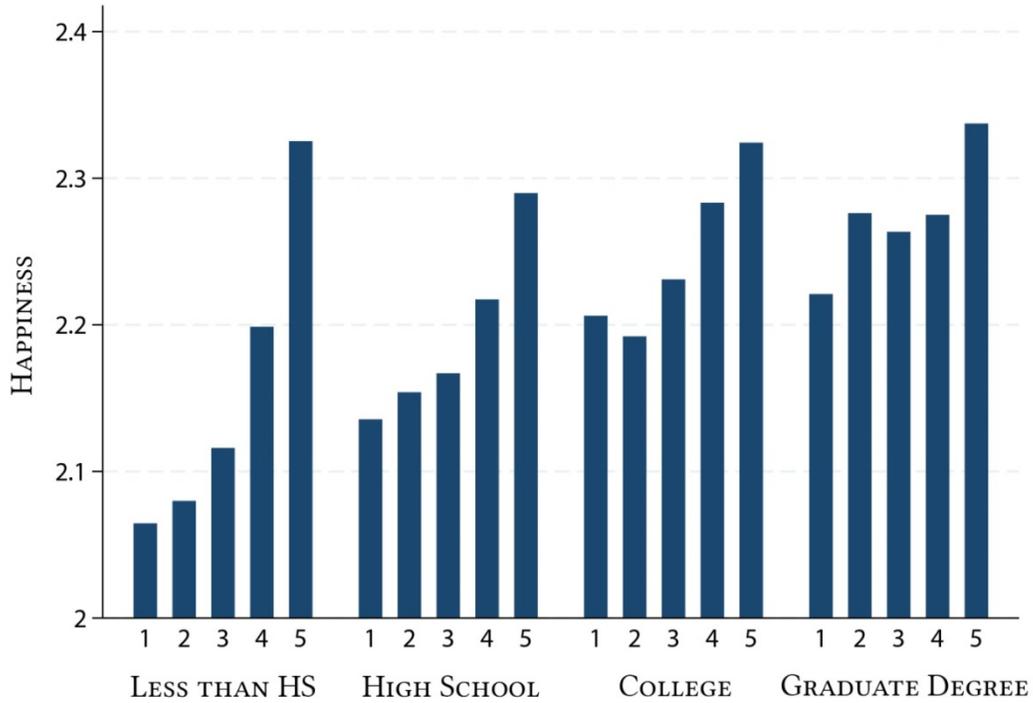
Figure 3.9: Happiness by Income and Educational Attainment

Note: 'Happiness' represents averages to the question: "*Taken all together, how would you say things are these days would you say that you are very happy* [3], *pretty happy* [2], *or not too happy* [1]? The categories '1' to '5' represent income quintiles, with '1' standing for the bottom 25 percent of income earners and '5' for the top 25 percent of income earners.
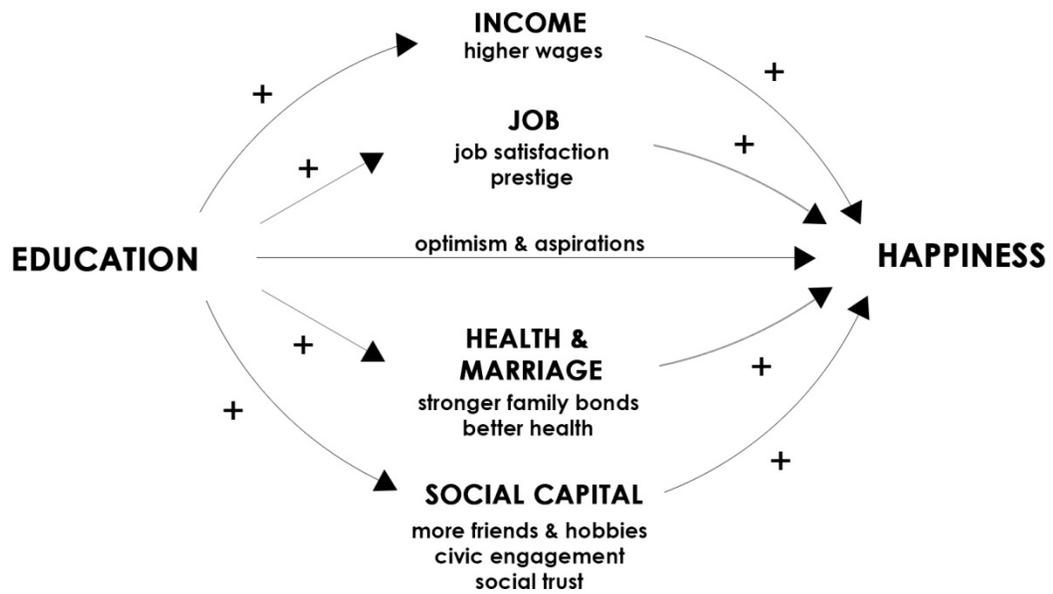
Figure 3.10: Indirect and Direct Effects of Educational Attainment on Happiness
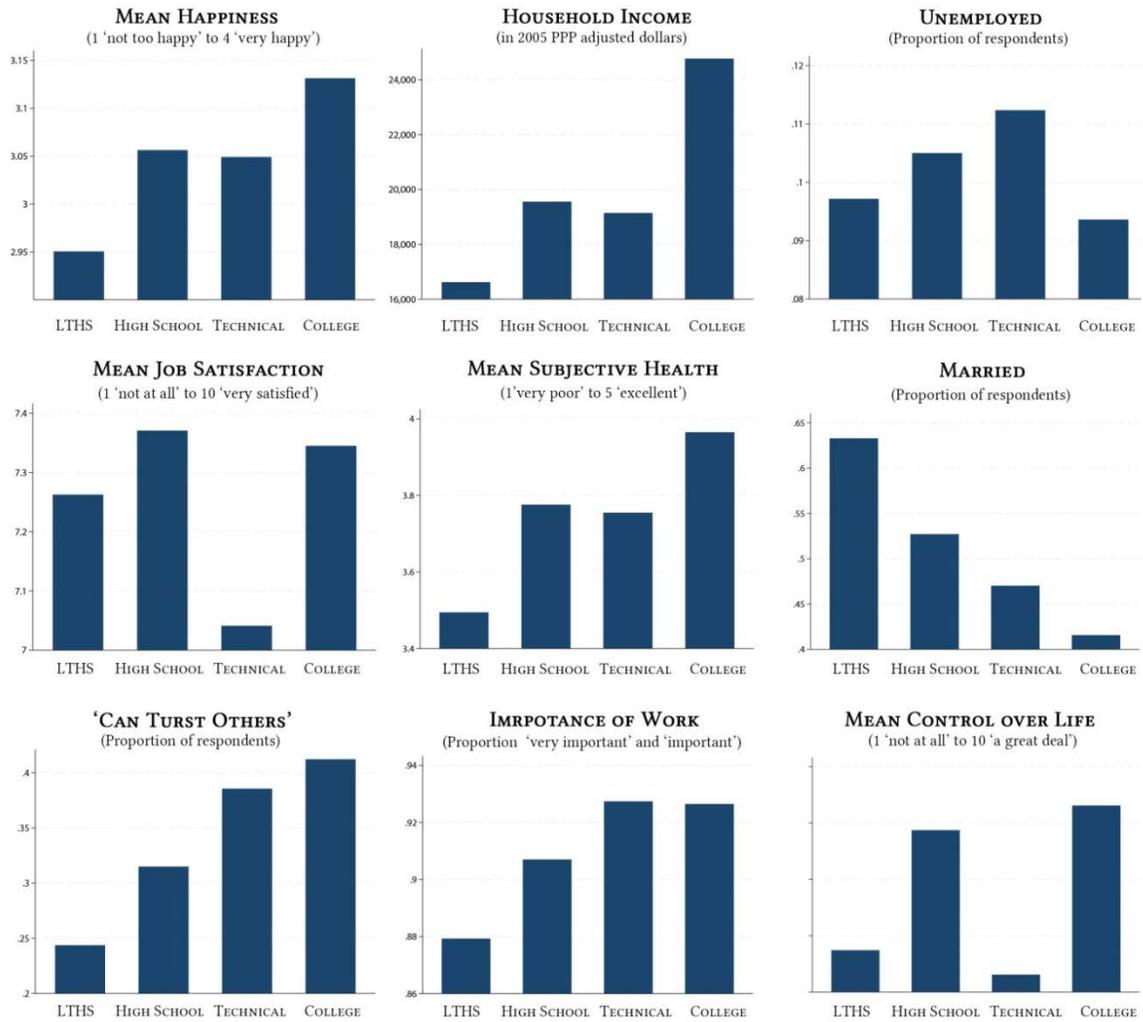
Figure 3.11: Educational Attainment and Subjective Well-Being in Europe

Table 3.1: Description and Sources of Main Variables

Micro Variables		
Happy	Data were collected with the 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?*" (1 'not too happy', 2 'pretty happy', 3 'very happy')	General Social Survey (GSS variable: *happy*) http://www3.norc.org/gss+website
Education	Dummy variables for 'high school', 'college', 'graduate school' ('less than high school' is the base category)	GSS variable: *degree*
Income	Respondent's income (in 2005 constant dollars)	GSS variable: *conrinc*
Relative Income	y_i/y^* where y^* is median income for sample (by year)	Own calculations
SEI	Prestige and socio-economic index	GSS variable: *sei*
Trust	Data was collected with the question: "*Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people*?" (0 'can trust', 1 'cannot trust')	GSS variable: *trust*
Fairness	*"Do you think most people would try to take advantage of you if they got a chance, or would they try to be fair?* (0 'take advantage' and 1 'fair')	GSS variable: *fair*
Job Satisfaction	Answers to the question: "*On the whole, how satisfied are you with the work you do*?" (0 'very dissatisfied' to 10 'very satisfied')	GSS variable: *satjob*
Friendships	Answers to the question: *"[H]ow much satisfaction do you get from … your friendships?"* (0 'none' and 7'very great deal')	GSS variable: *satfrnd*
Hobbies	Answers to the question: *"[H]ow much satisfaction do you get from … non-work activities?"* (0 'none' and 7'very great deal')	GSS variable: *sathobby*
Own a Gun	Dummy if person owns a gun (0 'does not' 1 'owns')	GSS variable: *owngun*
Optimistic	Responses to the statement: "*I'm always optimistic about my future*" (from 1 'strongly disagree' to 4 'strongly agree')	GSS variable: *optimism*
Pessimistic	Responses to the statement: "*I hardly ever expect things to go my way.*" (from 1 'strongly disagree' to 4 'strongly agree')	GSS variable: *pessimst*
More good things	Responses to the statement: "*Overall, I expect more good things to happen to me than bad.*" (from 1 'strongly disagree' to 4 'strongly agree')	GSS variable: *moregood*
Confidence Science	Responses to "confidence in … scientific community" (from 1 'hardly any to 4 'a great deal')	GSS variable: *consci*
Age	Age in years	GSS variable: *age*
Sex	Dummy variable for gender (0 'male', 1 'female')	GSS variable: *sex*
Race	Dummy variable for race (0: White, 1: Black)	GSS variable: *race*
Marital Status	Dummy variables for 'divorced', 'separated', and 'widowed' ('married' is the base category)	GSS variable: *marital*
Health	Dummy variables for 'poor', 'fair', 'good', and 'excellent' health ('poor' is used as a base)	GSS variable: *health*
Children	Number of children	GSS variable: *childs*
Employment Status	Dummy variable for unemployed	GSS variable: *wrkstat*
Knowledge	Score on knowledge test (0 'lowest' 10'highest')	GSS variable: *wordsum*
Siblings	Number of brothers and sisters	GSS variable: *sibs*
Hours worked	Number of hours worked last week	GSS variable: *hrs1*

Note: All variables were obtained from the General Social Survey. http://www3.norc.org/gss+website/

Table 3.2: Summary Statistics for Microeconomic Variables

Micro Variables	Observations	Mean	St. Dev.	Min	Max
Happy	52321	2.19	0.64	1	3
Degree	56896	1.05	0.80	0	3
Log Income	33365	9.92	1.09	5.95	12.98
Relative Income	33365	1.27	1.29	0.02	16.10
SEI	31277	48.42	19.18	17.1	97.2
Job Satisfaction	41277	3.30	0.81	1	4
Trust	37493	0.38	0.49	0	1
Fairness	35713	0.56	0.50	0	1
Friendships	24128	5.76	1.24	1	7
Hobbies	24034	5.29	1.57	1	7
Own a gun	34459	0.41	0.49	0	1
Optimistic	2367	3.11	0.72	1	4
Pessimistic	2368	2.05	0.74	1	4
More good things	2371	1.77	0.67	1	4
Confidence Science	35771	1.64	0.61	1	3
Age	56859	45.70	17.47	18	89
Female	57061	0.56	0.50	0	1
Black	57061	0.14	0.35	0	1
Married	57041	0.54	0.50	0	1
Widowed	57041	0.10	0.30	0	1
Divorced	57041	0.12	0.33	0	1
Separated	57041	0.03	0.18	0	1
Never Married	57041	0.20	0.40	0	1
Poor Health	42426	0.06	0.23	0	1
Fair Health	42426	0.19	0.39	0	1
Good Health	42426	0.45	0.50	0	1
Excellent Health	42426	0.31	0.46	0	1
Children	56880	1.95	1.79	0	8
Unemployed	57047	0.03	0.18	0	1
Knowledge	26916	6.00	2.14	0	10
Siblings	55382	3.94	3.19	0	68
Hours Worked	33051	41.23	14.20	0	89

Table 3.3: Basic Results

	Model 1			Model 2			Model 3			Model 4		
Log Income	0.0410	(.0039)	***	0.0375	(.0038)	***	0.0267	(.0044)	***	0.0305	(.0061)	***
Education												
High School	0.0489	(.0113)	***	0.0504	(.0111)	***	0.0124	(.0126)		0.0073	(.0179)	
College	0.1132	(.0135)	***	0.1151	(.0135)	***	0.0487	(.0154)	***	0.0606	(.0227)	***
Grad School	0.1157	(.0162)	***	0.1128	(.0161)	***	0.0499	(.0184)	***	0.0534	(.0272)	**
Personal Characteristics												
Age	-0.0101	(.0016)	***	-0.0185	(.0017)	***	-0.0142	(.0020)	***	-0.0155	(.0028)	***
Age squared	0.0001	(.0000)	***	0.0002	(.0000)	***	0.0002	(.0000)	***	0.0002	(.0000)	***
Female	0.0342	(.0074)	***	0.0608	(.0073)	***	0.0633	(.0084)	***	0.0924	(.0117)	***
Black	-0.1719	(.0108)	***	-0.1188	(.0108)	***	-0.1098	(.0123)	***	-0.1334	(.0167)	***
Unemployed	-0.2576	(.0202)	***	-0.2135	(.0200)	***	-0.2044	(.0225)	***	-0.2169	(.0316)	***
Marriage												
Widowed				-0.3234	(.0201)	***	-0.3194	(.0231)	***	-0.3240	(.0322)	***
Divorced				-0.2791	(.0102)	***	-0.2740	(.0116)	***	-0.2591	(.0162)	***
Separated				-0.3442	(.0199)	***	-0.3431	(.0226)	***	-0.2972	(.0318)	***
Never married				-0.2405	(.0100)	***	-0.2327	(.0114)	***	-0.2289	(.0159)	***
Number of Children				-0.0035	(.0027)	***	-0.0038	(.0030)		-0.0076	(.0042)	**
Health												
Fair							0.1723	(.0323)	***	0.1607	(.0478)	***
Good							0.3572	(.0312)	***	0.3511	(.0461)	***
Excellent							0.5522	(.0316)	***	0.5535	(.0466)	***
Other												
Knowledge										-0.0064	(.0031)	**
Number of siblings										0.0004	(.0020)	
R-Squared	0.0318			0.0764			0.1321			0.1357		
Observations	30401			30334			22409			11159		

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. All estimates are pooled OLS. The categories 'male', 'white', 'married', and 'poor health' were omitted because they are used as a base category.

Table 3.4: Job Satisfaction and Prestige

	Model 1			Model 2			Model 3			Model 4		
Log Income	0.0286	(.0054)	***	0.0178	(.0045)	***	0.0112	(.0058)	***	0.0224	(.0060)	***
Education												
High School	0.0068	(.0140)		0.0110	(.0128)		0.0142	(.0119)		0.0034	(.0189)	
College	0.0416	(.0166)	***	0.0475	(.0154)	***	0.0516	(.0149)	***	0.0360	(.0229)	*
Grad School	0.0461	(.0196)	**	0.0345	(.0183)	**	0.0345	(.0180)	**	0.0122	(.0275)	
Hours worked (last week)	0.0006	(.0003)										
Job Satisfaction												
a little dissatisfied				0.0549	(.0249)	***	0.0557	(.0230)	***	0.0609	(.0340)	***
mod. satisfied				0.1952	(.0226)	***	0.1957	(.0206)	***	0.2248	(.0310)	***
very satisfied				0.3994	(.0228)	***	0.3992	(.0206)	***	0.4311	(.0313)	***
Relative Position												
Relative Income							0.0087	(.0046)	**			
Socio-Economic Status										0.0004	(.0003)	
Controls	Yes			Yes			Yes			Yes		
R-Squared	0.1217			0.1751			0.1742			0.1827		
Observations	19219			21160			21206			12430		

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. All estimates are pooled OLS, and include controls for age, age squared, sex, race, marital status, health, and a dummy variable if the person is unemployed. The categories 'male', 'white', 'married', 'poor health' and 'less than high school' were omitted because they are used as a base category. Job satisfaction (GSS variable: *satjob*) represents answers to the question: "*On the whole, how satisfied are you with the work you do?*" Relative income is defined as y_i/y^* where y^* is median income for each year. Socioeconomic status (GSS variable: *SEI*) represents respondent's prestige and socioeconomic index (*see* GSS Methodological Report No. 74, Nakao and Treas, 1992)

Table 3.5: Social Capital

	Model 1			Model 2			Model 3			Model 4		
Log Income	0.0187	(.0072)	***	0.0202	(.0047)	***	0.0197	(.0072)	***	0.0190	(.0063)	***
Education												
High School	0.0109	(.0174)		0.0130	(.0134)		0.0025	(.0175)		0.0042	(.0179)	
College	0.0512	(.0222)	**	0.0507	(.0160)	***	0.0314	(.0224)		0.0271	(.0213)	
Grad School	0.0458	(.0274)	*	0.0464	(.0191)	**	0.0272	(.0278)		0.0094	(.0261)	
Job Satisfaction	0.1340	(.0080)	***	0.1602	(.0055)	***	0.1396	(.0079)	***	0.1607	(.0072)	***
Social Capital												
Friendships	0.0999	(.0055)	***									
Own a gun				0.0233	(.0086)	***						
Non-work activities							0.0680	(.0046)	***			
Social Trust										0.0645	(.0120)	***
Fairness										0.0736	(.0120)	***
Controls	Yes			Yes			Yes			Yes		
R-Squared	0.1958			0.1717			0.1642			0.1806		
Observations	8705			19207			9238			11389		

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. All estimates are pooled OLS, and include controls for age, age squared, sex, race, marital status, self-reported health, job satisfaction, and a dummy variable if the person is unemployed. The categories 'male', 'white', 'married', 'poor health' and 'less than high school' were omitted because they are used as a base category. Friendships (GSS variable: *satfrnd*) represents answers to the question "how much satisfaction [respondent] gets from friendships" on a scale from '1' (none) to '10' (very great deal). Hobbies (GSS variable: *sathobby*) represents answers to the question "how much satisfaction [respondent] gets from non-work activities" on a scale from '1' (none) to '10' (very great deal). Trust (GSS variable: *trust*) is a dummy variable with '1' if the respondent answered that most people can be 'trusted.' Fairness (GSS variable: *fair*) is a dummy variable with '1' if the respondent answered that most people are 'fair.' Own a gun (GSS variable: *owngun*) is a dummy with '1' if the respondent owns a gun.

Table 3.6: Education and Social Capital

Dependent Variable	Friendships (1)			Trust (2)			Hobbies (3)			Own a Gun (4)		
Log Income	0.0426	(.0110)	***	0.0347	(.0099)	***	-0.0567	(.0136)	***	-0.0333	(.0096)	***
Education												
High School	0.1378	(.0273)	***	0.4528	(.0298)	***	-0.3533	(.0337)	***	-0.0785	(.0267)	***
College	0.2410	(.0364)	***	0.8720	(.0353)	***	-0.6225	(.0450)	***	0.2751	(.0334)	***
Grad School	0.2602	(.0461)	***	1.0058	(.0423)	***	-0.6030	(.0570)	***	0.3899	(.0398)	***
Controls	Yes			Yes			Yes			Yes		
R-Squared	0.0389			0.0759			0.0350			0.0394		
Observations	13861			21295			13840			20393		

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. Since the regressions include aggregated variables over time, the standard errors are clustered around year. Model (1) and (3) are pooled OLS regressions and models (2) and (4) provide estimates from an ordered probit procedure. All models include controls for age, age squared, sex, and race. The categories 'male', 'white', 'married', and 'less than high school' were omitted because they are used as a base category. The dependent variables are the following: Friendships (GSS variable: *satfrnd*) represents answers to the question "how much satisfaction [respondent] gets from friendships" on a scale from '1' (none) to '10' (very great deal). Hobbies (GSS variable: *sathobby*) represents answers to the question "how much satisfaction [respondent] gets from non-work activities" on a scale from '1' (none) to '10' (very great deal). Trust (GSS variable: *trust*) is a dummy variable with '1' if the respondent answered that most people can be 'trusted.' Fairness (GSS variable: *fair*) is a dummy variable with '1' if the respondent answered that most people are 'fair.' Own a gun (GSS variable: *owngun*) is a dummy with '1' if the respondent owns a gun.

Table 3.7: Optimism and Aspirations

	Model 1			Model 2			Model 3			Model 4		
Log Income	0.0383	(.0237)		0.0390	(.0240)		0.0326	(.0239)		0.0361	(.0045)	***
Education												
High School	0.0514	(.0938)		0.0252	(.0955)		0.0567	(.0939)		0.0385	(.0126)	***
College	0.1306	(.1047)		0.0669	(.1079)		0.1212	(.1049)		0.0943	(.0156)	***
Grad School	0.1614	(.1132)		0.1136	(.1162)		0.1762	(.1134)		0.0815	(.0191)	***
Optimism												
Optimistic	0.3136	(.0630)	***									
Pessimistic				0.2097	(.0606)	***						
Good things							0.3908	(.0808)	***			
Confidence Science										0.0504	(.0085)	***
Controls	Yes			Yes			Yes			Yes		
R-Squared	0.0610			0.0431			0.0597			0.0325		
Observations	669			669			668			21685		

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. Since the regressions include aggregated variables over time, the standard errors are clustered around year. All estimates are from pooled OLS regressions, and include controls for age, age squared, sex, race, marital status, unemployment rate, education level, and a dummy whether the person is unemployed. The categories 'male', 'white', 'married', and 'less than high school' were omitted because they are used as a base category.

Table 3.8: The Marginal Rate of Substitution (at Mean High School Income)

1 Educational Level	2 Mean Income	3 ψ	4 Marginal Benefit	5 Lifetime Premium
Less Than High School	$26,625	base	base	base
High School (Base)	$26,625	$31,734	$31,734	$1,269,350
College	$26,625	$73,417	$41,683	$2,936,686
Graduate School	$26,625	$75,017	$1,600	$3,000,678

Note: ψ represents marginal rate of substitution between educational attainment and income. Coefficients on log of income and educational attainments from model 3 in Table 3.3 were used to calculate ψ.. Mean income represents mean income for high school graduates in 2010. Lifetime premium calculated for a hypothetical 40-year working life and is discounted at a rate of 7 percent. A typical work-life is defined by the Census Bureau as the period between 25 and 65.

Table 3.9: The Marginal Rate of Substitution (at Mean Level of Income by Educational Attainment)

1 Educational Level	2 Mean Income*	3 ψ	4 Marginal Benefit	5 Lifetime Premium
Less Than High School	$26,625	base	base	Base
High School (Base)	$26,625	$31,734	$31,734	$1,269,350
College	$43,702	$120,506	$88,772	$4,820,246
Graduate School	$61,083	$172,104	$51,598	$6,884,147

Note: ψ represents marginal rate of substitution between educational attainment and income. Coefficients on log of income and educational attainments from model 3 in Table 3.3 were used to calculate ψ.. Mean income represents mean income for high school graduates in 2010. Lifetime premium calculated for a hypothetical 40-year working life and discounted at a rate of 7 percent. A typical work-life is defined by the Census Bureau as the period between 25 and 65.

Table 3.10: The Marginal Rate of Substitution – Accounting for Marriage and Health

1 Educational Level	2 Mean Income	3 ψ	4 Marginal Benefit	5 Lifetime Premium
Less Than High School	$26,625	base	base	Base
High School (Base)	$26,625	$6,385	$6,385	$255,417
College	$26,625	$52,949	$46,563	$2,117,957
Graduate School	$26,625	$46,651	-$6,298	$1,866,044

Note: ψ represents marginal rate of substitution between educational attainment and income. Coefficients on log of income and educational attainments from model 3 in Table 3.3 were used to calculate ψ. Mean income represents mean income for high school graduates in 2010. Lifetime premium calculated for a hypothetical 40-year working life and discounted at a rate of 7 percent per year. A typical work-life is defined by the Census Bureau as the period between 25 and 65.

Table 3.11: The Marginal Rate of Substitution – Accounting for Job Satisfaction and Social Capital

1 Educational Level	2 Mean Income*	3 ψ	4 Marginal Benefit	5 Lifetime Premium
Less Than High School	$26,625	base	base	base
High School (Base)	$26,625	$5,903	$5,903	$236,132
College	$26,625	$37,935	$32,032	$1,517,408
Graduate School	$26,625	$13,125	-$24,810	$525,015

Note: ψ represents marginal rate of substitution between educational attainment and income. Coefficients on log of income and educational attainments from model 4 in Table 3.9 were used to calculate ψ. Mean income represents mean income for high school graduates in 2010. Lifetime premium calculated for a hypothetical 40-year working life and is discounted at a rate of 7 percent per year. A typical work-life is defined by the Census Bureau as the period between 25 and 65.

Table 3.12: Basic Results, Ordered Probit

	Model 1			Model 2			Model 3			Model 4		
Log Income	0.0779	(.0074)	***	0.0733	(.0075)	***	0.0538	(.0089)	***	0.0625	(.0126)	***
Education												
High School	0.0925	(.0212)	***	0.0985	(.0215)	***	0.0256	(.0252)		0.0150	(.0366)	
College	0.2155	(.0256)	***	0.2262	(.0263)	***	0.0998	(.0310)	***	0.1257	(.0467)	***
Grad School	0.2210	(.0309)	***	0.2221	(.0317)	***	0.1023	(.0375)	***	0.1108	(.0562)	**
Personal Characteristics												
Age	-0.0193	(.0031)	***	-0.0364	(.0034)	***	-0.0288	(.0040)	***	-0.6625	(.0655)	***
Age squared	0.0002	(.0000)	***	0.0004	(.0000)	***	0.0004	(.0000)	***	-0.5278	(.0331)	***
Female	0.0646	(.0141)	***	0.1184	(.0144)	***	0.1274	(.0169)	***	-0.6023	(.0643)	***
Black	-0.3225	(.0202)	***	-0.2295	(.0209)	***	-0.2186	(.0243)	***	-0.4674	(.0326)	***
Unemployed	-0.4810	(.0379)	***	-0.4098	(.0386)	***	-0.4046	(.0448)	***	-0.0157	(.0087)	***
Marriage												
Widowed				-0.6285	(.0388)	***	-0.6406	(.0459)	***	-0.3240	(.0322)	***
Divorced				-0.5410	(.0198)	***	-0.5468	(.0233)	***	-0.2591	(.0162)	***
Separated				-0.6639	(.0383)	***	-0.6813	(.0448)	***	-0.2972	(.0318)	***
Never married				-0.4674	(.0196)	***	-0.4654	(.0230)	***	-0.2289	(.0159)	***
Number of Children				-0.0068	(.0052)	***	-0.0077	(.0061)		-0.0076	(.0042)	**
Health												
Poor							0.3416	(.0650)	***	0.3253	(.0976)	***
Good							0.7052	(.0630)	***	0.7076	(.0946)	***
Excellent							1.0993	(.0642)	***	1.1236	(.0961)	***
Other												
Knowledge										-0.0131	(.0065)	**
Number of siblings										0.0007	(.0041)	
R-Squared	0.0318			0.0764			0.1321			0.1357		
Observations	30401			30334			22409			11159		
/cut1	-0.7400	(.0796)	***	-1.3836	(.0881)	***	-0.6865	(.1187)	***	-0.7667	(.1732)	***
/cut2	1.0354	(.0796)	***	0.4478	(.0877)	***	1.1940	(.1189)	***	1.1606	(.1735)	***

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. All estimates are ordered probit. The categories 'male', 'white', 'married', and 'poor health' were omitted.

Table 3.13: Inequality and Risk Aversion

Subgroup	λ			Observations	ε
All subjects	0.50	(.0555)	***	30439	0.50
Less than High School	0.72	(.2303)	***	4360	0.28
High School	0.67	(.1000)	***	18350	0.33
College	0.64	(.1467)	***	5139	0.36
Graduate School	0.03	(.2017)	***	2549	0.97
Year <1980	0.81	(.1920)	***	5293	0.19
1980 <Year <1990	0.61	(.1303)	***	8782	0.39
1990 <Year <2000	0.51	(.1301)	***	9427	0.49
Year > 2000	0.36	(.0945)	***	6934	0.64
Year <1995					
Low Education	0.83	(.1314)	***	13950	0.17
High Education	0.70	(.2649)	***	3997	0.30
Year >1995					
Low Education	0.49	(.1338)	***	8760	0.51
High Education	0.34	(.1629)	**	3729	0.66

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. All coefficients are estimated using maximum likelihood procedure with a Box-Cox transformation on the independent variable *income*. All regressions include controls for age, age squared, sex, race, marital status. The categories 'male', 'white', 'married', and 'less than high school' were omitted because they are used as a base category.

Table 3.14: Interaction between Income and Educational Attainment

	Model 1			Model 2			Model 3		
Log Income	0.0220	(.0051)	***	0.0136	(.0057)	**	0.0081	(.0058)	***
Education									
High School	0.0154	(.0126)		-0.0100	(.0141)		-0.0042	(.0143)	
College	0.0996	(.0159)	***	0.0389	(.0183)	**	0.0407	(.0182)	**
Grad School	0.1148	(.0206)	***	0.0453	(.0236)	**	0.0281	(.0233)	
Y*High School	1.49E-06	(2.40E-07)	***	9.80E-07	(2.66E-07)	***	6.60E-07	(2.61E-07)	**
Y*College	6.91E-07	(2.17E-07)	***	4.81E-07	(2.53E-07)	**	3.32E-07	(2.49E-07)	
Y*Grad School	4.20E-07	(2.20E-07)	**	3.53E-07	(2.52E-07)		3.28E-07	(2.45E-07)	
Job Satisfaction							0.1608	(.0052)	***
Controls	YES			YES			YES		
R-Squared	0.0331			0.1751			0.1733		
Observations	30401			21160			21160		

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. All estimates are pooled OLS regressions, and include controls for age, age squared, sex, race, marital status, health, number of children, and a dummy whether the person is unemployed. The categories 'male', 'white', 'married', 'poor health' and 'less than high school' were omitted because they are used as a base category. Model (1) is the basic model. Model (2) includes additional controls for marriage and health. Model (3) also includes a variable that measures job satisfaction.

Table 3.15: Non-Monetary Returns by Subgroups

	Sex				Race			
	Male		Female		White		Black	
High School	0.0191		0.0856	***	0.0558	***	0.0252	***
	(.0149)		(.0173)		(.0128)		(.0285)	
College	0.0594	***	0.1742	***	0.1222	***	0.0845	
	(.0180)		(.0205)		(.0150)		(.0407)	
Grad School	0.0593	***	0.1810	***	0.1300	***	0.0870	*
	(.0213)		(.0249)		(.0213)		(.0249)	
Observations	15474		14927		24882		3967	
R-Squared	0.0394		0.0305		0.0220		0.0355	

	Marital Status				Political Affiliation			
	Married		Never Married		Democrat		Republican	
High School	0.0493	*	0.0460	*	0.0283		0.1304	***
	(.0148)		(.0247)		(.0179)		(.0463)	
College	0.1002	**	0.1485	***	0.0947	***	0.1318	***
	(.0176)		(.0288)		(.0226)		(.0503)	
Grad School	0.0830	***	0.1754	***	0.1135	***	0.1476	**
	(.0203)		(.0361)		(.0258)		(.0591)	
Observations	16687		7188		10812		2683	
R-Squared	0.0215		0.0406		0.0307		0.0355	

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. All estimates are from pooled OLS regressions, and include controls for age, age squared, sex, race, marital status, number of children, health, and a dummy whether the person is unemployed. The categories 'male', 'white', 'married', 'poor health' and 'less than high school' were omitted because they are used as a base category.

Table 3.16: The Non-Monetary Return from Education over Time

	<1995				>1995		
Log Income	0.0362	(.0061)	***		0.0494	(.0060)	****
Education							
High School	0.0494	(.0153)	***		0.0745	(.0210)	****
College	0.0998	(.0197)	***		0.1527	(.0237)	****
Grad School	0.1277	(.0241)	***		0.1341	(.0273)	****
Controls	Yes				Yes		
R-Squared	0.0366				0.0308		
Observations	13192				12475		

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. All estimates are from pooled OLS regressions, and include controls for age, age squared, sex, race, marital status, number of children, health, and a dummy whether the person is unemployed. The categories 'male', 'white', 'married', 'poor health' and 'less than high school' were omitted because they are used as a base category.

Table 3.17: Structural Equation Model – Direct and Indirect Effect from Education

Part 1	Direct Effects			Indirect Effect			Total Effect		
Log Income	0.0155	(.0061)	***	0.0321	(.0021)	***	0.0476	(.0066)	***
Education	0.0055	(.0076)		0.0727	(.0042)	***	0.0782	(.0075)	***
Job Satisfaction	0.1680	(.0071)	***				-0.0031	(.0026)	***
Unemployed	-0.2216	(.0355)	***				-0.2216	(.0355)	***
Health	0.1612	(.0079)	***				0.1612	(.0079)	***
Marriage	-0.2525	(.0297)	***				-0.2525	(.0297)	***
Social Trust	0.0984	(.0111)	***				0.0984	(.0111)	***

Part 2	Log Income (1)				Unemployed (2)		
Education	0.4557	(.0111)	***	Log Income	-0.0158	(.0020)	***
				Education	-0.0064	(.0017)	***
Divorced or Separated (3)				**Health (4)**			
Log Income	-0.0033	(.0017)	***	Log Income	0.0497	(.0069)	***
Education	-0.0103	(.0022)	***	Education	0.1792	(.0089)	***
Social Capital (5)				**Job Satisfaction (6)**			
Log Income	0.0351	(.0044)	***	Log Income	0.0969	(.0078)	***
Education	0.1282	(.0059)	***	Education	0.0325	(.0098)	***

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. The structural model is estimated with a maximum likelihood procedure. All models include controls for age, age squared, sex, and race. The categories 'male', 'white', 'married', 'poor health' and 'less than high school' were omitted because they are used as a base category.

Table 3.18: Educational Attainment and Subjective Well-being in Europe

	Model 1			Model 2			Model 3			Model 4		
log Income	0.1351	(.0039)	***	0.0941	(.0054)	***	0.0053	(7.8300)	***	0.0400	(.0054)	***
Education												
High School	0.0291	(.0077)	***	0.0380	(.0103)	***	0.0378	(.0097)	***	0.0354	(.0100)	***
Technical	0.0313	(.0167)	*	0.0200	(.0197)		0.0263	(.0187)		0.0248	(.0191)	
College	0.0396	(.0108)	***	0.0388	(.0132)	***	0.0404	(.0125)	***	0.0364	(.0128)	***
Personal												
Age	-0.0108	(.0009)	***	-0.0117	(.0017)	***	-0.0161	(.0018)	***	-0.0164	(.0019)	***
Age squared	0.0001	(.0000)	***	0.0001	(.0000)	***	0.0001	(.0000)	***	0.0001	(.0000)	***
Female	0.0118	(.0058)	**	0.0048	(.0073)		0.0319	(.0070)	***	0.0258	(.0072)	***
Unemployed	-0.1047	(.0102)	***	-0.0511	(.0674)		-0.0599	(.0647)		-0.0582	(.0656)	
Job												
Job Satisfaction				0.0612	(.0018)	***	0.0467	(.0017)	***	0.0451	(.0017)	***
Marriage												
Cohabiting							-0.0366	(.0220)	*	-0.0333	(.0224)	*
Divorced							-0.2110	(.0129)	***	-0.2079	(.0133)	***
Separated							-0.3310	(.0278)	***	-0.3219	(.0285)	***
Widowed							-0.2688	(.0205)	***	-0.2679	(.0209)	***
Never Married							-0.1591	(.0109)	***	-0.1621	(.0112)	***
Children							0.0090	(.0037)	***	0.0094	(.0038)	***
Health												
Poor							0.3805	(.0548)	***	0.3637	(.0556)	***
Fair							0.6254	(.0523)	***	0.6050	(.0530)	***
Good							0.8214	(.0522)	***	0.7940	(.0529)	***
Very Good							1.0806	(.0526)	***	1.0461	(.0533)	***
Social Capital												
Trust										0.0304	(.0085)	***
Fairness										0.0139	(.0017)	***
Control												
Control over Life												
R-Squared	0.1520			0.1786			0.2745			0.2786		
Country x Year	Yes			Yes			Yes			Yes		
Observations	50272			25434			25100			23985		

Note: ***(**)[*] indicate significance at p<.01(p<.05)[p<.1]. Robust standard errors are reported in parenthesis. All estimates are from pooled OLS regressions. The categories 'male', 'married', 'very poor health' and 'less than high school' were omitted because they are used as a base category.

Table 3.19: The Marginal Rate of Substitution -- Europe

1	2	3	4	5
Educational Level	**Mean Income***	**ψ**	**Marginal Benefit**	**Lifetime Premium**
Less Than High School	$26,625	base	base	base
High School	$26,625	$5,743	$5,743	$229,726
Technical	$26,625	$6,174	$431	$246,974
College	$26,625	$7,803	$1,629	$312,122

Note: ψ represents marginal rate of substitution between educational attainment and income. Coefficients on log of income and educational attainments from model 1 in Table 3.17 were used to calculate ψ. Mean income represents mean income for high school graduates in 2010. Lifetime premium calculated for a hypothetical 40-year working life and discounted at 7 percent. A typical work-life is defined by the Census Bureau as the period between 25 and 65.

Table 3.20: Educational Attainment and Subjective Well-being in Europe and United States

	Model 1				Model 2				Model 3				Model 4			
	EU		USA		EU		USA		EU		USA		EU		USA	
log Income	0.1351	***	0.1149	***	0.0941	***	0.0979	***	0.0053	***	0.0328	***	0.0053	***	0.0281	***
	(.0039)		(.0036)		(.0054)		(.0040)		(7.8300)		(.0048)		(7.8300)		(.0065)	
Education																
High School	0.0291	***	0.0224	***	0.0380	***	0.0181	**	0.0378	***	0.0081		0.0378	***	-0.0055	
	(.0077)		(.0080)		(.0103)		(.0091)		(.0097)		(.0102)		(.0097)		(.0137)	
Technical	0.0313	*			0.0200				0.0263				0.0263			
	(.0167)				(.0197)				(.0187)				(.0187)			
College	0.0396	***	0.0582	***	0.0388	***	0.0475	***	0.0404	***	0.0322	***	0.0404	***	-0.0008	
	(.0108)		(.0098)		(.0132)		(.0108)		(.0125)		(.0122)		(.0125)		(.0165)	

Note: ***(**)[*] indicate significance at $p<.01$ ($p<.05$) [$p<.1$]. Robust standard errors are reported in parenthesis. All estimates are from pooled OLS regressions, and include controls for age, age squared, sex, race, marital status, self-reported health, job satisfaction, a dummy whether the person is unemployed, social trust, and perception of fairness. The categories 'male', 'white', 'married', 'poor health', 'less than high school', 'cannot trust other', and 'people try to take advantage' were omitted because they are used as a base category.

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