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# Has Economic Growth Made Americans Better Off despite Rising Income Inequality? Evidence from Subjective Well-Being Data

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**Abstract**
A large portion of the real income gains from US economic growth since the 1970s has accrued to the top income quartile. We evaluate the equality-efficiency trade-off using subjective well-being data from the General Social Survey. Specifically, we estimate the parameter of inequality aversion within a neoutilitarian framework of welfare analysis and calculate the Atkinson Inequality Index. We then use this information to evaluate social welfare over the period 1974–2012. The analysis suggests that economic growth has been sufficient to raise social welfare despite the rising level of income inequality, but Americans have become more inequality averse over time.

*JEL Codes*: D63, I31, O15, O51
*Keywords*: happiness, income inequality, inequality aversion, economic growth, social welfare, subjective well-being

## I. Introduction

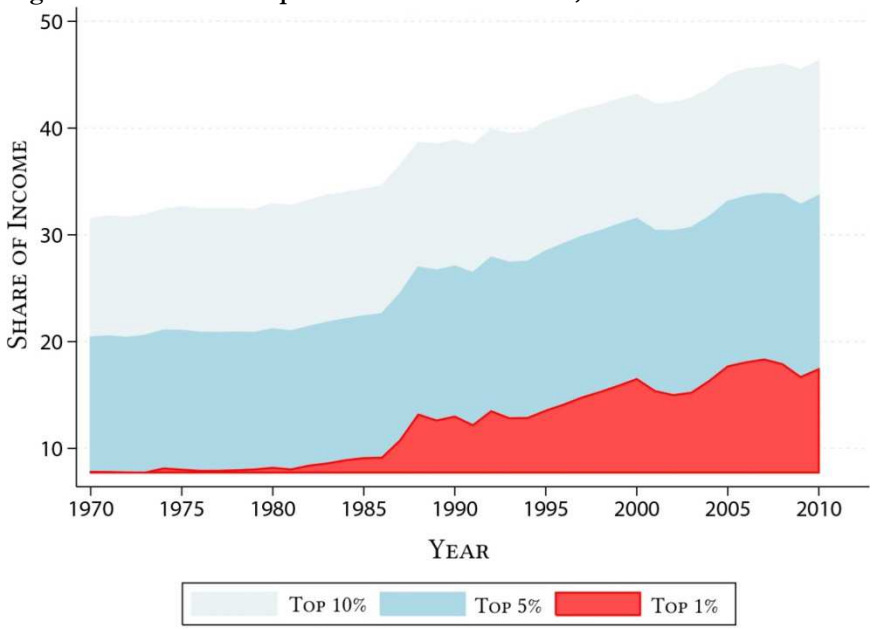
Recent studies in happiness economics suggest that creating a more egalitarian society (Alesina, Di Tella, and MacCulloch 2004; Graham and Felton 2006)[1] and increasing the absolute level of personal income (Frey and Stutzer 2002; Kahneman and Deaton 2010) may promote a happier society. Yet, as Okun (1975) points out, economic growth and income equality may be mutually exclusive public policy objectives (see also Vedder and Gallaway 1999). While per capita GDP grew by nearly 2 percent per year from 1970 through 2010, income inequality also generally increased over this period. Figure 1 shows the evolution of top income shares in the United States from 1970 to 2010. The share of national income concentrated in the top 1

[1] The literature on the relationship between inequality and happiness has produced mixed findings (e.g., Snowdon 2012).

percent of the US population increased from around 8 percent in the late 1970s to almost 20 percent in 2010.[2] This level of income inequality was the highest since 1928, when the share of income concentrated in the top 1 percent of the population reached 24 percent.

Parallel with this trend, resentment over economic inequality has grown more vocal in the United States, culminating in the Occupy Wall Street movement in 2011. With both economic growth and income inequality increasing over the past few decades, the question remains: Are Americans better or worse off? Or might the growing gap between the rich and the poor help explain Americans' stagnating happiness levels (Stevenson and Wolfers 2008)?

**Figure 1. Evolution of top income shares in the US, 1970–2010**



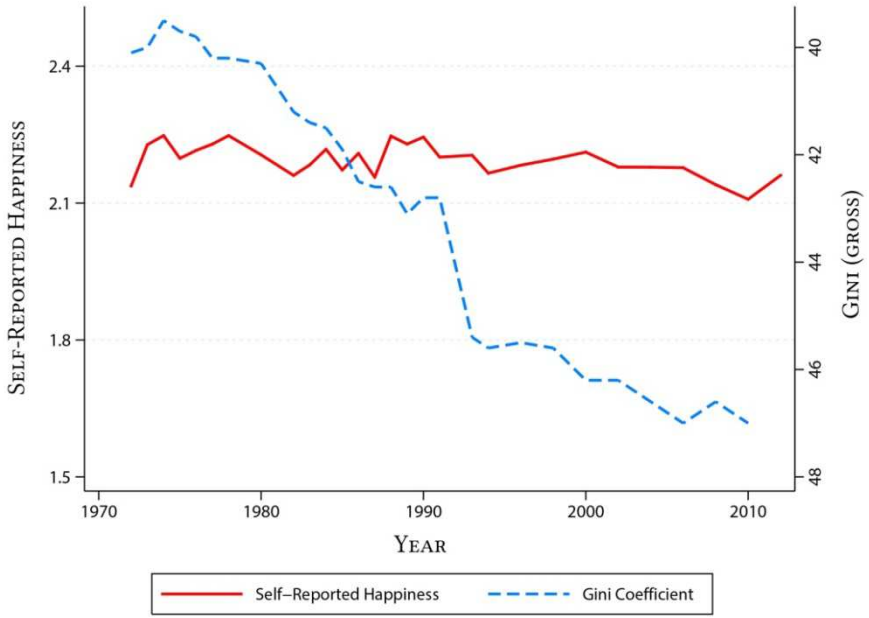

*Source:* Piketty and Saez (2003). Figure created by the authors using updated data series covering the period 1920–2010 and can be found on the Berkeley website of Emanuel Saez in table A.3.

Figure 2 shows that the mean level of happiness has been relatively stagnant while income equality has declined in the United

[2] Recent studies suggest that methodological issues led Piketty and Saez to overestimate the degree of inequality in the United States as well as how much it has increased in recent decades (see, e.g., Magness and Murphy 2015; Auten and Splinter 2018; Rose 2018).

States over the four decades since 1970, but to better shed light on these questions, we use subjective well-being (SWB) data from the General Social Survey (GSS) to estimate the parameter of inequality aversion, $\epsilon$, for the United States within a neoutilitarian framework of social welfare analysis (Atkinson 1970) over the period 1974–2012. This estimation allows us to calculate the Atkinson Inequality Index and compare how social welfare has evolved over time while accounting for inequality aversion that is inherent in the concavity of the utility function.

**Figure 2. Self-reported level of happiness and income equality in the US, 1970–2010**




*Notes:* Figure created by the authors using data on self-reported level of happiness from the GSS variable *happy*. Self-reported happiness represents annual averages for 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]?" Gini represents gross income (before taxes) Gini coefficient for households (all races) from the US Department of Commerce. Gini coefficients are a measure of inequality and take values from 0 (complete equality) through 100 (complete inequality). Movements up (down) the secondary axis are associated with less (more) income inequality.

While this approach has its limitations, it is one possible way to evaluate the evolution of the trade-off between economic growth and inequality in the United States over the past few decades. The results suggest, given our estimate of inequality aversion, that rising incomes

attributable to economic growth have more than offset the disutility created by rising income inequality, as social welfare has increased since the 1970s. Our results also indicate that inequality aversion in the United States may have increased over time, which suggests that future social welfare gains may be mitigated if income inequality continues to rise.

Given the growing concern over inequality as a social issue and the desire to achieve equitable growth and individual well-being, businesses and policy-makers may have to more carefully consider the welfare implications embedded in the growth-inequality trade-off when setting policy in the future. The analytical framework advanced here provides a means to evaluate these objectives empirically.

The remainder of the paper is organized as follows. Section 2 reviews relevant literature to motivate the theoretical model, which is presented in the appendix. In section 3, we describe the data used to estimate $\epsilon$, which allows us to estimate the Atkinson Inequality Index over the period 1974–2012 and evaluate changes in social welfare over this period. We describe our empirical model and present our results in section 4. Section 5 concludes.

## II. Literature Review

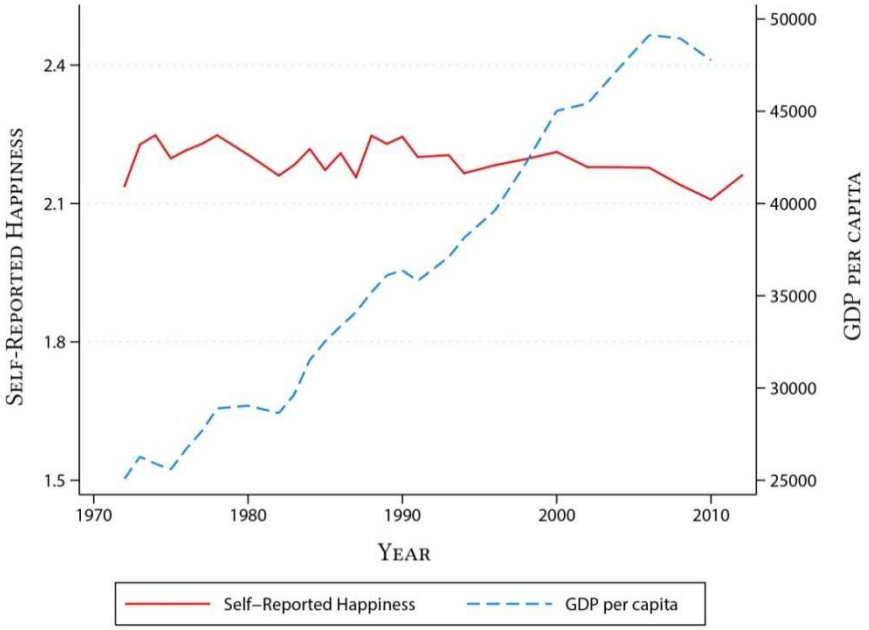
This paper examines the trade-off between economic growth and rising income inequality in the United States over the period 1974–2012. This section reviews the relevant literature to motivate the theoretical model and empirical analysis.

### *A. The Income-Happiness Paradox*

The question of whether economic growth leads to greater happiness has been widely debated in the economic literature. One popular view, which has come to be known as the Easterlin Paradox, suggests that economic growth does not improve the SWB of individuals (Easterlin 1974). 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 shows that this relationship holds for a list of developed nations including the United States, Japan, and nine developed countries in Europe (Easterlin 1974, 1995). More recently, Easterlin, McVey, Switek, Sawangfa, and Zweig (2010) show that this relationship is also true for 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 (ten years or more), both rich and poor people are stuck on a "hedonic treadmill." In the United States, happiness levels have stagnated since the 1970s despite a near doubling of real income per capita, as figure 3 shows.

**Figure 3. Self-reported level of happiness and GDP per capita in the US, 1970–2010**




*Notes:* Figure created by the authors using data on self-reported level of happiness from the GSS variable *happy*. Self-reported happiness represents annual averages for 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 (constant 2011 dollars) from the Bureau of Labor Statistics.

One argument explaining this observation is that beyond some "subsistence" level of income, money does not buy happiness. Frey and Stutzer (2002), for instance, suggest that per capita income of around $10,000 may be the tipping point at which additional increases in per capita income no longer are associated with an increase in mean life satisfaction in a country. Using individual-level data for the United States, Kahneman and Deaton (2010) find that emotional well-being increases with income up to a threshold of around $75,000. Income above this level, they argue, "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, p. 1649)."[3]

Despite the Easterlin Paradox and some evidence suggesting that money cannot buy happiness beyond some subsistence level, a large body of economic literature shows that income is one of the strongest determinants of life satisfaction within and across countries. Powdthavee (2010), for instance, provides evidence of a large and potentially causal impact of income on life satisfaction. Di Tella, MacCulloch, and Oswald (2003) find that life satisfaction moves predictably with macroeconomic variables such as GDP per capita in the United States and Europe, controlling for individual characteristics, unobserved country and individual fixed effects, and country-specific time trends. Perovic and Golem (2010) report similar results for a sample of thirteen transition economies.

Several studies also find that both GDP per capita and economic freedom are positively correlated with well-being (Bennett, Nikolaev, and Aidt 2016; Bjørnskov, Dreher, and Fischer 2010; Gehring 2013; Horpedahl, Jackson, and Mitchell 2019; Nikolaev 2014; Nikolaev and Bennett 2017; Rode 2013).[4] Additionally, Bennett and Nikolaev (2017b) find that both per capita GDP and economic freedom may be associated with less happiness inequality, and Bjørnskov and Ming-Chang (2015) find that legal quality improvements are associated with more happiness and less misery across a large sample of countries. However, the impact of informal institutions on the well-being distribution varies depending on a nation's level of economic development.

### *B. Income Comparisons and Adaptation*

The above-discussed findings are inconsistent with the Easterlin Paradox, suggesting that income plays an important role in determining individual happiness. Clark, Frijters, and Shields (2008) suggest that empirical evidence contrary to the Easterlin Paradox can

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[3] Kahneman and Deaton (2010) acknowledge that happiness is multidimensional and differentiate between emotional well-being, or *hedonic experiences*, and life-satisfaction, or *life evaluation*. Although money is not a good predictor of emotional happiness beyond $75,000 of annual household income, they estimate that a higher income is significantly and positively correlated with higher life satisfaction well beyond this threshold.

[4] Researchers have found economic freedom to be a robust positive determinant of economic growth (Bennett et al. 2016, 2017; De Haan, Lundström, and Sturm 2006; Hall and Lawson 2014). But, they have also found that economic freedom has an ambiguous relationship with inequality (Bennett and Nikolaev 2016, 2017a).

potentially be reconciled with the notion that people are prone to perform income comparisons. Consider the utility function given by equation 1, which is an adaptation of the model developed by Clark et al. (2008).

$$U = f[u_1(y), u_2\left(\frac{y}{y^*}\right), u_3(Z)] \quad (1)$$

Total utility, *U*, is a function of the sub-utility functions, $u_1, u_2, \text{and } u_3$. Individual income is represented by *y* and an individual's utility is characterized by diminishing marginal utility of income such that $u_1' > 0 \text{ and } u'' < 0$ (Easterlin 2005). Thus, depending on the concavity of $u_1(y)$, marginal income is associated with gradually less marginal happiness.

The second sub-utility function, $u_2\left(\frac{y}{y^*}\right)$, reflects the idea of income comparisons. In this function, $y^*$ refers to a *reference group* and the ratio $\frac{y}{y^*}$ refers to *relative income* (Duesenberry 1949). The reference group can be internal, such as one's own past or expected income (*adaptation*), or external, such as the income of some specific demographic group (*social comparison*). In the latter case, $u_2\left(\frac{y}{y^*}\right)$ is referred to as the *status return* from income, or alternatively, the consumption of a positional good.

Early economists such as Adam Smith, John Stuart Mill, Karl Marx, and Thorstein Veblen emphasized the social nature of consumption. Their discussions lend credence to the idea that relative income and ability to consume relative to one's peers are important. Finally, the third sub-utility function, $u_3(Z)$, picks up the utility effect of leisure and other individual-level characteristics (e.g., socioeconomic and demographic variables) that have been linked to happiness (e.g., Wiklund et al. 2019).

In the happiness literature, scholars often assume that the relationship between *U* and *y* is log-linear (Deaton 2008; Stevenson and Wolfers 2008). This assumption 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. An important characteristic of $u_2\left(\frac{y_i}{y_i^*}\right)$ is that it is homogeneous of degree zero, which implies that status is unaffected by proportional increases in $y_i$ and $y^*$.[5] As such, the reduced-form

[5] Mathematically, $u_2\left(\frac{ay}{ay^*}\right) = u_2\left(\frac{y}{y^*}\right)$.

specification of equation 1 that can be empirically estimated is given by equation 2, where $y_i$ is a measure of real income for individual *i*, $y_i^*$ is the income of individual *i*'s reference group (e.g., median country income), and $Z_i'$ is a vector of individual-level characteristics.

$$U_i = \beta_1 lny_i + \beta_2 \left(\frac{y_i}{y_i^*}\right) + Z_i'\gamma + \nu_i \quad (2)$$

The main implication of this utility function is that the contemporary gradient between income and happiness for a given country at a point in time is greater than the dynamic gradient over time. This is because status does not affect the aggregate level of happiness in a country. In other words, it is a zero-sum game. What individuals with above-average income growth gain in status happiness is lost by those with below average income growth. At a given point in time, those individuals within a country who have higher incomes enjoy higher status and are happier. Despite a fixed level of status, higher incomes attributable to growth raise individual consumption and leisure possibilities, resulting in an increase in individual happiness and overall social utility.

*C. The Importance of Absolute Income*

Diener, Lucas, and Scollon (2006) show, however, that the happiness of some people can and does change over time. Sacks, Stevenson, and Wolfers (2013) Find that: (1) within a given country, richer individuals report higher levels of life satisfaction; (2) across countries, richer individuals have higher levels of life satisfaction; and (3) as countries become richer, the aggregate level of happiness tends to rise. The estimates of Sacks, Stevenson, and Wolfers (2013) show 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 SWB and that social comparisons alone cannot explain the Easterlin Paradox.

Inglehart, Foa, Peterson, and Welzel (2008) show that economic development, democratization, and increases in social tolerance over the past thirty years have increased the SWB 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 (Inglehart et al. 2008; Sen 1999), which is

linked to greater life satisfaction (Doyle and Youn 2000; Verme 2009).[6] As Inglehart et al. (2008, p. 266) note:

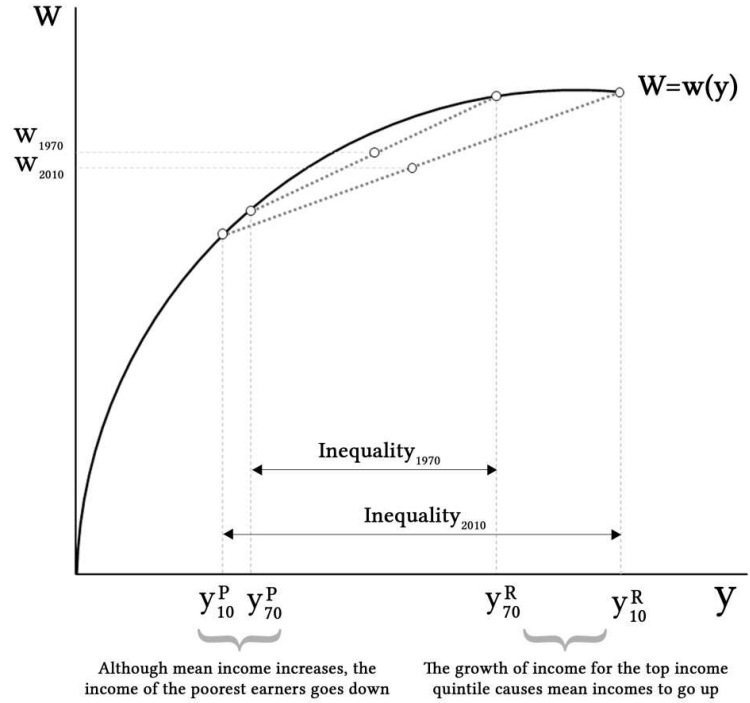
> Under conditions of scarcity, people focus on survival needs, giving top priority to economic and physical security. Economic development increases people's sense of existential security, leading them to shift their emphasis from survival values toward self-expression values and free choice which is 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.

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 has stayed flat remains a puzzle. An implicit assumption of equation 2 is that economic growth has no effect on the distribution of income. If economic growth affects the income distribution, however, then as inequality in a country increases, the aggregate mean level of happiness can decrease.[7] This premise follows directly from the concavity of the utility function. Consider figure 4, for instance, where $W$ is the social welfare function, which can be thought of as the aggregate mean level of happiness, or $W = \frac{1}{n}\sum u_i(y_i)$.

[6] The paradox of choice hypothesis suggests that individuals faced with too much freedom of choice may suffer from decision paralysis, hindering their perception of the amount of control they have over their lives and leading to dissatisfaction (Schwartz 2004). Nikolaev and Bennett (2016) find evidence contrary to this hypothesis: both economic freedom and per capita GDP are positively associated with individual control perceptions over their sample. Pitlik and Rode (2016) find similar results, although they do not explicitly test the Paradox of Choice hypothesis.

[7] As Bennett and Nikolaev (2017) describe, it is possible for both the mean level of happiness and the dispersion of happiness to decrease simultaneously as a result of changes in the macroeconomic environment.

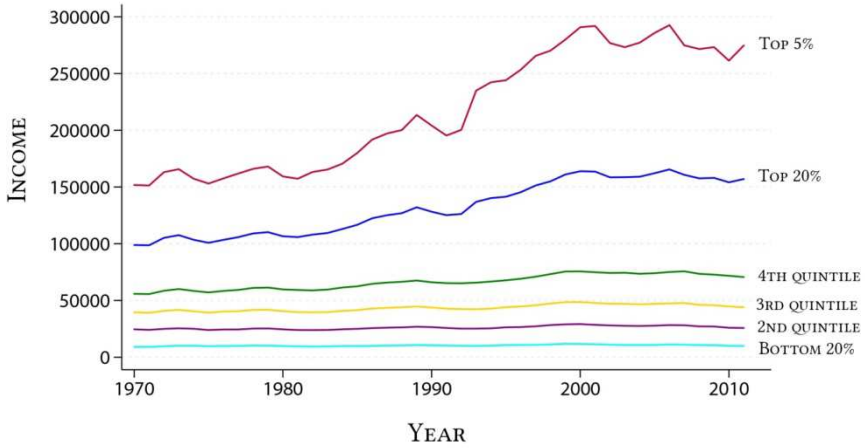
**Figure 4. A stylized example of mean income, income inequality, and social welfare**




*Source:* Figure created by the authors.

If the marginal utility of income diminishes with one's income (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 theoretically possible for the mean national income to increase and average happiness to decline if the people at the top of the income distribution experience greater incomes gains than those at the bottom of the distribution, although the empirical evidence is mixed (Lee 2011). Figure 4 presents one such possible scenario in which the gains from additional income at the top of the income distribution are more than offset by the loses of income (and happiness) at the bottom of the income distribution. Thus, the aggregate mean level of happiness, or social welfare, will depend on the relationship between economic growth and income inequality. As indicated by figure 5, incomes in the top quintile have grown considerably since 1970, while the incomes of the bottom four quintiles have been relatively stagnant over this period.

**Figure 5. Mean household income received by each quintile and the top five percent**




*Notes:* Income represents the mean income for each group (e.g., quintiles, top 5%). Figure created by the authors using data from the U.S. Department of Commerce.

*D. Inequality Aversion*

Since Adam Smith's *Inquiry into the Nature and Causes of the Wealth of Nations* ([1776] 1904) was published, the idea that self-interest is the primary driver of human action has become the cornerstone of economic theory. But in *The Theory of Moral Sentiments*, Smith pointed out 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]1976, p. 1).

Beginning with Becker's (1981) seminal work on family and household economics, a number of formal theories have been developed that account for other-regarding preferences that extend the analysis to strangers. A large volume of experimental literature provides evidence that people are not only driven by self-interest, but they are also concerned for the well-being of others (Cooper and Kagel 2015). The theory of *inequality aversion* is an extension of this line of work. It suggests that individuals are often willing to sacrifice some of their income to obtain a more equitable distribution and that marginal income may generate less utility if it comes at the cost of higher inequality (Bolton and Ockenfels 2000; Fehr and Schmidt 2003). Thus, the direct effect of inequality aversion is inherent in the concavity of the utility function.

Aknin, Norton, and Dunn (2009) provided one possible explanation for this phenomenon, suggesting that 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. In other words, people believe that increases in income at the top of the income distribution do not provide as much happiness as equal increases at the bottom.

Perhaps not surprisingly, as income inequality in the United States has increased over the past forty years, resentment over economic inequality has become more vocal. The Occupy Wall Street movement encouraged millions of Americans to protest over dissatisfaction with, among other things, corporate welfare and the growing level of inequality (Stiglitz 2012). These observations are consistent with survey data that examine attitudes toward economic inequality. Norton and Ariely (2011), for example, find that most Americans, regardless of their political affiliation and wealth status, prefer to live in a country with a more equitable distribution of wealth.

## III. Data

Data on personal characteristics and SWB 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 various sources. Table 1 provides descriptions and sources for all variables, and table 2 shows summary statistics. The data are cross sectional and include a pool of American citizens over the period 1974–2012.

**Table 1. Description and sources of main variables**

| Micro variables | Description | Source |
|---|---|---|
| *Happy* | Data were collected with the question: "Taken all together, how would you say things are these days: Would you say that you are very happy [3], pretty happy [2], or not too happy [1]?" | General Social Survey (GSS variable: *happy*) |
| *Income* | Respondent's income (in 2005 constant dollars) | GSS variable: *conrinc* |
| *Trust* | Data were collected with the question: "Generally speaking, would you say that most people can be trusted [0] or that you can't be too careful in dealing with people [1]?" | GSS variable: *trust* |
| *Fairness* | Data were collected with the question: "Do you think most people would try to take advantage of you if they got a chance [0], or would they try to be fair [1]?" | 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 microeconomic variables**

| Micro variables | Obs. | Mean | St. Dev. | Min. | Max. |
|---|---|---|---|---|---|
| Happiness | 52,321 | 2.19 | 0.64 | 1 | 3 |
| Income | 33,365 | 31,770 | 32367 | 383 | 434612 |
| Log income | 33,365 | 9.92 | 1.09 | 5.95 | 12.98 |
| Relative income (y/y*) | 33,365 | 1.27 | 1.29 | 0.02 | 17.38 |
| Relative position $(y-y^*)^2$ | 33,365 | 1.09E+09 | 6.63E+09 | 0.00E+00 | 1.66E+11 |
| Age | 56,859 | 45.70 | 17.47 | 18.00 | 89.00 |
| $Age^2$ | 56,859 | 2,394 | 1761 | 324 | 7921 |
| Female (male is base) | 57,061 | 0.56 | 0.50 | 0 | 1 |
| Black (white is base) | 57,061 | 0.14 | 0.35 | 0 | 1 |
| *Marital* (married is base) | | | | | |
| Widowed | 57,041 | 0.10 | 0.30 | 0 | 1 |
| Divorced | 57,041 | 0.12 | 0.33 | 0 | 1 |
| Separated | 57,041 | 0.03 | 0.18 | 0 | 1 |
| Never married | 57,041 | 0.20 | 0.40 | 0 | 1 |
| *Education* (less than high school is base) | | | | | |
| High school | 56,896 | 0.51 | 0.50 | 0 | 1 |
| Junior high | 56,896 | 0.05 | 0.23 | 0 | 1 |
| College | 56,896 | 0.14 | 0.35 | 0 | 1 |
| Graduate school | 56,896 | 0.07 | 0.25 | 0 | 1 |
| Trust | 37,493 | 0.58 | 0.49 | 0 | 1 |
| Fairness | 35,713 | 0.56 | 0.50 | 0 | 1 |

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

### *A. Subjective Well-Being*

The dependent variable in the empirical analysis is the self-reported level of happiness, which was derived from the following GSS 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?*" The data

were numerically recoded as follows: (1) not too happy; (2) pretty happy; and (3) very happy.[8]

Researchers have found SWB data to be valid, reliable, and comparable via a variety of validation tests and evidence that SWB moves predictably with other external variables that are theoretically correlated with happiness, such as income, marriage, unemployment, and economic growth (Di Tella et al. 2003; Frey and Stutzer 2002; Kahneman and Krueger 2006).

*B. Personal Income*

The independent variable income is constructed from the GSS categorical variable *conrinc* and represents inflation-adjusted personal income before taxes in constant 2005 dollars.[9] This variable has been widely used in the social sciences (Card 1999).

*C. Individual Characteristics*

We also employ as control variables a variety of individual-level characteristics from the GSS dataset. These include variables that empirical happiness studies commonly find to be correlated with SWB, including age, gender, race, educational level, marital status, personal unemployment, trust, and fairness perceptions (e.g., Graham 2009).

## IV. Empirical Results

In this section, we describe how we evaluate whether the growth-inequality trade-off in the United States over the period 1974–2012 was socially beneficial for Americans with respect to SWB. Traditional measures of economic growth are based on per capita income and do not account for distribution concerns, while the most common measure of inequality, the Gini coefficient, does not differentiate between high- and low-income countries.[10] These shortcomings make it difficult to evaluate different states of socioeconomic development that may embody a trade-off between economic growth and equality.

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[8] A small portion of respondents indicated "Don't know" or "No answer." The analysis ignores these observations.

[9] For details, refer to Holt (2004).

[10] 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, with its citizens enjoying greater consumption and welfare.

We therefore turn to neoutilitarian social welfare analysis, which was developed by Atkinson (1970). Deaton (1997, p. 135) provides a useful definition of the social welfare function, suggesting that it "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."

In particular, we estimate the Atkinson Inequality Index, which accounts for the trade-off between income and inequality and is related to a class of additive social welfare functions (Atkinson 1970) as described by equation 3, where $y_i$ and $\bar{y}$ denote the income of individual *i* and the mean level of income, and $\epsilon$ is the inequality aversion parameter. We must first estimate $\epsilon$, which we describe next. Please see the appendix for a detailed description of how we derived the equations estimated below from our theoretical model.

$$A(\epsilon) = 1 - \left[\frac{1}{n}\sum\left(\frac{y_i}{\bar{y}}\right)^{1-\epsilon}\right]^{\frac{1}{1-\epsilon}} \quad (3)$$

*A. Estimating the Inequality Aversion Parameter, $\epsilon$*

There is a large literature that estimates the parameter on inequality aversion, $\epsilon$. Because $\epsilon$ is conceptually the same as the risk-aversion parameter in a constant relative risk aversion (CRRA) utility function, most 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 (Hartley, Lanot, and Walker 2014).

One issue is that previous studies rely on indirect measures of utility and involve several extraneous assumptions. A second issue is that these estimates are based on expected utility, not experienced utility. Yet, as Kahneman, Diener, and Schwartz (1999) suggest, people usually make erroneous forecasts about their true utility. In this study, we estimate $\epsilon$ based on a direct measurement of experienced utility using SWB data.

Recall from equations 1 and 2 that utility is a function of personal income, relative income, and other individual-level characteristics. We can derive a reduced-form utility function that accounts for the utility

(or disutility) received from relative income by including $\epsilon$.[11] Because true utility is not observable, we follow Layard et al. (2008) in assuming that reported happiness is linked to utility via a fixed transformation.[12] Using SWB as our measure of utility, we can then estimate $\epsilon$ using equation 4, where $y_i$ is personal income, $\boldsymbol{X}$ is a $n \times k$ matrix of individual characteristics and $\nu_i$ is an idiosyncratic error.[13]

$$u_i = \alpha\left(\frac{y_i^{1-\epsilon}-1}{1-\epsilon}\right) + \boldsymbol{X}'\beta + \theta_i \qquad (4)$$

Letting $\lambda = 1 - \epsilon$, we first estimate $\lambda$ from equation 4 using Box-Cox regression (Box and Cox 1964). We then use this value to calculate $\epsilon$. Table 3 presents the main results from the Box-Cox regressions for the full sample and a variety of subsamples representing a variety of time periods and different groups of individuals. The inequality aversion parameter, $\epsilon$, for the full sample is 0.50. The parameter shows consistency across groups with values ranging from 0.29 to 0.97. Interestingly, $\epsilon$ increased over time from 0.19 in the 1970s to 0.65 in the 2000s. The latter result is consistent with growing public concern over rising income inequality.

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[11] The inequality aversion parameter, $\epsilon$, captures the concavity of the utility function with respect to income or the negative elasticity of the marginal utility of income, and the coefficient $\alpha$ is assumed to be the same for everyone.

[12] Following these authors requires two assumptions. First, reported happiness, $h_i$, is linked to true utility, $u_i$, via a fixed transformation such that $h_i = f_i(u_I) = f(u_i) + \mu_i$, where $f_i$ is common to all people up to a random additive idiosyncratic term, $\mu_i$ that is independent of the circumstances affecting $u_i$. Second, the transformation is assumed to be linear such that $h_i = u_i + \mu_i$.

[13] A significant body of literature justifies the assumptions above. First, reports on happiness tend to be consistent with other measures of well-being. For example, Diener et al. (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 tend to move in a predictable way with external factors such as unemployment and marriage. For example, income increases predicted happiness and unemployment decreases it (Kahneman et al. 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). However, it is important to note that due to data limitations, we are not able to control for individual heterogeneity, which may bias our results.

**Table 3. Estimates for ε using a Box-Cox transformation**

| Subgroup | λ | | | Obs. | 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 |

*Notes:* Standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

*B. Main Results*

Next, we calculate the Atkinson Inequality Index, $A(\epsilon)$, using equation 3 and the estimated value of $\epsilon$ from above. Intuitively, $A(\epsilon)$ tells us how much society is willing to give up in terms of the aggregate level of income to achieve an egalitarian distribution of income, suggesting that there exists a level of income, $\xi$, to be received by all members of society. We next estimate the equivalently distributed income, $\xi(\epsilon)$, using equation 4. For a given level $\epsilon > 0$, social welfare is equal to the equivalently distributed level of income, $W = \xi(\epsilon)$, such that we can estimate *W* using equation 5.

$$\xi(\epsilon) = \frac{1}{n}[\sum y_i^{1-\epsilon}]^{\frac{1}{1-\epsilon}} \quad (4)$$

$$W\big(\bar{y}, A(\xi)\big) = \bar{y}[1 - A(\xi)] \quad (5)$$

Table 4 presents our main results for each year over the period 1974–2012. Column 2 shows the mean income for the sample. For $\epsilon = 0.5$, the calculated $A(\epsilon), \xi(\epsilon)$, and $W(\epsilon)$ are reported in columns 3, 4, and 5, respectively. Because $\epsilon$ has increased over time and differs across subgroups of the population, we also include the same calculations for $\epsilon = 1$. We 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. Analogous results for $\epsilon = 1$ are reported in columns 6–8.

In 1974, for example, mean income in the GSS sample was $29,852. With $\epsilon = 0.5$, the distribution of income corresponds to an Atkinson Inequality Index of 0.16 percentage points. 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. In other words, 16 percent of national income could have been sacrificed to achieve an egalitarian income distribution ($\xi = \$24{,}977$) and at the same time preserve the same level of national happiness. This is not to suggest that the cost of redistributing incomes equally is only 16 percent of income, but rather that given a modest level of aversion to inequality ($\epsilon = 0.5$), social welfare would be unchanged if incomes were redistributed equally and total income only fell by 16 percent.

The social welfare associated with the income distribution in 1974 and $\epsilon = 0.5$ is 316. This number by itself does not have any meaning, but it is useful to compare the welfare associated with different distributions and, for our purposes, to track the evolution of welfare over time. For instance, our results suggest that welfare slightly increased from 316 in 1974 to 329 in 2012. However, the increasing value of the Atkinson Inequality Index, $A(\epsilon = 0.5)$, indicates a growing willingness to sacrifice an increasing portion of total income to achieve a more equal distribution. As briefly described above, in 1974, the same level of social welfare could have been obtained if everybody received an income of $24,977, equivalent to a reduction of 16 percent of total income. By 2012, $A(\epsilon = 0.5)$ 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.

**Table 4. Atkinson inequality, equivalent income, and social welfare for selected values of ε, 1974–2012**

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

*Notes:* Data are not available for all years over the sample period. Estimates are presented when available.

The results are, however, sensitive to the value of $\epsilon$, as demonstrated by the calculations using $\epsilon = 1$ reported in columns 6–8. At this level of inequality aversion, the results suggest that social welfare has changed little since 1974. As expected, greater inequality aversion is associated with a much higher trade-off between equity and efficiency. According to the results in column 7, the same level of welfare could have been achieved in 2012 if everybody received an income of $19,399, a 47 percent reduction in total income.

## V. Conclusion

Economic growth in the United State since the 1970s has not benefited all income classes equally. The top income quintile has

experienced significantly larger income gains than the lower income quintiles, resulting in a rising level of income inequality.[14] This study examines the social welfare impact of the subsequent increase in personal incomes and income inequality over the period 1974–2012 using subjective well-being data from the General Social Survey.

We first estimate the parameter of inequality aversion as $\epsilon = 0.5$, although our calculations indicate that Americans have become more inequality averse over time. We then use $\epsilon$ to calculate the Atkinson Inequality Index, $A(\epsilon)$, equivalently distributed income, $\xi(\epsilon)$, and social welfare, $W(\epsilon)$, for each year over the period 1974–2012. The results suggest that, despite growing income inequality, rising incomes attributable to economic growth have more than offset the disutility created by income inequality as social welfare has increased since the 1970s. The growing aversion to inequality among Americans, however, suggests that future social welfare gains may be mitigated if income inequality continues to rise going forward. If this is the case, in setting public and business policies, policymakers and firms will have to more carefully consider the trade-off between efficiency and inequality. Understanding the reasons for growing aversion to inequality in the United States would be a useful extension of this research.

The results should, however, be taken with caution due to several methodological issues. First, our inability to control for unobserved individual heterogeneity is limited by data availability and may bias the results (Ferrer-i-Carbonell and Frijters 2004). To the best of our knowledge, no longitudinal dataset exists for the United States that offers consistent data for the period this study examines. Second, the Atkinson Inequality Index could be interpreted as capturing a value judgement on inequality aversion in social evaluations. This value judgement may indeed take the concavity of the utility function into account, but it may also represent other things, such as fairness considerations. It is possible, for example, that in a world in which everybody has a linear utility function, people care about fairness and

[14] Analysis of income changes by quintiles suggests an increase in inequality. It does not, however, suggest a lack of social mobility, as income quartile statistics are based on a snapshot of the income distribution for income earners at a given point in time. As such, the snapshot does not account for the composition of workers or their career stage. This consideration is important, as individuals move in and out of income quintiles over their working lives as they gain human capital and progress in their careers. See, for example, Güell, Mora, and Solon (2018) for an overview of recent research on intergenerational mobility.

inequality. Thus, our results should be viewed as estimating a lower bound of inequality aversion. Finally, because happiness is measured on a three-point categorical scale, survey respondents likely face scaling effects over time as they experience income gains and recalibrate the scale.

Despite these limitations, our analysis serves as an alternative method to examine the equality-efficiency trade-off using SWB data that accounts for inequality aversion, rather than traditional measures of socioeconomic progress such as the Gini coefficient and economic growth. Research that employs more granular measures of well-being would be another useful extension.

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## Appendix: Theoretical Model

This appendix describes the theoretical model that we used to derive the equations for our empirical analysis. As described in section 4, our analysis is based on a neoutilitarian social welfare framework In particular, we estimate the Atkinson Inequality Index, which accounts for the trade-off between income and inequality (Atkinson 1970). The Atkinson Inequality Index is related to a class of additive social welfare functions as depicted by equation 6, where social welfare, *W*, is an aggregate measure of utility and is a function of all individuals' personal incomes, $y_i, \forall i$.

$$W = \frac{1}{n}\sum u_i(y_i) \tag{6}$$

To incorporate the idea that additional income may bring greater marginal utility to poorer people, we use the isoelastic utility function depicted in equation 7, where $\epsilon$ is the inequality aversion parameter or the negative elasticity of marginal income (Layard, Mayraz, and Nickell 2008). Conceptually, this function is equivalent to a CRRA function.[15]

$$u_i = \begin{cases} \frac{y_i^{1-\epsilon}-1}{1-\epsilon} & \text{if } \epsilon \neq 1 \\ \log(y_i) & \text{if } \epsilon = 1 \end{cases} \tag{7}$$

Two polar cases require discussion. First, when inequality aversion is zero ($\epsilon = 0$), society does not care about inequality at all and utility equals income ($u_i = y_i$) such that social welfare collapses to the *Utilitarian* function. In this scenario, social welfare equals the average level of income ($\bar{y}$), as depicted by equation 8, and there is no trade-off between growth and inequality because all individuals receive the same marginal utility from a marginal change in income. Social welfare is maximized by maximizing growth, irrespective of who receives the additional income.

$$W = \frac{1}{n}\sum u_i = \frac{1}{n}\sum y_i = \bar{y} \quad if\ \epsilon = 0 \rightarrow Utilitarian \tag{8}$$

Second, if society is infinitely averse to inequality ($\epsilon = \infty$), then social welfare is equal to the utility of the poorest member of society, as depicted by equation 9. In this scenario, social welfare increases only when income gains accrue to the poorest member of society. Income gains that accrue to individuals other than the poorest person

[15] Because income is associated with utility, the isoelastic utility function presented in equation 4 is also analytically analogous to the Box-Cox transformation (Box and Cox 1964) when we set $\lambda = 1 - \epsilon$. We exploit this feature in the results section to estimate the inequality aversion parameter, $\epsilon$.

have no effect on social welfare. As such, the objective of policy is to maximize the income of the individual with the minimal income. This principle is similar to Rawls's maxi-min principle (Rawls 1971), so this scenario is referred to as the Rawlsian social welfare function.

$$W = \min[u_i(y_i)] \quad \text{if } \epsilon = \infty \rightarrow Rawlsian \tag{9}$$

When society has some aversion to inequality and that aversion is not infinite ($0 < \epsilon < \infty$), the social welfare function takes the isoelastic function form, as depicted by equation 10.

$$W = \frac{1}{n}\left[\frac{\sum y_i^{1-\epsilon} - 1}{1-\epsilon}\right] \quad \text{if } 0 < \epsilon < \infty \rightarrow Iso - elastic \tag{10}$$

In this scenario, social welfare exhibits diminishing marginal returns because it is increasing in income ($\frac{\partial W}{\partial y_i} = \frac{y_i^{-\epsilon}}{n} > 0$) at a decreasing rate ($\frac{\partial^2 W}{\partial^2 y_i} = -\epsilon \frac{(y_i^{-\epsilon-1})}{n} < 0$). As $\epsilon$ increases, lower incomes are given relatively more weight for social welfare. The ratio of the marginal social welfare contribution of two individuals' incomes is given by equation 11. When $\epsilon = 1$, the utility function takes the log-linear form ($u_i = \log y_i$) and the marginal utilities of two individuals are inversely proportional. The implication of this case is that an individual with an income of $10,000 will derive ten times more utility from an additional dollar of income than an individual with an income of $100,000. Many studies in happiness economics use the log-linear specification (see, e.g., a survey of the inequality and happiness literature in Ferrer-i-Carbonell and Ramos 2014), implicitly assuming that $\epsilon = 1$ and individual marginal utilities are inversely proportional.

$$\frac{\frac{\partial W}{\partial y_A}}{\frac{\partial W}{\partial y_B}} = \left(\frac{y_B}{y_A}\right)^{\epsilon} \tag{11}$$

Within this framework, the Atkinson Inequality Index, $A(\epsilon)$, is given by equation 12, where $\bar{y}$ is the mean level of income. When $\epsilon = 1$, $A(\epsilon)$ takes the multiplicative form given by equation 13. Intuitively, $A(\epsilon)$ tells us how much society is willing to give up in terms of the aggregate level of income to achieve an egalitarian distribution of income, suggesting that there exists a level of income, $\xi$, to be received by all members of society such that $W(\xi) = W(y_i), \forall i$.

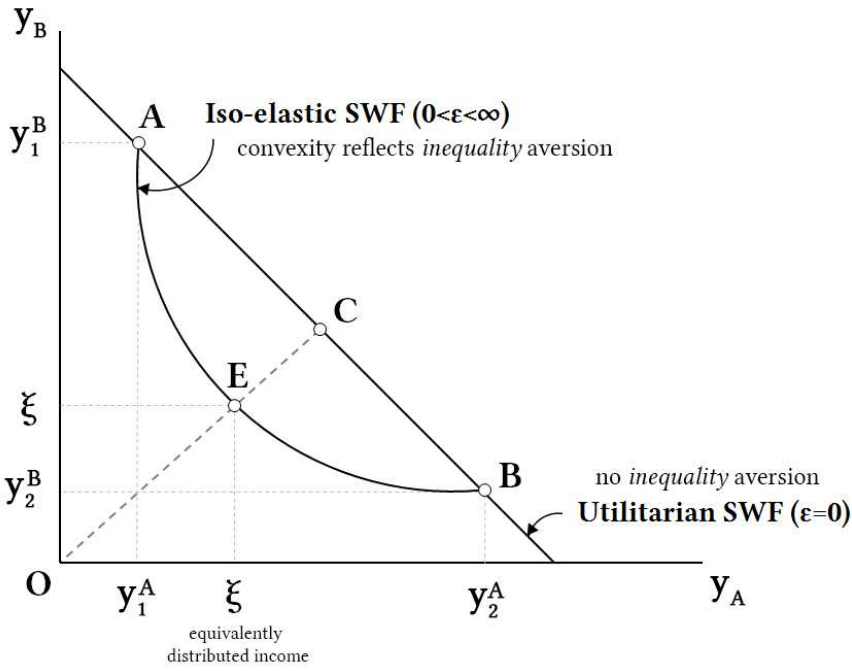
$$A(\epsilon) = 1 - \left[\frac{1}{n}\sum\left(\frac{y_i}{\bar{y}}\right)^{1-\epsilon}\right]^{\frac{1}{1-\epsilon}} \tag{12}$$

$$A(\epsilon) = 1 - \Pi\left(\frac{y_i}{\bar{y}}\right)^{\frac{1}{n}} \quad (13)$$

Figure 6 demonstrates this concept for a society consisting of two representative agents, A and B. The X-axis shows the income of agent A and the Y-axis shows the income of agent B. Assume that the income distribution is at point A where $y_A < y_B$. If $\epsilon = 0$ (zero inequality aversion) then the social welfare function (SWF) will be utilitarian (a straight line between A, B, and C). Any point along the utilitarian SWF optimizes social welfare, regardless of the distribution of income. In this scenario, economic growth that raises the incomes of both agents will unambiguously improve social welfare, regardless of how the relative income gains are distributed. Similarly, any reduction of the overall level of income, such as that observed during a recession, will unambiguously result in lower social welfare, even if income becomes more evenly distributed as a result.

When $0 < \epsilon < \infty$, the SWF will be isoelastic. The convex SWF reflects a positive aversion to inequality in the trade-off between equality and income. Social welfare is unchanged along the isoelastic curve and there exists a point E where both agent A and agent B receive an income of $\xi$ such that perfect income equality is achieved. This level of income is known as the *equally distributed equivalent*. Due to the convexity of the SWF, it is always the case that $\xi < \bar{y}$. Even though total income is lower at point E relative to point C, the social welfare that is lost due to a decline of total income is fully compensated for by the gain in equality. This is to say that society is willing to pay a price in terms of a reduction in total income to achieve a more equal distribution of total income when there is a positive aversion to inequality.

**Figure A1. The trade-off between equality and mean income**




Since equality is measured by the ratio of the length of the vector OC to the length of vector OE (OC/OE), or equivalently $\frac{\bar{y}}{\xi}$, then $\xi = \bar{y} = 1$ for a society with an egalitarian distribution. We can then express the Atkinson Inequality Index as a function of $\xi$, as described by equation 14.

$$A(\xi) = 1 - \frac{\xi}{\bar{y}} \tag{14}$$

Because $y_i = \xi, \forall i$, we can also rewrite the utility function given by equation 7, assuming that $\epsilon \neq 1$, as a function of $\xi$, as described by equation 15.

$$u(\xi, \epsilon) = \frac{\xi^{1-\epsilon}-1}{1-\epsilon} \ , \forall i \tag{15}$$

Similarly, the isoelastic social welfare function given by equation 7 can be rewritten as a function of $\xi$, as described by equation 16. Note that social welfare is now equivalent to the individual utility function.

$$W(\xi, \epsilon) = \frac{\xi^{1-\epsilon}-1}{1-\epsilon} \tag{16}$$

We can solve directly for $\xi$ as a function from equations 7 and 13, yielding equation 17. Given any income distribution and the

inequality aversion parameter, $\epsilon$, we can calculate $\xi$. When $\epsilon = 0$, $\xi = \bar{y}$. For $\epsilon > 0$, $\xi < \bar{y}$ and will decrease as $\epsilon$ grows larger, reflecting the greater social cost of inequality.

$$\xi(\epsilon) = \frac{1}{n}[\sum y_i^{1-\epsilon}]^{\frac{1}{1-\epsilon}} \quad (17)$$

For a given $\epsilon > 0$, $W = \xi$ such that we can solve for $W$ as a function of $\bar{y}$ and $A(\xi)$ from equation 11, resulting in equation 18. Because $\frac{\partial W}{\partial \bar{y}} > 0$, it is possible to simultaneously experience an increase in both social welfare and inequality.

$$W\big(\bar{y}, A(\xi)\big) = \bar{y}[1 - A(\xi)] \quad (18)$$

The overall change in social welfare ultimately depends on the concavity of the SWF, which is determined by the level of inequality aversion, or the value of $\epsilon$. Analysts' choice of $\epsilon$ is often arbitrary. The Census Bureau, for example, reports $\epsilon$ for values of 0.25, 0.50, and 0.75. In section 3, we estimate parametrically the value of $\epsilon$ using SWB data from the GSS using the procedure outlined above. Once we estimate the value of $\epsilon$, we proceed to calculate the values of $A(\epsilon)$, $\xi(\epsilon)$, and $W(\epsilon)$ to evaluate whether economic growth in the United States over the period 1974–2012 has been sufficient to compensate for the growing level of income inequality.