# Rising income inequality and economic growth – are Americans better off?

## Evidence from subjective well-being data

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**Abstract**

Economic growth in the United State since the 1970's has not benefited equally all income classes. Most income gains have gone to the top income quintile while the real wages of the poorest Americans have declined. This study shows that the rising level of income inequality can explain the stagnating happiness levels of Americans in the past several decades. First, using subjective well-being data from the General Social Survey, I estimate the parameter of inequality aversion 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 concavity of the social welfare 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 model predicts that economic growth has not been sufficient to compensate for the loss of subjective well-being associated with the rising level of inequality.

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# 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 1 and 2 in the Appendix 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 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, $\varepsilon$, 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.

[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).

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

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 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, $\varepsilon$, 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, $\varepsilon$ 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 paper 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, Verme, 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.

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

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

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 Theoretical Considerations

## 2.1 Economic Growth and Happiness

### 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, 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

[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.

"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 4).

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 individual fixed-effects (such as different personality traits) find that the income variable is positively correlated with life-satisfaction. Figure 6 in the Appendix shows that the average self-reported happiness in the United States increases with income. Similarly, Figure 7 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.

### 2.1.2 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:

$$U = U(u_1(y), u_2(y/y^*), u_3(Z)) \tag{1}$$

[6]It is important to note that Kahneman and Deaton acknowledge that happiness is multi-dimensional 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.

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:

$$U_i = \beta_1 lny_i + \beta_2(y_i/y_i^*) + Z_i^{'}\gamma + \varepsilon_{it} \tag{2}$$

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.

### 2.1.3 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 8 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 9 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 9 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 10 in the Appendix).

### 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 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.[7] 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:

$$W = \frac{1}{n} \sum u_i(y_i) \tag{3}$$

where social welfare, $W$, is aggregate utility, a function of personal income, $y_i$.[8] To incorporate the idea that additional income may bring greater marginal utility to poorer people, I use an iso-elastic utility function, which assigns weights to different levels of income:

$$u_i = \begin{cases} \dfrac{y_i^{1-\varepsilon} - 1}{1-\varepsilon} & \text{if} \quad \varepsilon \neq 1 \\ logy_i & \text{if} \quad \varepsilon = 1 \end{cases} \tag{4}$$

where $\varepsilon$ 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:

$$W = \frac{1}{n} \sum u_i(y_i) \rightarrow Utilitarian. \tag{5}$$

In this case society does not care about inequality at all, and social welfare is determined only by

[7] 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.

[8] 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."

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 $\varepsilon \to \infty$ the social welfare function turns into:

$$W = min(u_i(y_i)) \to Rawlsian. \tag{6}$$

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 $\varepsilon$ is between these two polar cases, the social welfare function has an iso-elastic form:

$$W = \frac{1}{n} \sum \frac{y_i^{1-\varepsilon} - 1}{1 - \varepsilon} \to Iso - elastic. \tag{7}$$

This function is increasing with income:

$$\frac{\partial W}{\partial y_i} = \frac{y_i^{-\varepsilon}}{n} > 0 \tag{8}$$

but at a decreasing rate:

$$\frac{\partial^2 W}{\partial y_i^2} = -\varepsilon \frac{y_i^{-\varepsilon-1}}{n} < 0 \tag{9}$$

so that as $\varepsilon$ 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:

$$\frac{\partial W/\partial y_A}{\partial W/\partial y_B} = \left(\frac{y_B}{y_A}\right)^{\varepsilon}. \tag{10}$$

Thus, when $\varepsilon = 1$, and $u_i = logy_i$, 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.

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

$$A(\varepsilon) = 1 - \left(\frac{1}{n}\sum (y_i/\mu)^{1-\varepsilon}\right)^{1/1-\varepsilon} \tag{11}$$

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

$$A(\varepsilon) = 1 - \prod (y_i/\mu)^{1/n}. \tag{12}$$

The core idea of the Atkinson index is that there exists a level of income, $\xi$, 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 13 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 $\xi$, 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 $\xi/\mu$, then a society with an egalitarian distribution will have $\xi/\mu = 1$. The Atkinson index of inequality then can be expressed as:

$$A(\varepsilon) = 1 - \frac{\xi}{\mu}. \tag{13}$$

In order to find an expression for $\xi$, we observe that by virtue of (4):

$$u(\xi) = \frac{\xi^{1-\varepsilon} - 1}{1 - \varepsilon} \tag{14}$$

and from (7) we get:

$$W = \frac{1}{n} \sum \frac{y_i^{1-\varepsilon} - 1}{1 - \varepsilon} = \frac{1}{n} n \frac{\xi^{1-\varepsilon} - 1}{1 - \varepsilon}. \tag{15}$$

Thus, from the definition of $\xi$ we can directly express it as:

$$\xi(y_i) = \frac{1}{n} \left( \sum y_i^{1-\varepsilon} \right)^{1/1-\varepsilon}. \tag{16}$$

Given any income distribution, then, we can calculate $\xi$. Of course $\xi$ will depend on the level of inequality aversion, $\varepsilon$. For $\varepsilon = 0$, $\xi$ will simply be the the average level of income. For $\varepsilon > 0$, $\xi$ will be lower than the average income, $\mu$, and will decrease as $\varepsilon$ grows larger, reflecting a greater cost of inequality. Finally, we can derive a social welfare function in abbreviated terms by solving equation (4) for $\xi$ (16):

$$W(\mu, A(\xi)) = \mu(1 - A(\xi)). \tag{17}$$

Since social welfare increases with $\mu$, it is possible to have an increase in welfare and an increase in inequality simultaneously when $\mu$ increases. Fig. 12 presents a possible scenario in which

economic growth has been sufficient to offset the negative 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 $\varepsilon$. Usually, determining $\varepsilon$ is a value judgment. The Census Bureau, for example, reports $\varepsilon$ 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 $\varepsilon$ using subjective well-being data from the GSS (the exact procedure is outlined in section 3.2). Once I estimate the value of $\varepsilon$, 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.

# 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 1 in the Appendix provides description and sources for all variables, and Table 2 and 3 show summary statistics. The data is cross section and includes a pool of American citizens from 1972 to 2012.

## 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?*"[9] 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 (2006). 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.

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

### 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.

### 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).[10] 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).

### 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.

### 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.

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

# 4 Estimating the Parameter of Inequality Aversion $\varepsilon$

There is a large literature that estimates the parameter on inequality aversion, $\varepsilon$. Since $\varepsilon$ 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.[11] 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 $\varepsilon$ based on a direct measurement of experienced utility.

I start the analysis by estimating the parameter on inequality aversion, $\varepsilon$, with the following specification:

$$u_i = \alpha \left( \frac{y_i^{1-\varepsilon} - 1}{1-\varepsilon} \right) + \sum \beta' \mathbf{X} + \nu_i \tag{18}$$

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 $\nu_i$ is random error. In this specification, $\varepsilon$ captures the concavity of the utility function with respect to income or the negative elasticity of the marginal utility of income. The coefficient $\alpha$ is assumed to be the same for all people. I use a Box-Cox transformation on the income variable so that:

$$u_i = \alpha \left( \frac{y_i^{\lambda} - 1}{\lambda} \right) + \sum \beta' \mathbf{X} + \nu_i \tag{19}$$

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:

$$h_i = f_i(u_i) = f(u_i) + \mu_i \tag{20}$$

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

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

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

$$h_i = u_i + \mu_i \tag{21}$$

Thus, my final model is given by:

$$h_i = \alpha \left( \frac{y_i^{\lambda} - 1}{\lambda} \right) + \sum \beta' \mathbf{X} + \epsilon_i \tag{22}$$

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).

Table 4 presents the main results from the Box-Cox regressions. The inequality aversion parameter, $\varepsilon$, is found to be 0.50 for the overall sample. I further estimate $\varepsilon$ 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, $\varepsilon$ 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 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.

### 4.1 Calculating A($\varepsilon$), $\xi(\varepsilon)$, and W($\varepsilon$), 1974-2010

Next, I calculate the Atkinson index of inequality, A($\varepsilon$), the equivalently distributed income, $\xi(\varepsilon)$, and social welfare, W($\varepsilon$), based on the value of $\varepsilon = 0.5$ found in the previous section. Since $\varepsilon$ 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 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, $\xi$. Finally, column (6) calculates the welfare of society using equation 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($\varepsilon$=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 $\varepsilon$. Thus, the last three columns of Table 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).

# 5 Estimating the Indirect Costs of Inequality

## 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 paper, then, estimates the external cost of inequality while accounting for the direct loses associated with the concavity of the utility function. To estimate the external cost of the general level of inequality on SWB, I use the following model which is a modification of model (22):

$$h_i = \alpha \left( \frac{y_i^{\lambda} - 1}{\lambda} \right) + \gamma G + \sum \beta' \mathbf{X} + \epsilon_i \tag{23}$$

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:[12]

$$G = \frac{n+1}{n-1} - \frac{2}{n(n-1)\mu} (\sum_{i=1}^{n} R_i y_i) \tag{24}$$

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

where $\mu$ 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:

$$h_i = \alpha log y_i + \gamma G + \sum \beta' \mathbf{X} + \epsilon_i \tag{25}$$

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, 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.

### 5.2 Empirical Results

Table 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. 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.

Table 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 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 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 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, Oishi *et al.*, 2011, and Verme, 2011). However, they come in contrast to those of Alesina *et al.* (2004) who find that although Europeans are sensitive to income inequality, Americans are not affected by it. Table 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 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.

### 5.3 Robustness Test

Table 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 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.

# 6 Calculating the Net Benefit

## 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:

$$MRS_{INEQ-Y} = \frac{\gamma}{\alpha} * y = \psi \tag{26}$$

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 6, I next calculate the marginal rate of substitution between income inequality and personal income in equation (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 13 ($\psi$) 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 $\psi$ 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 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 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.

# 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, $\varepsilon$ , 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.

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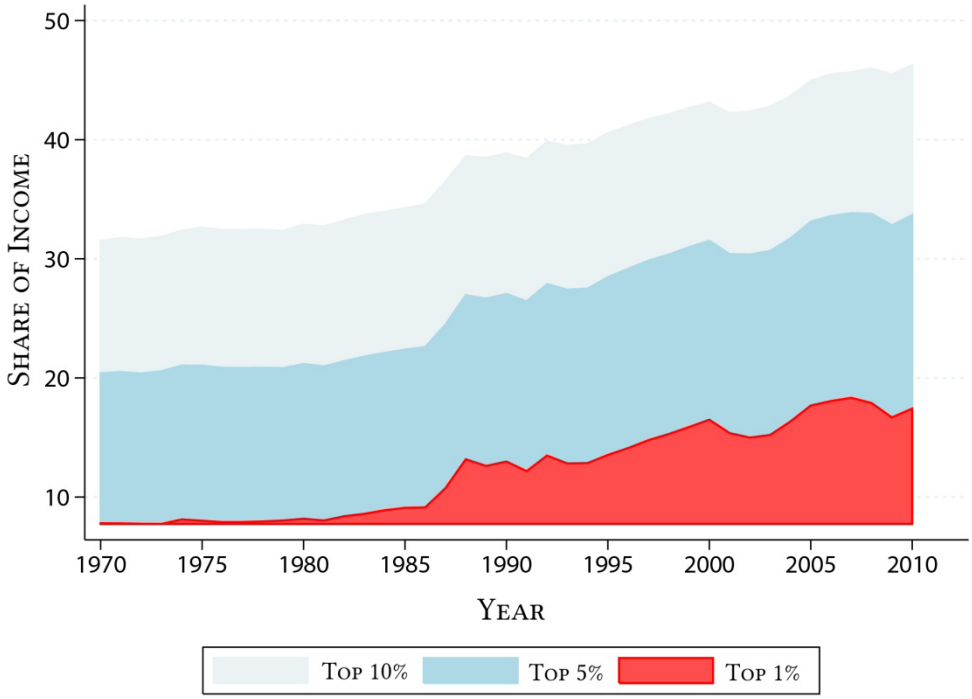
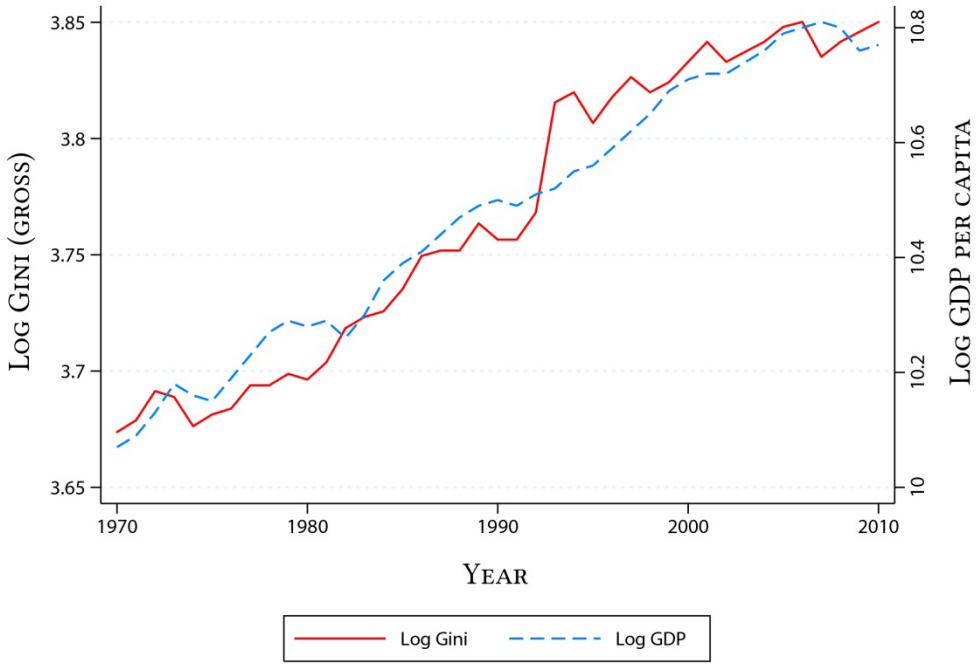
## Appendix

*Figure 1*: Evolution of Top Income Shares in the US, 1970-2010



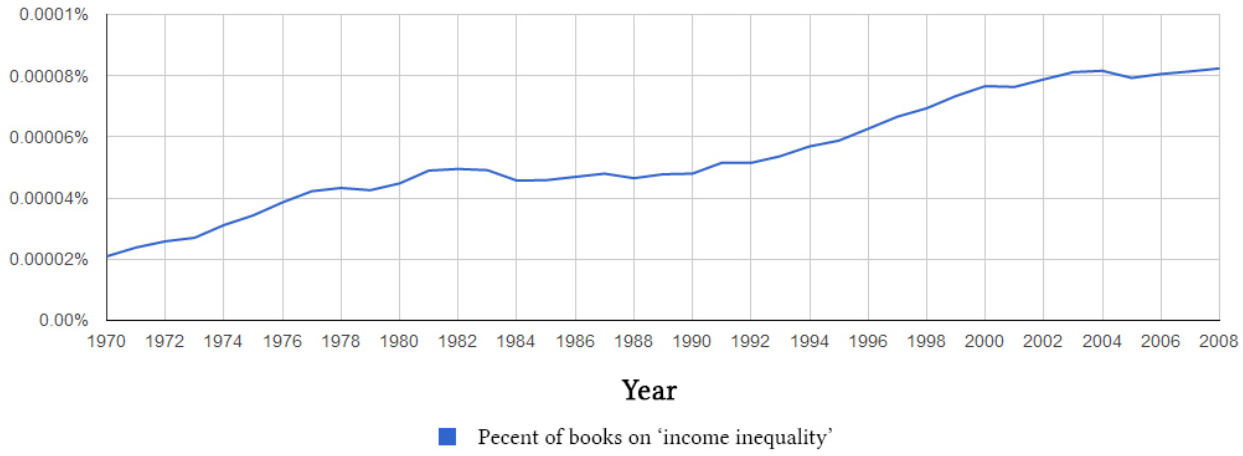

*Source:* Picketty and Saez (2003). Updated data series covering the period 1920-2010 can be found on the website of Emanuel Saez, Table A.3. Website: http://elsa.berkeley.edu/~saez/#income

*Figure 2:* Log Gini and Log GDP, 1970-2010



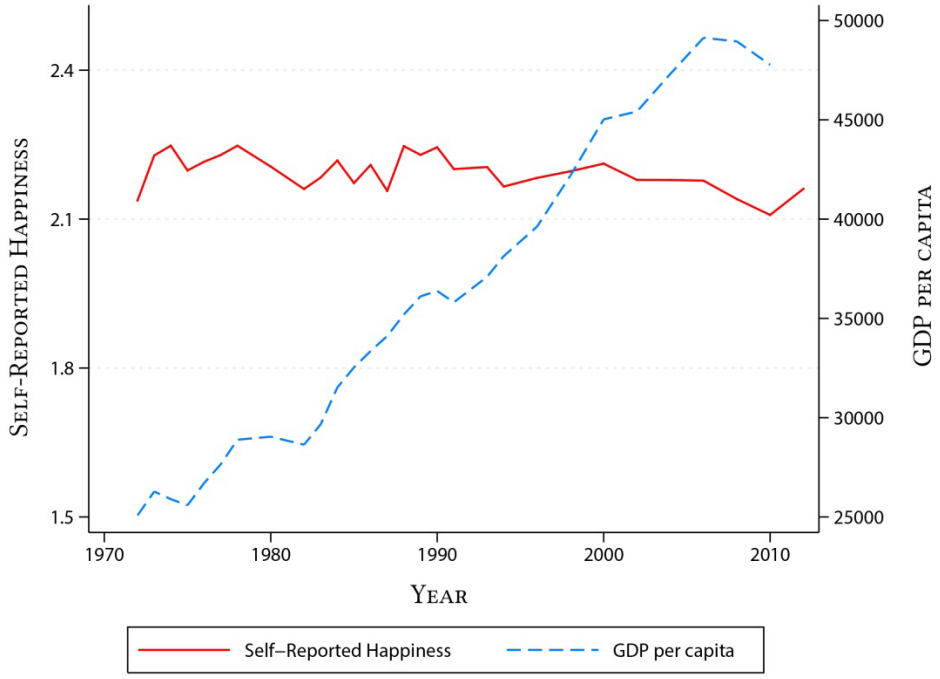

*Note:* Gini represents gross gini ratios for households (all races). Data was obtained from the U.S. Department of Commerce: http://www.census.gov/hhes/www/income/data/historical/inequality/ Table H-4). Data on GDP per capita was obtained from the Bureau of Labor Statistics and represents constant 2011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

*Figure 3*: Percent of Books on Income Inequality, 1970-2008



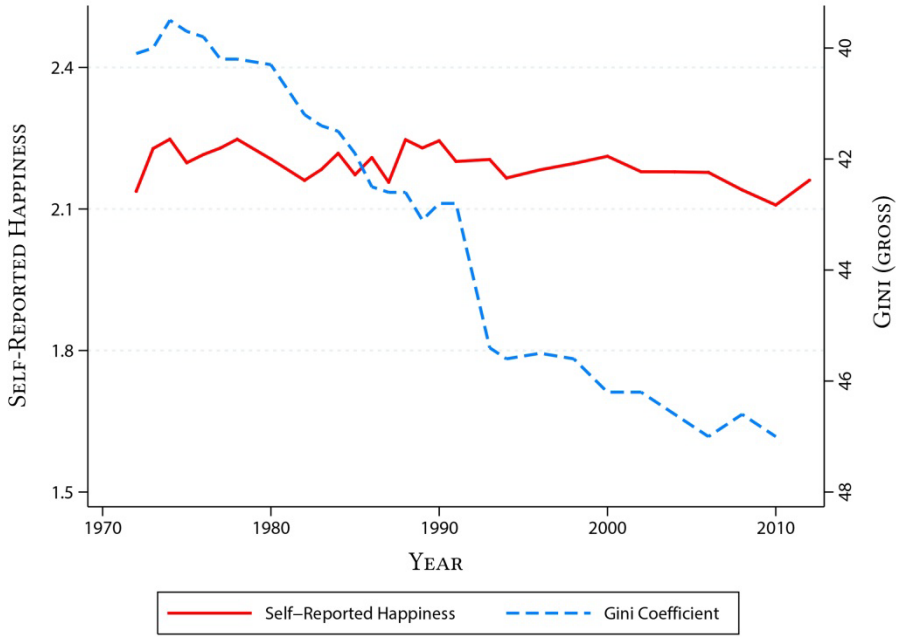

*Note:* Data was obtained from google NGram viewer: http://books.google.com/ngrams/

*Figure 4:* Self-Reported Level of Happiness and GDP per capita in the US, 1970-2010



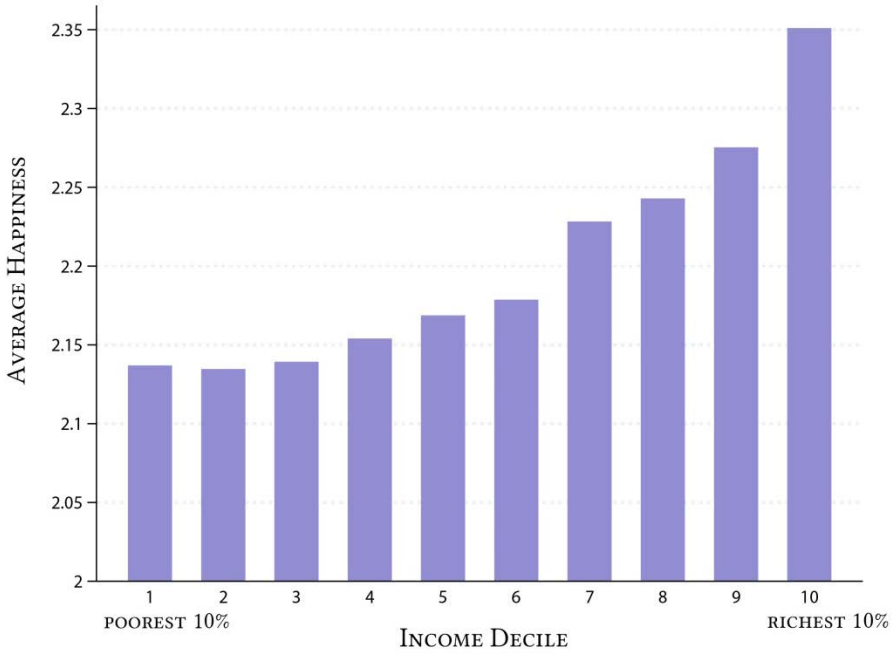

*Note:* Data on self-reported level of happiness came from the General Social Survey (GSS variable: *happy*). Self-reported happiness represent yearly averages to the question: "Taken all together, how would you say things are these days would you say that you are very happy [3], pretty happy [2], or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

*Figure 5:* Self-Reported Level of Happiness and Inequality in the US, 1970-2010



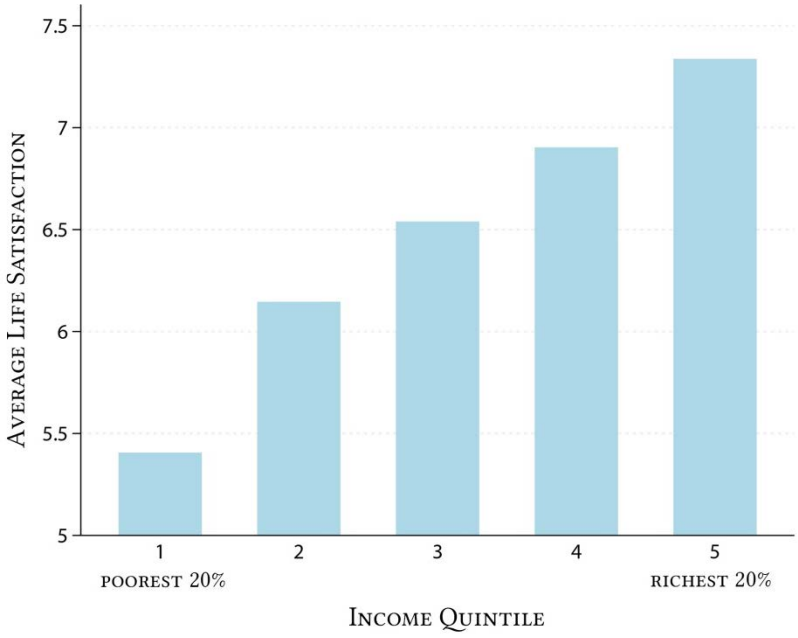

*Note:* Data on self-reported level of happiness came from the General Social Survey (GSS variable: *happy*). Self-reported happiness represent yearly averages to the question: "Taken all together, how would you say things are these days would you say that you are very happy [3], pretty happy [2], or 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 6*: Self-Reported Happiness by Income Quintile, GSS



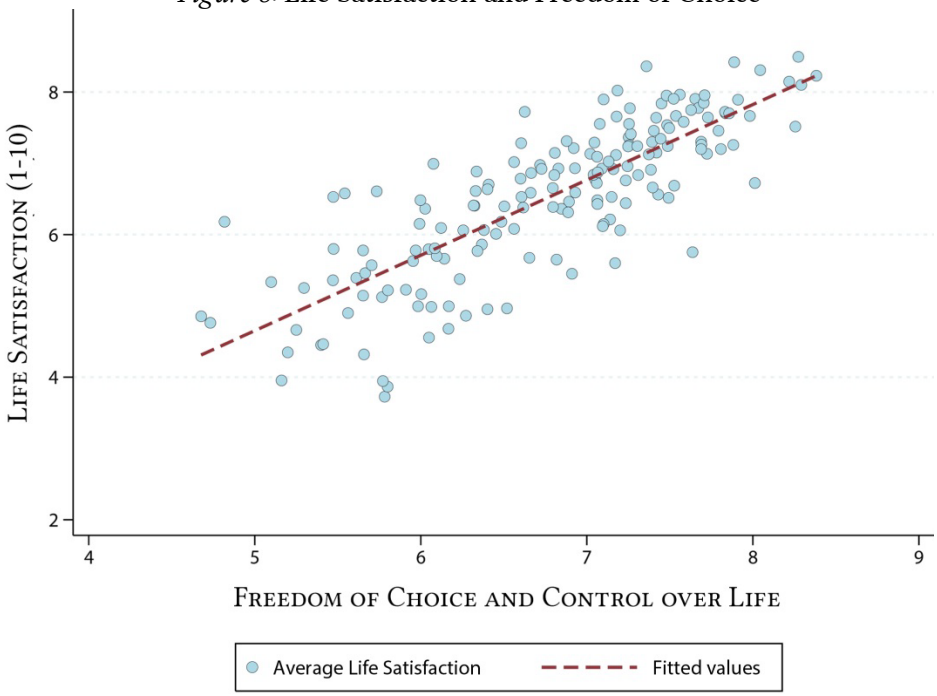

*Note:* Data on self-reported level of happiness came from the General Social Survey (GSS variable: *happy*). Self-reported happiness represents averages to the question: "Taken all together, how would you say things are these days would you say that you are very happy [3], pretty happy [2], or not too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

*Figure 7*: 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 8:* 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 9*: Mean Income, Income Inequality and Social Welfare

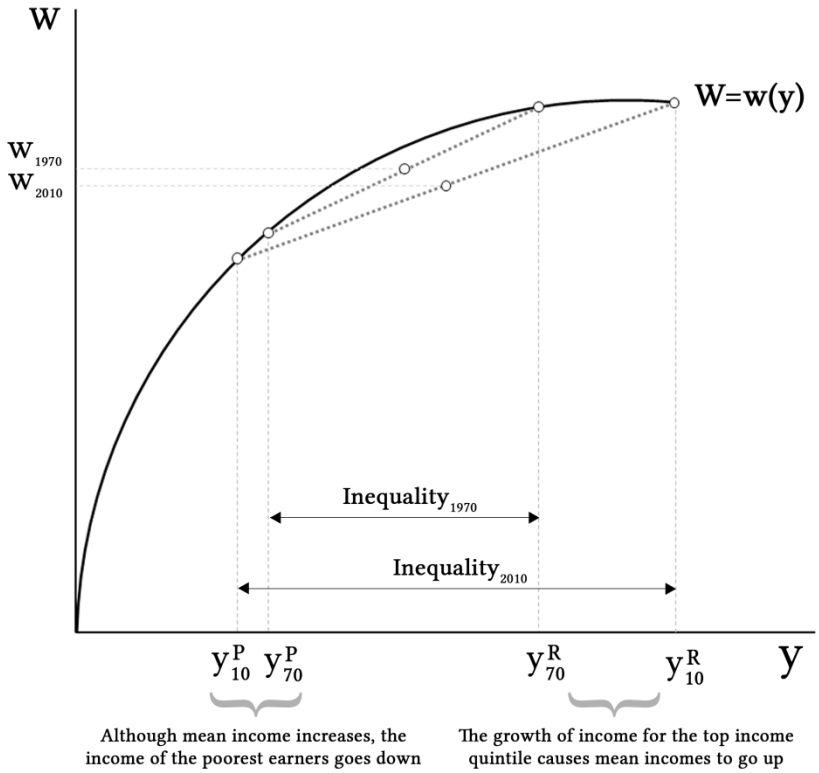
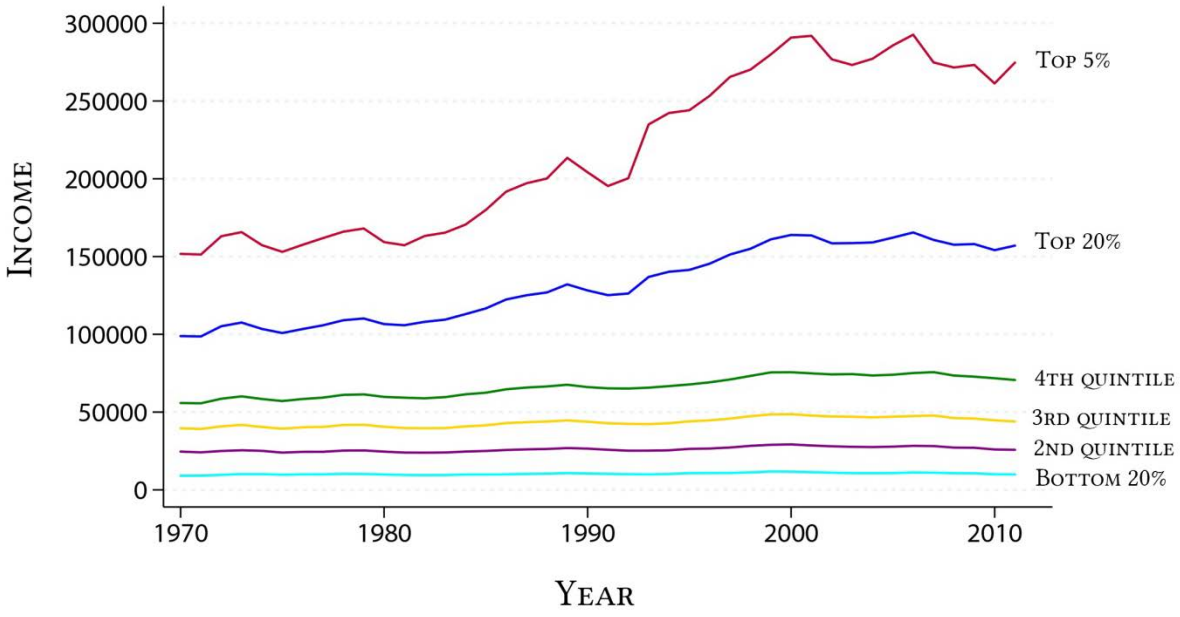
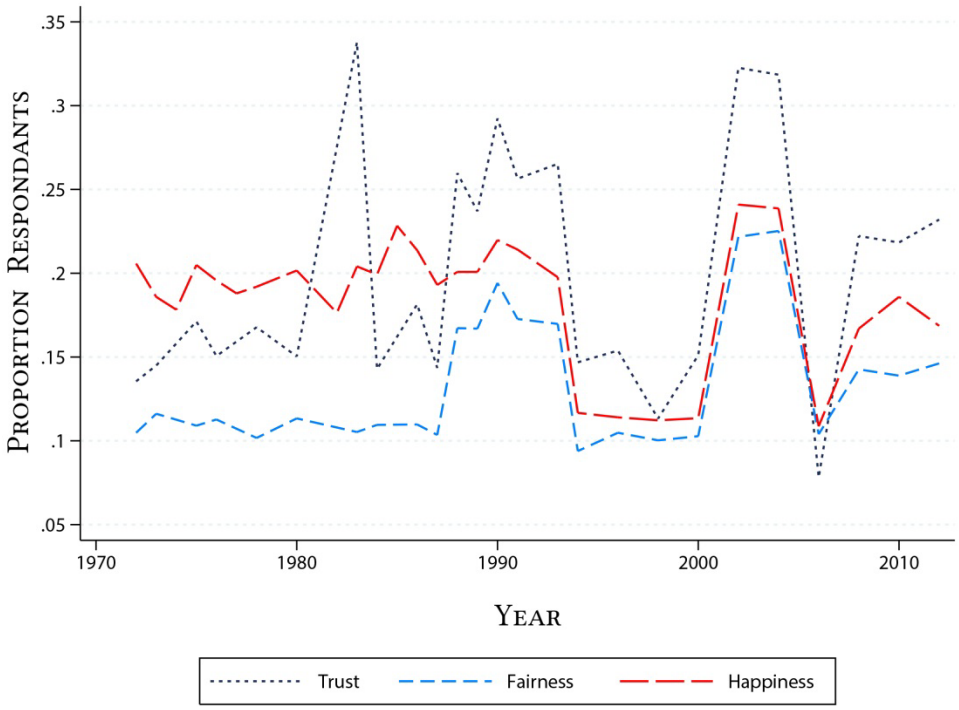


*Figure 10:* Mean Household Income Received by Each Quintile and the Top Five Percent




*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 11:* 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 12*: Economic Growth and the External Cost of Income Inequality

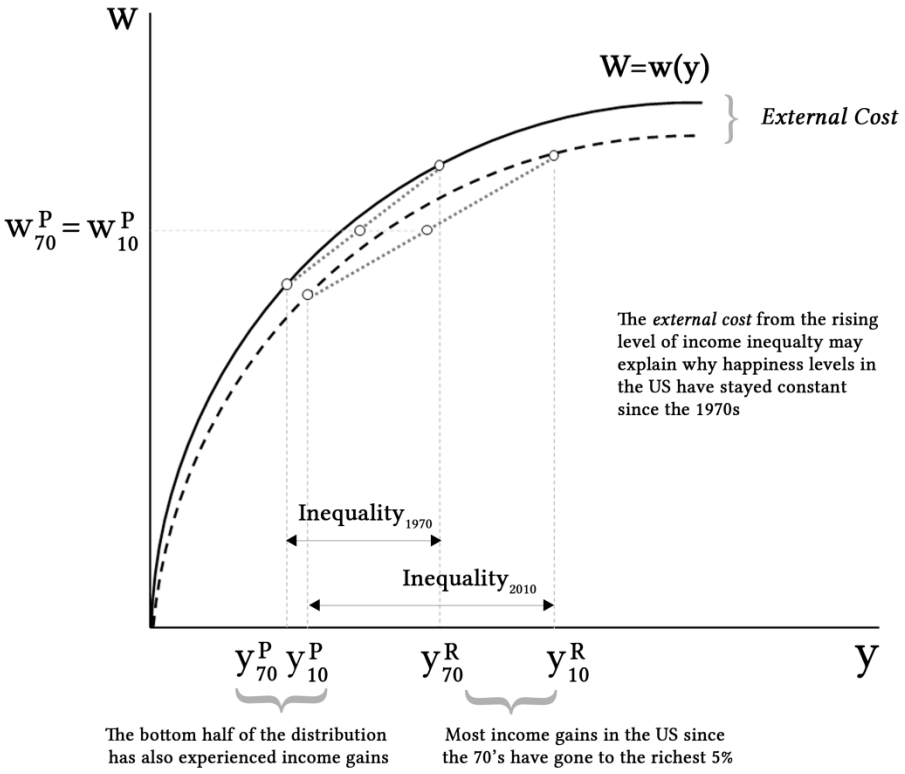



*Figure 13:* The Trade-off between Equality and Mean Income

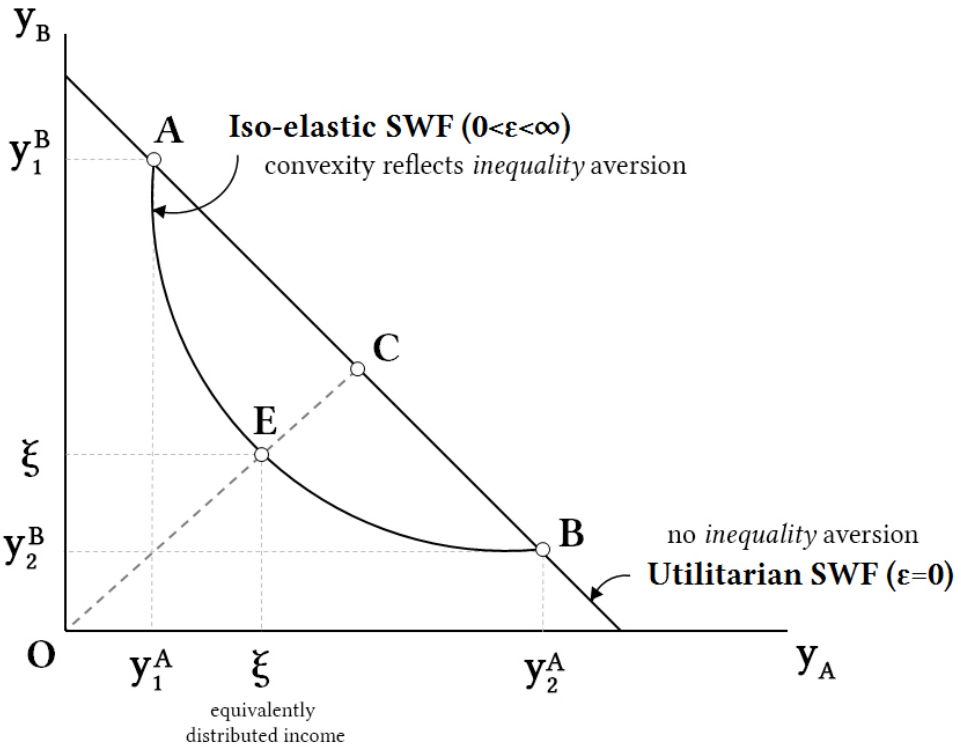


*Table 1*: Description and Sources of Main Variables

| **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 median income for sample for each year | Own calculations |
| 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:* 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 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 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 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 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 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 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 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 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 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 ($\chi^2$ 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 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 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).