THE PENNSYLVANIA STATE UNIVERSITY
SCHREYER HONORS COLLEGE

DEPARTMENT OF ECONOMICS

Happiness and Economic Inequality – Evaluating the Effects of National Inequality on
Levels of Happiness

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SUMMER 2013

A thesis
submitted in partial fulfillment
of the requirements
for baccalaureate degrees
in Economics and Mathematics
with honors in Economics

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ABSTRACT

This paper will analyze the field of happiness economics and its impact on the economics discipline and today's policy. Further, this paper will study the effects that economic inequality has on happiness. After analyzing various data, it is determined that economic inequality is not significantly correlated with happiness across all countries. For the wealthiest countries, there is a significant negative correlation between inequality and happiness. The result is that economic inequality reduction would not appear to have any intrinsic effect on boosting happiness for countries without sufficiently high income. Once nations reach sufficiently high income, only then is there a significant incentive to reduce inequality.

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ACKNOWLEDGEMENTS

I would first like to thank the Schreyer Honors College and the Department of Economics for granting me the opportunity to take up independent research as part of my undergraduate curriculum. Such opportunities have opened my eyes to the incredible amount of work and thought that goes into such an endeavor.

I also want to thank some faculty from the Penn State Department of Economics: Dr. James Jordan for initially introducing me to advanced theoretical economics and encourage me to study mathematics to assist in my economics studies, Dr. Bee Roberts for advising me through much of my undergraduate years, Dr. Russell Chuderewicz for helping me to acquire various research assistantships, Dr. Robert Marshall, Dr. Edward Green, and Mr. Vikram Kumar for guiding me in my two research assistantships, Dr. Dan Goldstein for assisting me with the econometric and statistical analysis portion of my thesis, and Dr. David Shapiro for helping to guide me through developing my thesis topic.

Finally, I am very thankful for all of the other opportunities that Penn State has given me. From two internships with Poverty Resolutions and the U.S. Department of State, volunteer experiences, and academic achievement programs, I have benefited in so many ways from my education here in all aspects of my life. Special thanks here goes to SHC career advisor Mrs. Lisa Kerchinski and fellowships advisor Dr. Ruth Mendum for guiding me through making the most of my college years and helping me to explore my future prospects after graduation.

Chapter 1

Introduction

It is a prevalent fact that measuring income alone does not tell the full story of a nation's general well-being. In order to fill in some gaps, a number of other indices can be used, an example of a prominent one being the Human Development Index (HDI). The various indices used to measure the well-being of a nation do a tremendous amount of work in drawing comparisons across borders and potentially driving policy that could lead to improvements in our societies, but no one indicator truly demonstrates the overall life satisfaction of people within nations.

Happiness economics is a field which has of late seen rapid development. In attempting to use the quantitative and theoretical tools developed by economics to study well-being and life evaluations (well-being is often used interchangeably with happiness, as it will be in this paper), it has garnered much interest for offering a better picture of the advancement of modern society than those portrayed by GDP, HDI, or any other method of evaluation which has no implicit means of telling the full story of well-being.

This latter statement may sound somewhat harsh or untrue, but take GDP for instance. GDP measures the final market value of final goods and services within a country in a given period of time. Such a measure is useful because it generally correlates closely with people getting what they want, thus leading to increases in well-being. But this correlation is not implicit – a society in which everyone was enslaved in output maximizing industries which dumped all final products into the ocean would have a very high GDP but is unlikely to provide any benefit to well-being.

Such a society would never exist in the real world (at least we should hope not), but it does point to remind us of one fact – GDP and other statistics are only useful in measuring well-being so long as they are closely correlated. And so it is useful then to have a statistic measuring well-being itself, to see exactly how closely models for GDP, growth, democracy, health, etc… correlate with real world life improvements on the macro-level.

And so we come to surveys on general well-being, measuring happiness. Happiness indices measure the overall well-being of a society by surveying large samples of the population to evaluate their well-being on scales of varying degrees using a set of questions. Such questions may range from asking people to rank their overall life satisfaction to asking if the person felt anxious at any point on the previous day. By gathering large samples of these data, statisticians are able to closer analyze general well-being and correlate the gathered data into a single happiness index.

Thus, we can say that GDP is a statistic worth growing if it is positively correlated with happiness. But if we break it down to the micro-level and determine that a certain economic activity is boosting GDP while lowering happiness, then logically we shouldn't encourage such economic activity.

To theoretically demonstrate such an economic activity, suppose a community borders a forest, beneath which lies a large oil deposit. The community believes that the forest is sacred, and many of its people would be devastated to see the forest get knocked down, irrelevant of the value of the oil beneath the forest. If a policymaker from outside the community used the tools of modern economics to determine the impact of selling off the forest to the forestry and oil industries, he would likely discover that the overall income of the community would rise and that employment in the community would increase from destroying the forest. Logically, it would seem to him that the well-being of the community would thus increase. Unfortunately, the

modern economic analysis, by only taking into account the economic ramifications of selling off the forest, would lead to entirely the wrong conclusions.

If the policy-maker were, on the other hand, to view more inclusive happiness-based models, he would see that this policy which would appear to boost economic output would be detrimental to the community's well-being.

And thus we see that no matter how closely correlated GDP is with well-being, it is an imperfect tool for measuring well-being. Further, GDP growth should never be considered an objective of any policy or program without first consulting a more inclusive statistic on overall well-being.

So how exactly does happiness measure well-being? Studies measure happiness three ways: one is by assessing overall life satisfaction, then, by assessing the short-term hedonistic happiness, and lastly by looking at more long-term eudaimonistic happiness.

Life satisfaction is perhaps the factor which economists are most interested in when studying happiness, as it reveals the more macro-level trends that policy can directly affect. It is often determined by the two other two types of happiness.

Hedonistic happiness deals with the daily pleasures and emotions of life. This can range from enjoying a day at the park, to eating one's favorite food, to receiving a thrill. Such happiness relates to individual actions/activities, and will eventually wane in time, except perhaps in memory.

Eudaimonistic happiness translates closer to having a sense of purpose in life, which can be derived from one's status, lifetime achievement, health, philosophy, or spirituality. These feelings may not be linked to those of pleasure, but there is certainly a sense of well-being that is spread across a lifetime and not diminishing with time.

The measures for each are done similarly through gathering survey data. A question which might reveal one's life satisfaction would be straightforward, asking to rank one's life

satisfaction on a given scale (often 0 to 10). A question which may reveal hedonistic well-being would ask about one's emotions in a recent period, for example, how happy one felt yesterday. A question revealing eudaimonistic well-being would ask about one's overall sense of purpose in life.

Each of these questions reveals something a little different about well-being, and so are important to measure together in determining a happiness statistic. Survey data taken from the U.K.'s Office of National Statistics reveals that all three types of happiness are correlated, but that life satisfaction and eudaimonistic happiness tend to be higher correlated with each other than either is with hedonistic happiness (Heliwell et al. 2012).

With an understanding of what happiness is and how it can be measured, this paper will set out to look deeper into some of the happiness literature before beginning its main purpose: analyzing the effects of economic inequality on happiness.

First, we will see why economic inequality may be an important determinant of happiness. With the rise of the "Occupy" movement, protesting the rise of economic inequality in society made apparent by the recent recession, there is definitely a consensus amongst many facets of society that such inequality must be curtailed. Thus, we will look at how inequality actually affects happiness, and if reducing the income gap alone will truly make society much better off as much of the Occupy movement espouses.

A study released by Michael I. Norton and Dan Ariely (2011) revealed that on average, Americans perceive society to be more equal than it actually is, and even further, believe an ideal society would be even more equal. Below is a graph representing actual, estimated, and ideal income distributions in the U.S. based on percentage of wealth each quintile of society does/is perceived to/would own.
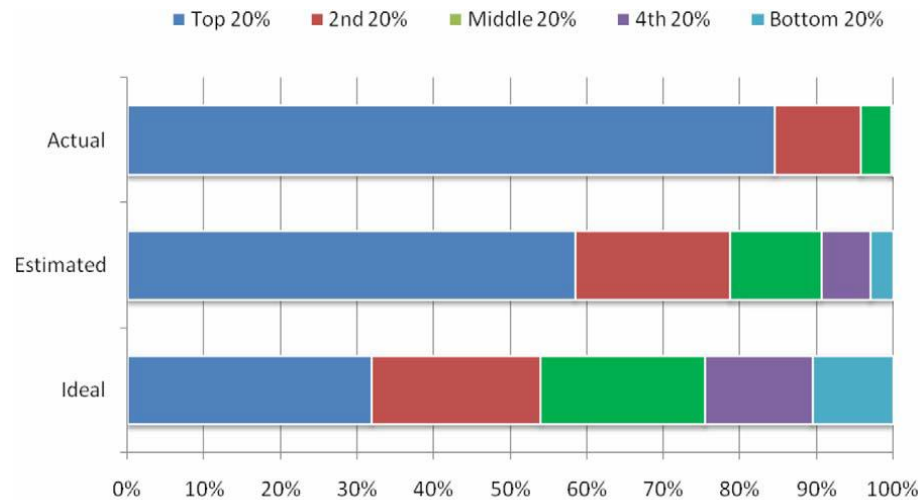
Figure 1-1. Actual U.S. wealth distribution alongside estimated and ideal distributions. Source: Norton and Ariely (2011).

There is a belief that ideally, there should be less inequality, and even misinformation about the level of inequality today. The paper further shows such patterns exist in all facets of society, from men to women, rich to poor, and Bush voters to Kerry voters.

Looking outside the United States, we will also reveal whether such inequalities are also a reason for diminished well-being in the developing world. It has been proposed that inequality be addressed directly in the Millennium Development Goals, to make sure that international development efforts reach all parts of society equally and fairly. It raises the question of whether development efforts should focus on reducing economic inequalities by helping the world's poorest even if at the expense of absolute economic growth in order to best increase well-being for all of society.

If people in the United States alone believe in a higher ideal for equality, perhaps the whole world does as well. Is wealth distribution truly a significant contributor to levels of happiness, or does it not make much of a difference on absolute levels of happiness within

countries? This paper will attempt to answer this question by analyzing country-level happiness and inequality data and dissecting trends among the global economies.

Chapter 2

Understanding Happiness

The development of a happiness statistic to be widely applied for applications to policy decisions was first done by the Kingdom of Bhutan in 1972. Gross National Happiness (GNH) was developed in Bhutan to measure the advancement of spiritual alongside material development, expanding since then to include nine domains of happiness, which range from health to cultural diversity.

In 2012, the United Nations launched its first ever World Happiness Report, which studied more in depth the factors determining happiness and how such statistics could be applied internationally. One finding of the paper is that while a model to estimate life satisfaction using the log of GDP alone accounted for 65% of the variation across countries, when factors such as health, education, and freedom were included, the model was able to account for 80% of the variation.

The report further takes into account a fault in wealth-only derived models of well-being: diminishing marginal utility of income (Heliwell et al. 2012). The idea is that in general, a given raise in income is worth less to someone with a higher income than it is to someone with a lower income. While some economists may disagree with this assumption due to unlimited wants, the idea that people with less derive more utility from equal wealth increases is widely accepted. Two implications follow. First, GDP as an aggregate of wealth does not properly account for divisions in income. Holding GDP constant, it is possible that a more equal society would tend to have higher well-being than a less equal society because the utility of income would be higher when redistributed to the poor. The second implication is that in terms of development efforts, the effectiveness of improving well-being through economic means will become less important as

wealth increases, meaning development efforts should be based on a broad array of policy objectives, inclusive of income and GDP growth.

A further important factor discussed in the report is the difference in the way GDP and happiness vary. Variation of well-being across the globe takes place much more so within countries than variation of income. This means that happiness is much more evenly spread around the world than income, and there is a much larger distinction between a rich and poor country than a happy and unhappy country.

So then does GDP even matter? The easy answer is absolutely! GDP is a measure of the overall economy, and a great one at that. It may not necessarily tell the full story of the lives of people within a country, nor be great at comparing the overall lifestyles between two countries, but it can tell you which country is richer. Further, general trends that can be found in the data will differ from person to person. Certain people may prefer economic success above all, and thus gravitate to high income areas.

On the micro level, we can think of GDP as a lot like individual income in a given career field. High paying jobs may lead to the happiest lifestyle and very well-off people. But for most, income isn't the only factor going into choosing a job. There are other areas such as satisfaction with the work, stress, and time off amongst others. While high paying fields are often among what people would consider the "best jobs," this is not true of everyone. Overall life satisfaction will vary from career to career, and even if income is correlated with high satisfaction, it certainly is not the sole determining factor. If one could foresee which job would bring them the most overall joy in life, it seems likely that one would choose it. But without that capability, salary will still act as a great determinant of how that person will end up.

Happiness and Welfare Economics

There is a long established field in microeconomics known as welfare economics. This field assumes that we can maximize economic welfare by maximizing society's overall utility. The approach used when this field was developed is utilitarian in nature, emphasizing the greatest overall utility to society. For example, welfare economics points out inefficiencies created by economic factors such as price floors or price ceilings. The idea is that there is much waste in the economy when such constraints are put in place, and maximizing social welfare would advocate the removal of such inefficiencies.

Taken alone, welfare economics would make it seem as though a policy such as placing a price ceiling on rent harms the overall well-being. But what isn't taken into account in such models is non-economic externalities. For example, what if we increased the wealth of one person while everyone else's remained constant? Welfare economics would tell us this is good for society since one person benefits while nobody suffers. But in non-economic terms, this could greatly affect the social dynamics of the community, the political scene, future income earning potential, and much more. A known effect is the "Comparison Effect" (Mota 2007) in which people, now comparing their incomes to the newly enriched person, see themselves as relatively poorer, thus reducing the non-material value of their money.

One can look to sweatshops in poor nations to see how economic efficiency doesn't necessarily lead to greater social welfare. While such voluntary employment would seem in a Western country to be a perfect characterization of freedom of labor, and the lack of regulations would make such jobs very economically efficient, this does not dispel many of the strong negative welfare effects of sweatshop labor.

The idea, then, is to avoid characterizing preferences by the choices people make, and instead to measure the way people feel about their choices. In economic models, instead of rationalizing purchases using a posteriori arguments that if the person made the choice, it must have been the person's welfare-maximizing choice, we must instead accept that "perfect information" assumptions are the furthest thing from the truth: very few people make their decisions thinking about all of the possible alternatives and ramifications. The evolution of economics lies in using economic models and theories to analyze a combination of psychological, sociological, and economic data to judge overall well-being within society as a combination of factors.

Undoubtedly, many within the discipline of economics will not like the idea of economics evolving into a field that intrudes extensively into the other social sciences and tries to perform happiness based social engineering. But happiness based social engineering is not much different in character than economic reforms of today. Governments regulate markets, control salaries, hand out subsidies, fund infrastructure, and take part in a number of other economy based social engineering initiatives. Using a better array of data borrowed from all the social sciences, economists can make more accurate predictions of the true welfare effects of both economic and non-economic policy and apply them in broader initiatives that reach out to more than just the economically impoverished.

More specific criticism of the subject comes from an article by Deirdre McCloskey (2012), who discusses the history of the development of first welfare economics, and now happiness economics, making each out to be a field that can never truly be realized. Starting with Jeremy Bentham attempting to analyze happiness through economic means, society has only been able to use arbitrary measures of happiness. After realizing that human brains experience the world in much different ways that cannot be counted easily, some arbitrary measures have been used, first through utils, then through pricing choices, and now through happiness statistics. She

claims that the upper limit placed on happiness rankings inherently prevents happiness from growing in tandem with a measure such as wealth with infinite growth possibilities. What's more, a happiness ranking of 4 to Jim might be a happiness ranking of 6 to Jane.

While definitely valid arguments, they are not necessarily unavoidable problems. Already, in happiness surveys, there is certainly consistency in responses that would hint that the aggregation of the data would tell at least some accurate story. For example, in the World Happiness Report, responses in what is called the Cantril Ladder, an 11-point happiness survey, are distributed with at least some consistency, with regional responses tending to cluster around certain rankings (Heliwell et. al. 2012). It also is worth noting that respondents in rich and open countries (generally the West) have a strong tendency to give higher responses than those in poorer, corrupt nations (generally Sub-Saharan Africa). This aligns with what one might expect a happiness statistic to show, and there is at least some consistency in the data that would prove responses to not be entirely arbitrary.

Carol Graham, Senior Fellow at the Brookings Institution, defended happiness economics against some of McCloskey's other critiques. Firstly, the idea of what happiness is. Graham (2012) points to two measures for happiness. The first measure of happiness, which Graham calls "Benthamite," is experienced well-being, also called hedonism, and what McCloskey generally critiqued for being the primary measure of happiness. The second, what Graham calls "Aristotelian," is evaluated well-being, what we think of as life satisfaction and eudaimonism, the longer-term sense of overall purpose in life. An economist who believes that happiness just takes into account hedonistic Benthamite happiness without the overall Aristotelian eudaimonic and overall life satisfaction is missing a majority of the picture.

There is then still the problem of an upper limit of happiness surveys. What happens if all of society ranked at a 10? Should we give up trying to improve? Are increases in income no longer worth anything to society because it has achieved maximum happiness? It is obvious that

in such surveys taken over time, happiness will never be able to see a "hockey stick" as has been seen in wealth, where the industrial revolution brought about a boom in wealth which has never been seen before in history. A happiness model can never really follow a similar pattern, as it has an upper bound. This is, of course, a problem with the current methods for analyzing happiness, and why statistics such as GDP are still very important measures to continue to study growth, as the current happiness model limits it from ever-increasing growth.

While this flaw in the model may seem to be a problem, there is a school of thought that claims that such a model is actually reflective of the nature of happiness. The idea is that there may be a "hedonic treadmill," limiting human capability for ever upward growth in happiness. Such a design entails that people always have a tendency to revert back to a modest state of happiness, no matter how fast they chase happiness-increasing activities. The idea was given much credit when Richard Easterlin (1974) famously noted that happiness in the United States didn't increase even when income was growing, showing that perhaps once past a level of sustenance, newly acquired wealth doesn't make one feel any better off as long as those gains in wealth are in conjunction with the rest of society (i.e., gains must be relative to the rest of society in order to increase happiness). This is what we now know as the Easterlin paradox.

The Easterlin paradox, however, has not been accepted by all economists. In 2008, Betsey Stevenson and Justin Wolfers released a paper critiquing the existence of Easterlin's paradox. In their paper, they show that there is a clear positive linear relation between happiness and the logarithm of income that never appears to hit a satiation point, as would be required by the Easterlin paradox. If such a situation holds true, then economic growth can and should indefinitely cause happiness to rise. However, it would require exponential income growth to maintain constant happiness growth; not an impossibility if we consider the hockey stick.

Daniel Kahneman and Angus Deaton (2010) were sure to note something particular about the hedonic treadmill, potentially explaining this difference between the Stevenson/Wolfers paper

and the Easterlin paradox – it only applies to hedonic happiness. Life evaluations, they found,

continue to rise with income. Thus, while income may only boost hedonistic pleasure up to a

certain point, life evaluations do not stop increasing as wealth gets higher and higher. Since this

is the case, it sets the stage for increasing but diminishing returns to national income. But once

hedonistic pleasure stops climbing for the majority of the population, perhaps equality of wealth

will become a more focused determinant of happiness, with higher happiness returns to income in

the hands of the poor than the wealthy.

In fact, using the results of an earlier paper by Michael R. Hagerty and Ruut Veenhoven

(2003), which raised disagreement with the Easterlin paradox five years before Stevenson and

Wolfers, we can perhaps use Kahneman and Deaton's work to better explain the Easterlin

paradox. Below is a finding of Hagerty and Veenhoven of the effect of predicted happiness from

a 10% rise in GDP per capita:
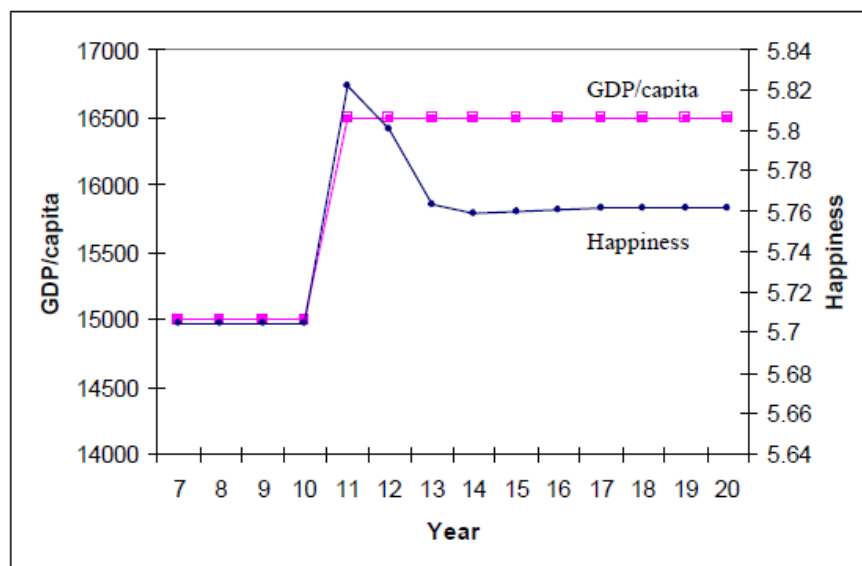
Figure 1-2. Effect on predicted happiness of a 10% rise in GDP/capita.

Source: Hagerty and Veenhoven (2003).

One can see that happiness initially rises with income, but proceeds to fall back; however,

it remains above its baseline level. If gains to hedonic happiness revert to a starting level, but life

satisfaction is permanently boosted, it would make sense that the gain in hedonic happiness is the difference between the peak in happiness and the final level of happiness, while the gain in life satisfaction would be the difference between the final level of happiness and the starting level of happiness.

Even with these more recent findings by economists, the debate on the existence of the Easterlin paradox is still raging between various economists, with Easterlin vigorously defending the existence of his paradox.[1] What does remain is to see if inequality has an effect on happiness. If diminishing marginal utility of income holds true, then increased wealth should have higher long-term happiness effects on the lowest classes, thus more equal societies should be happier, ceteris paribus. This will be explored further in the following chapters.

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[1] See Easterlin (2004); Easterlin et al. (2010); Sacks et al. (2010); Stevenson and Wolfers (2013)

Chapter 3

Happiness and Inequality

Does inequality itself affect happiness? This question has been answered in many different ways, from a definite yes, to a definite no, to somewhere in between. The opinion on this question has varied over the years from person to person, and society to society. People on the right wing will give one answer, while egalitarians on the left will have an alternative hypothesis entirely. Using the tools of happiness economics, as outlined in Chapters 1 and 2, we can look more in depth at whether or not differences in happiness from economic inequality occur across all human societies, if it affects societies differently, or if no society is truly affected.

The history of relating economic inequality to happiness in has deep roots. We can begin with describing the way income gains are thought of in welfare economics. There is an assumption pervading many economic models which states that people make rational decisions. Therefore, it is said that if one person in society is made better off economically, but nobody is made worse off, it is an improvement, specifically a "Pareto improvement," for all of society. For a rational human sees that by one person gaining, he is not losing, so he is the same as he always was. This idea seems to make sense on the surface, but does the evidence support it?

Not exactly. In the field of game theory, another field of economics which directly studies micro-level interactions between agents, there is evidence that people will not always be completely okay with one person gaining while they don't (humans value fairness over perfect rationality; who would have guessed?). In experimental ultimatum games, it has been shown that people would be willing to sacrifice their own income to prevent an allocation which could be perceived as unfair. For example, two people are given $10 to divide amongst themselves. One person is granted the power to choose the dollar amount that each individual gets. The second

person, upon hearing the first person's allocation, can either accept it, or reject it, in which case neither party gets any of the $10. Logically, the second person should accept any offer greater than $0, since otherwise he is forgoing monetary gain for nothing in return. And according to standard convention in welfare economics, even an offer of $0 would not harm the second player to accept, because he isn't losing anything (thus being a Pareto improvement). Yet the experiments show that the second player will often reject offers deemed to be unfair (Oosterbeek et al. 2004), thus denying either player a gain in income (such rejections vary across experiments, an example given being in the first such experiments by Güth et al. (1982) in which an offer of 30% of the initial allocation was rejected).

Now applying the feature from game theory to our earlier question, we can see that an unequal allocation of resources, especially if perceived to be unfair, could easily have a negative effect on happiness. Applied on the macro level, we will notice that this could also be an effect of relative income. What this means is that once people are able to get everything that they need to survive, their perceived income level is determined on a relative basis: how much that person has compared to his neighbors. So with the same absolute level of income, a person could feel extremely rich and happy if everyone around him had less income than he, or poor and less happy if everyone around him had greater income than he.

Thus, if one person's income increases while everyone else's remains the same, though society would be economically better off on the absolute level, this newly made wealthy person might make everyone else feel relatively worse off, thus reducing the actual aggregate well-being of the society as a whole.

So what does the data say to answer the question of whether or not inequality affects happiness? A data analysis aimed at answering the question proposed at the close of Chapter 1will form the basis of much of the remainder of this thesis. Before we go to that process, we will look at what is known.

A 2011 article appearing in *The Economist* cites a report released by the OECD noting that the gap in reported happiness between the happiest people and the least happy people across countries remained the same irrespective of the levels of in-country inequality. For example, in a country like Denmark, a fairly equal country, the happiest decile and the least happy decile are just as far apart on a 1 through 10 scale as they are in Indonesia, a fairly unequal country.

A 2002 report by Alberto Alesina, Rafael Di Tella, and Robert MacCulloch reports on the effects of inequality on happiness in Europe vs. the U.S. Their conclusions note that there is a negative correlation between inequality and happiness, pointing to the severity of this effect being based on national ideals. In Europe, the groups that appear most negatively affected by inequality are the poor and politically left. In the U.S., it's the rich (an interesting effect, Alesina et al. note, caused by perceived social mobility: the poor in the U.S. feel things can always improve; the rich fear falling behind). Such differences would show that there is unlikely to be a single model for the effect of inequality on happiness across all nations. But, where inequality does affect happiness, it would be important to determine why this is so, and if there is any way to reduce the inequality while not negatively affecting the happiness of any individual – a Pareto improvement in happiness of sorts.

A separate 2010 paper by Christian Bjørnskov, Axel Dreher, Justina A. V. Fischer, and Jan Schnellenbach suggests that perceived social mobility within a country can determine how inequality will affect happiness. Higher perceived social mobility will tend to reduce the effect that inequality has on happiness. Such a conclusion shows another related dimension of how relative income affects happiness – if people see their relative income as low but able to improve, their happiness will not be negatively affected as much as if they believed that they were stuck in a low-income state – explaining further why the poor in the U.S. don't appear to be unhappy about levels of inequality.

The next step of this paper will be to begin our own cross-country analysis of the effects of inequality on happiness. We hope to demonstrate either a pattern, or a lack there-of, in regressions of happiness on inequality. This will help us to decide if in-country equality determines national levels of happiness and to derive policy implications from such a finding.

Chapter 4

Data Analysis

To analyze the effect of inequality on happiness, we require a number of different kinds of data, the first being on happiness. To collect our happiness data, we use the World Database of Happiness by Ruut Veenhoven of Erasmus University Rotterdam. The happiness data was gathered by asking people to rank on a scale of 0 to 10, with 0 being most dissatisfied and 10 being most satisfied, how satisfied they are with their lives. The data reports the mean average from various surveys from 149 countries, 139 of which were used in this analysis.[2] From Veenhoven's data, we are also able to analyze the standard deviation of each country's happiness measure, allowing for an assessment of happiness inequality, with larger standard deviations equating to higher inequality.

We then use GDP per capita (measured at purchasing power parity) to measure average wealth within a country, and Gini to measure inequality within countries. The Gini coefficient measures inequality on a scale from 0 to 1, with 0 being perfect equality (everyone has an equal share of wealth) and 1 being perfect inequality (one person has 100% of the wealth). Our data for GDP was taken from the International Monetary Fund, and Gini from the World Bank.

The Human Development Index (HDI), a composite measure of life expectancy, education, and income, was initially developed as another measure of well-being to act as an alternative to GDP in the hands of policy makers. HDI is measured from 0 to 1, increasing as human development increases. We can use this statistic to determine if it is a better determinant of happiness than GDP itself.

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[2] Countries which lacked either GDP or Gini statistics were left out of our analysis.

To develop a more holistic model of well-being, we will include a number of other statistics which are used in measuring happiness in Bhutan's GNH statistic according to the World Happiness Report. Nine determinants of happiness are discussed, summed up in this pie chart:
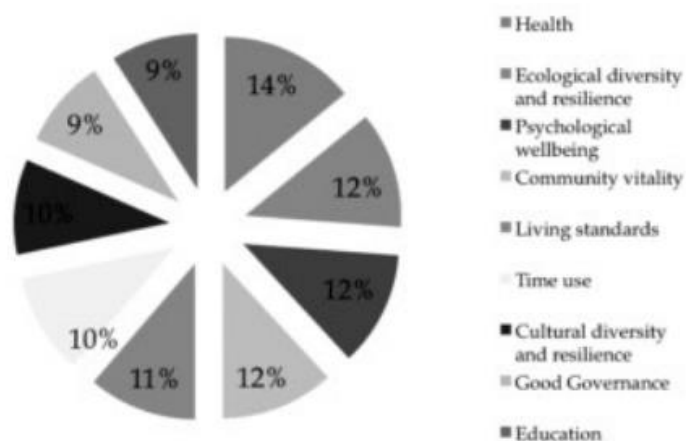
Figure 4-1. Domains in which happy people enjoy sufficiency.

Source: Heliwell et al. (2012).

For this analysis, data has been gathered on five additional statistics based on some of the determinants in this chart. Alongside GDP per capita, which would correlate closely with living standards, we apply the following indices:

We use average life expectancy to estimate health within a country, as higher lifespans can be assumed to correlate with higher health or access to medicine within countries. Higher life expectancies would therefore mean greater health.

Environmental Performance Index (EPI), measured from 1 to 100, is used to assess the performance of a nation's environmental policies. Closer to 100 implies a better score. This data comes from Yale University (EPI Rankings).

The trust index is a measure of the level of social trust within communities. The data is averaged around 100, with higher scores implying higher social trust. This data was collected from surveys conducted by Jaime Medrano (2012).

Corruption will be used to estimate the quality of governance, with higher corruption implying low quality of governance. This statistic will go from 0 to 100, with 0 being most corrupt. This data was gathered by Transparency International (2012).

Education is based on an index which ranks the quality of education within countries from 0 to 1, with 1 being the highest quality education. This index was compiled by the United Nations (2009; 2011).

Since our various indices and surveys do not covering all countries, the more statistics we include in our regression, the smaller our sample size will be. However, at least 100 countries have data collected for each index, so we are confident that all relationships will be covered by our data.

The first step in our analysis will be to check if each statistic has a linear relationship with happiness. We do this by running each one in a regression on happiness and utilizing a hypothesis test to see if we can determine a linear relationship with 95% confidence.

```
      Source |       SS       df       MS              Number of obs =     139
-------------+------------------------------           F(  1,   137) =   83.30
       Model |  90.0128433     1  90.0128433           Prob > F      =  0.0000
    Residual |   148.03219   137  1.08052694           R-squared     =  0.3781
-------------+------------------------------           Adj R-squared =  0.3736
       Total |  238.045034   138  1.72496401           Root MSE      =  1.0395


   happiness |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   gdpcapita |   .0000488   5.35e-06     9.13   0.000     .0000382    .0000594
       _cons |   5.118619   .1168117    43.82   0.000     4.887632    5.349606
```

Table 4-1. Regression of Happiness on GDP per capita.

```
      Source |       SS         df       MS              Number of obs =     138
-------------+------------------------------            F(  1,   136) =    0.31
       Model |  .53687042       1   .53687042           Prob > F      =  0.5789
    Residual | 235.852693     136  1.73421098           R-squared     =  0.0023
-------------+------------------------------            Adj R-squared = -0.0051
       Total | 236.389563     137  1.72547126           Root MSE      =  1.3169


-------------+----------------------------------------------------------------
   happiness |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        gini | -.7106815   1.277295    -0.56   0.579    -3.23661    1.815247
       _cons |  6.088308    .514893    11.82   0.000     5.070075    7.10654
-------------+----------------------------------------------------------------
```

Table 4-2. Regression of Happiness on Gini.

```
      Source |       SS         df       MS              Number of obs =     139
-------------+------------------------------            F(  1,   137) =  173.90
       Model | 133.148922       1  133.148922           Prob > F      =  0.0000
    Residual | 104.896112     137  .765665048           R-squared     =  0.5593
-------------+------------------------------            Adj R-squared =  0.5561
       Total | 238.045034     138  1.72496401           Root MSE      =  .87502


-------------+----------------------------------------------------------------
   happiness |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         hdi |  5.422639   .4112077    13.19   0.000     4.609504    6.235774
       _cons |  2.229213   .2820815     7.90   0.000     1.671416     2.78701
-------------+----------------------------------------------------------------
```

Table 4-3. Regression of Happiness on HDI.

```
      Source |       SS         df       MS              Number of obs =     136
-------------+------------------------------            F(  1,   134) =  153.64
       Model | 120.971431       1  120.971431           Prob > F      =  0.0000
    Residual | 105.506729     134   .78736365           R-squared     =  0.5341
-------------+------------------------------            Adj R-squared =  0.5307
       Total |  226.47816     135    1.677616           Root MSE      =  .88734


-------------+----------------------------------------------------------------
   happiness |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      health |    .08542   .0068914    12.40   0.000       .07179    .0990499
       _cons |  .0305443   .4739201     0.06   0.949    -.9067871    .9678756
-------------+----------------------------------------------------------------
```

Table 4-4. Regression of Happiness on Health.

```
      Source |       SS       df       MS              Number of obs =      118
-------------+------------------------------           F(  1,   116) =    32.70
       Model | 42.6541658      1  42.6541658           Prob > F      =   0.0000
    Residual | 151.324817    116  1.30452429           R-squared     =   0.2199
-------------+------------------------------           Adj R-squared =   0.2132
       Total | 193.978983    117  1.65794002           Root MSE      =   1.1422


-------------+----------------------------------------------------------------
   happiness |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         epi |   .0612943   .0107193     5.72   0.000     .0400635    .0825252
       _cons |   2.712201   .5813047     4.67   0.000     1.560854    3.863549
-----------------------------------------------------------------------------
```

Table 4-5. Regression of Happiness on EPI.

```
      Source |       SS       df       MS              Number of obs =      107
-------------+------------------------------           F(  1,   105) =    19.96
       Model | 26.7871239      1  26.7871239           Prob > F      =   0.0000
    Residual | 140.905775    105  1.34195976           R-squared     =   0.1597
-------------+------------------------------           Adj R-squared =   0.1517
       Total | 167.692899    106  1.58200848           Root MSE      =   1.1584


-------------+----------------------------------------------------------------
   happiness |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       trust |   .0179271   .0040125     4.47   0.000      .009971    .0258831
       _cons |   5.138707   .2349865    21.87   0.000     4.672772    5.604642
-----------------------------------------------------------------------------
```

Table 4-6. Regression of Happiness on Trust.

```
      Source |       SS       df       MS              Number of obs =      138
-------------+------------------------------           F(  1,   136) =    69.28
       Model | 80.1285954      1  80.1285954           Prob > F      =   0.0000
    Residual | 157.300461    136  1.15662103           R-squared     =   0.3375
-------------+------------------------------           Adj R-squared =   0.3326
       Total | 237.429056    137   1.7330588           Root MSE      =   1.0755


-------------+----------------------------------------------------------------
   happiness |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     corrupt |   .0384469   .0046192     8.32   0.000     .0293122    .0475816
       _cons |   4.162166   .2183728    19.06   0.000      3.73032    4.594011
-----------------------------------------------------------------------------
```

Table 4-7. Regression of Happiness on Corruption.

Source	SS	df	MS		Number of obs =	137
					F(1, 135) =	111.03
Model	103.23003	1	103.23003		Prob > F =	0.0000
Residual	125.510989	135	.929711031		R-squared =	0.4513
					Adj R-squared =	0.4472
Total	228.741019	136	1.68191926		Root MSE =	.96422

happiness	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
education	4.635816	.4399437	10.54	0.000	3.765742	5.505889
_cons	2.160904	.3593569	6.01	0.000	1.450206	2.871601

Table 4-8. Regression of Happiness on Education.

After running a regression on each variable, there is only one in which we cannot estimate a linear relationship with 95% confidence, that being Gini. This shows that happiness itself cannot be directly determined by inequality. Each of the remaining variables has a near 0 probability of not being linearly related with happiness.
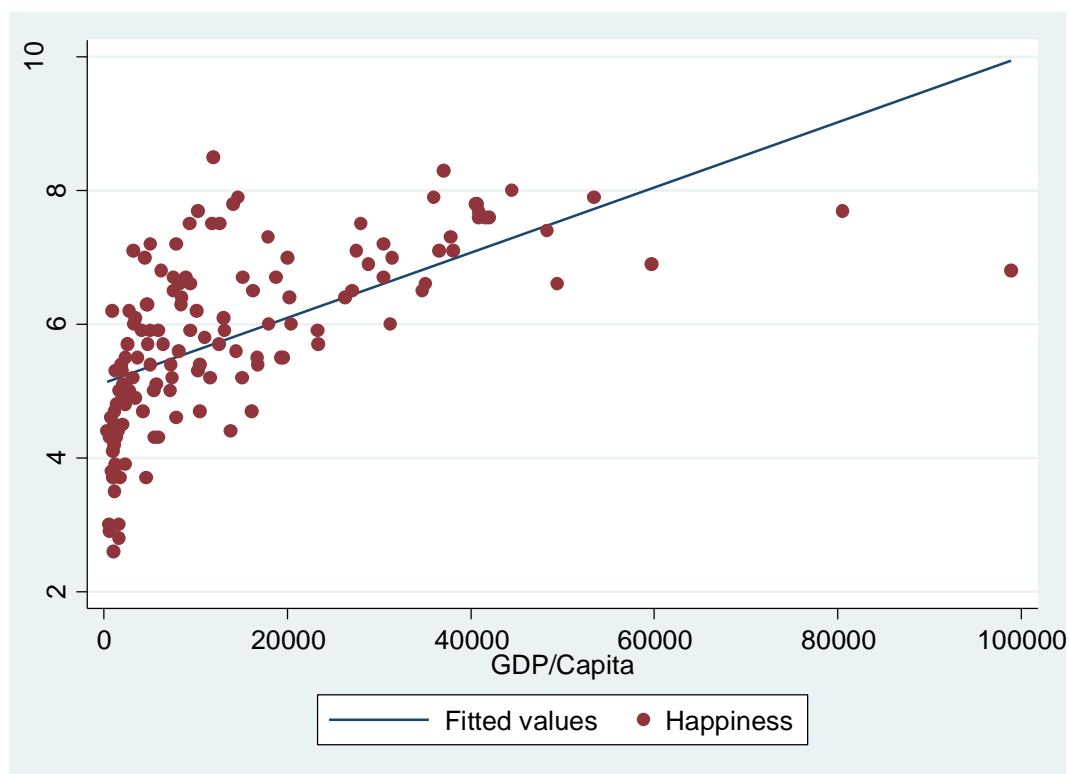
Figure 4-2. Scatterplot of Happiness on GDP per capita.

Source	SS	df	MS		Number of obs =	139
					F(1, 137) =	83.30
Model	90.0128433	1	90.0128433		Prob > F =	0.0000
Residual	148.03219	137	1.08052694		R-squared =	0.3781
					Adj R-squared =	0.3736
Total	238.045034	138	1.72496401		Root MSE =	1.0395

happiness	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
gdpcapita	.0000488	5.35e-06	9.13	0.000	.0000382	.0000594
_cons	5.118619	.1168117	43.82	0.000	4.887632	5.349606

Table 4-9. Regression of Happiness on GDP per Capita.

In figure 4-2 is displayed the graph of happiness vs. GDP per capita. There is a pattern to it, namely a downward curvature and spreading variance as GDP per capita increases. The downward curvature implies that there are diminishing returns to happiness from increased GDP/capita. The spreading variance implies that since variance is higher as GDP per capita increases, there are likely other factors playing important roles in happiness once income gets sufficiently high.

While income is likely to be very important in increasing happiness in countries when GDP per capita is low, the effect clearly tapers off to the point where countries on the highest end of the spectrum have lower happiness levels than some countries near the middle of the spectrum. To be specific, at $98,948, Qatar has the highest GDP per capita. However, with a happiness level of 6.8, it has markedly lower happiness than the happiest country measured, Costa Rica, which has happiness of 8.5 but GDP per capita at only $11,923.
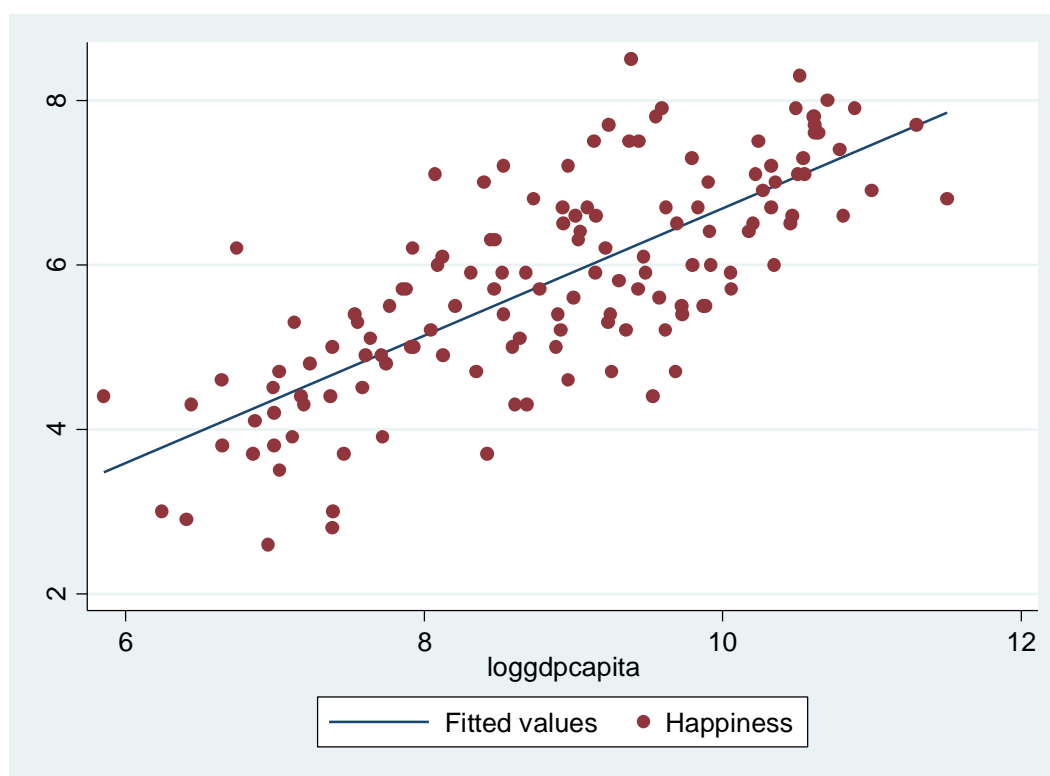
Figure 4-3. Scatterplot of Happiness on the logarithm of GDP per capita.

Source	SS	df	MS		Number of obs =	139
					F(1, 137) =	185.45
Model	136.905302	1	136.905302		Prob > F =	0.0000
Residual	101.139731	137	.738246215		R-squared =	0.5751
					Adj R-squared =	0.5720
Total	238.045034	138	1.72496401		Root MSE =	.85921

happiness	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
loggdp	.7755405	.0569502	13.62	0.000	.6629254	.8881555
_cons	-1.069211	.5109704	-2.09	0.038	-2.079619	-.0588018

Table 4-10. Regression of Happiness on the logarithm of GDP per capita.

To display a more accurate linear model of GDP per capita on happiness, we take the natural log of GDP per capita (lGDP), which, as seen in figure 4-3, shows a strongly positive linear correlation with happiness and much more evenly distributed variance, confirmed by a higher R-squared value (58% in Table 4-2 vs. 38% in Table 4-1). This is in accordance with the theory of diminishing marginal returns, which predicts a logarithmic relationship between

increased income and utility (an economic well-being term used often in welfare economics). This coincides with what was found in the World Happiness Report (Heliwell et al. 2012).

Next, we regress the standard deviation of happiness on Gini to determine if there is correlation between happiness inequality and wealth inequality.

```
      Source |       SS           df       MS            Number of obs =     126
-------------+----------------------------------         F(  1,   124) =    4.16
       Model |  .491749078         1  .491749078         Prob > F      =  0.0436
    Residual |  14.6670457       124  .118282627         R-squared     =  0.0324
-------------+----------------------------------         Adj R-squared =  0.0246
       Total |  15.1587948       125  .121270359         Root MSE      =  .34392

------------------------------------------------------------------------------
  sdhappiness |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        gini |   .7420941    .363955      2.04   0.044     .0217252    1.462463
       _cons |   1.889056   .1440796     13.11   0.000     1.603882     2.17423
------------------------------------------------------------------------------
```

Table 4-11. Regression of Standard Deviation of Happiness on Gini.

Our hypothesis test succeeds in determining that there is a statistically significant positive correlation between inequalities in each of these areas. Unfortunately, this does not give us enough information to determine whether the same groups within countries that are less happy also tend to be the poorer segments, though common sense and the fact that wealth is still positively correlated with happiness would tell us that this is generally the case.

Regressing happiness on HDI (Table 4-3.) also gives a great model based on R-squared values (percent of variance determined by model) nearly identical to (though actually slightly lower than) that provided by lGDP alone (56% vs. 58%).

```
      Source |       SS           df       MS            Number of obs =     134
-------------+----------------------------------         F(  3,   130) = 2109.95
       Model |  4.24425332         3  1.41475111         Prob > F      =  0.0000
    Residual |  .087166779       130  .000670514         R-squared     =  0.9799
-------------+----------------------------------         Adj R-squared =  0.9794
       Total |   4.3314201       133  .032567068         Root MSE      =  .02589

------------------------------------------------------------------------------
         hdi |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      loggdp |   .0732863   .0037408     19.59   0.000     .0658856      .080687
      health |   .0035989   .0003937      9.14   0.000       .00282     .0043778
   education |   .2981887   .0222587     13.40   0.000     .2541526     .3422248
       _cons |  -.4691843   .0174202    -26.93   0.000    -.5036481    -.4347206
------------------------------------------------------------------------------
```

Table 4-12. Regression of HDI on lGDP, Health, and Education.

Since HDI is measured by a combination of lGDP, health, and education, regressing HDI on these three variables provides a model accounting for over 97.9% of the variance on HDI.

Back to determining the effects of inequality on happiness, we already determined above that inequality does not directly correlate with happiness. But what if we put inequality in a model that also includes lGDP?

```
      Source |       SS       df       MS              Number of obs =     138
-------------+------------------------------           F(  2,   135) =   96.78
       Model | 139.258814      2  69.6294071           Prob > F      =  0.0000
    Residual | 97.1307491     135   .71948703           R-squared     =  0.5891
-------------+------------------------------           Adj R-squared =  0.5830
       Total | 236.389563     137  1.72547126           Root MSE      = .84823

-------------+----------------------------------------------------------------
   happiness |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      loggdp |   .8052538   .0579925     13.89   0.000     .6905625    .919945
        gini |   1.980455   .8452392      2.34   0.021     .3088314   3.652078
       _cons |  -2.113732   .6774267     -3.12   0.002    -3.453474  -.7739904
```

Table 4-13. Regression of Happiness on lGDP and Gini.

The regression of happiness on lGDP and Gini shows that Gini does now affect the model. The result is that holding lGDP constant, Gini is *positively* correlated with happiness, i.e., happiness goes up when inequality goes up. This is an interesting pattern which will recur in future regressions and is to be discussed in the conclusion, but is perhaps explained by the linear relationship between lGDP and Gini: higher inequality correlates with lower income.

Now, we use all of our indices together (lGDP, Gini, health, EPI, trust, corruption, and education) to create an optimal model for happiness, and to see which factors tend to matter most on the overall scale. Note first that many of our inputs will already be highly correlated with one another, e.g., lGDP will be positively correlated with health since more wealth generally implies better healthcare. Often, an argument that is used in favor of measuring well-being by GDP is the high correlation between GDP and the other determinants of happiness. But each of these

determinants has the possibility of having variance significant enough from its correlation with

GDP to suggest that its improvement can determine happiness independently from GDP.

```
      Source |       SS       df       MS                  Number of obs =      95
-------------+------------------------------               F(  7,    87) =   26.04
       Model | 91.1327699      7  13.0189671               Prob > F      =  0.0000
    Residual | 43.4960744     87  .499954879               R-squared     =  0.6769
-------------+------------------------------               Adj R-squared =  0.6509
       Total | 134.628844     94  1.43222175               Root MSE      =  .70707


   happiness |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      loggdp |   .4093432   .1791745     2.28   0.025     .0532144    .765472
        gini |   5.510165   .9052404     6.09   0.000     3.710902   7.309428
      health |   .0655197    .013927     4.70   0.000     .0378383   .0932011
         epi |   .0105784   .0109378     0.97   0.336    -.0111617   .0323185
       trust |   .0117313   .0031985     3.67   0.000     .0053741   .0180886
     corrupt |  -.0018463   .0067742    -0.27   0.786    -.0153107   .0116181
   education |   -.486057   .9265965    -0.52   0.601    -2.327768   1.355654
       _cons |  -5.147458   1.075561    -4.79   0.000    -7.285251  -3.009665
```

Table 4-14. Regression of Happiness on lGDP, Gini, Health, EPI, Trust, Corruption, and Education.

In this regression, we get an R-squared significantly higher than those when we ran the regressions with HDI (not used in this regression since its determinants are used independently in this model) and lGDP alone (68% vs. 58%). The variables which have an effect on this model include lGDP, Gini, health, and trust. EPI, corruption, and education do not have significant effect in this model, likely because they share linear relations with the other variables used.

Also of note in the above regression is that each of the variables which has a significant effect is positively correlated with happiness when holding the other variables constant. Again, this seeming positive relationship between happiness and Gini likely stems from its multicollinearity with lGDP.

We will lastly look at the effects of inequality by looking specifically at countries on the high and low end of the income spectrum, where absolute levels of GDP per capita have an insignificant effect on happiness.
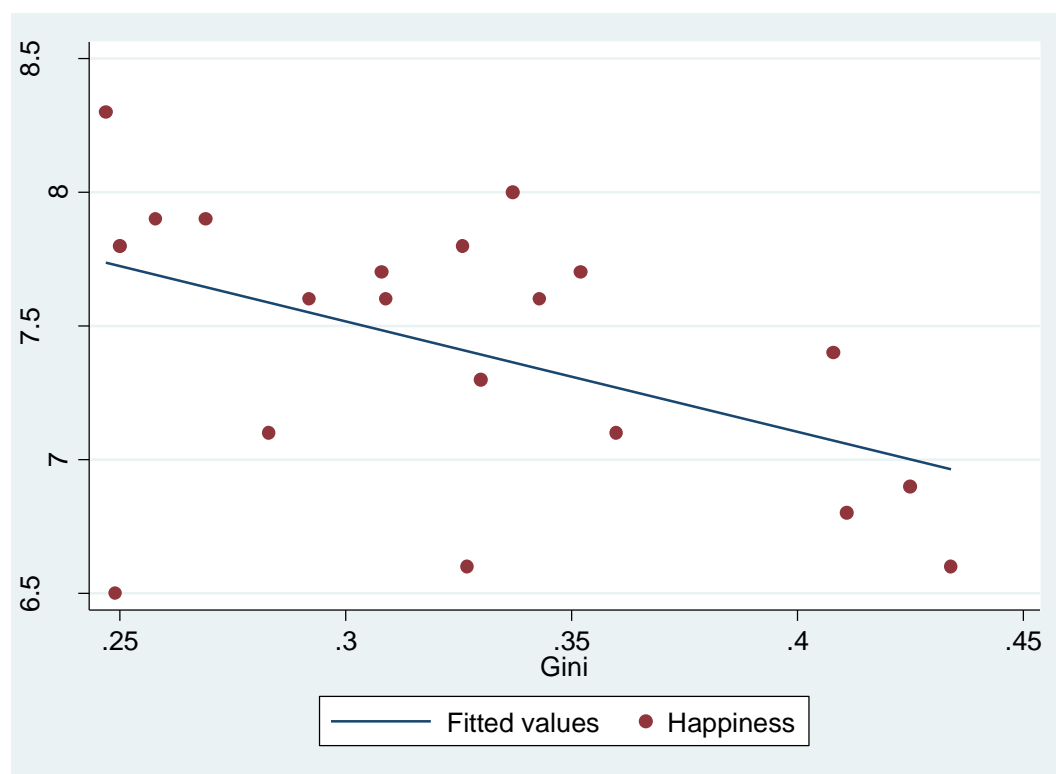
Figure 4-4. Scatterplot of Happiness on Gini for top 20 economies by GDP per capita.

```
      Source |       SS           df       MS            Number of obs =        20
-------------+----------------------------------       F(  1,      18) =      0.25
       Model |  .070616241         1  .070616241       Prob > F        =    0.6239
    Residual |  5.10738431        18  .283743573       R-squared       =    0.0136
-------------+----------------------------------       Adj R-squared   =   -0.0412
       Total |  5.17800055        19  .272526345       Root MSE        =   .53268


   happiness |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      loggdp |  -.2204615   .4419198    -0.50   0.624    -1.1489     .7079775
       _cons |   9.771599   4.735374     2.06   0.054    -.177053    19.72025
```

Table 4-15. Regression of Happiness on lGDP for top 20 economies by GDP per capita.

```
     Source |       SS          df       MS              Number of obs =      20
------------+------------------------------              F(  1,    18) =    5.14
      Model | 1.15061139         1  1.15061139           Prob > F      =  0.0359
   Residual | 4.02738916        18  .223743842           R-squared     =  0.2222
------------+------------------------------              Adj R-squared =  0.1790
      Total | 5.17800055        19  .272526345           Root MSE      =  .47302


------------+----------------------------------------------------------------
  happiness |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------+----------------------------------------------------------------
       gini | -4.140677   1.825923    -2.27   0.036     -7.9768   -.3045542
      _cons |  8.759447    .6043953    14.49   0.000    7.489659    10.02923
------------+----------------------------------------------------------------
```

Table 4-16. Regression of Happiness on Gini for top 20 economies by GDP per capita.

Figure 4-4 represents the regression between Gini and happiness when looking at

only the twenty wealthiest economies in our sample by GDP per capita. These

economies are:

	Country	GDP per capita (PPP)
1	Qatar	$98,948
2	Luxembourg	$80,559
3	Singapore	$59,710
4	Norway	$53,396
5	Hong Kong	$49,417
6	United States	$48,328
7	Switzerland	$44,452
8	Netherlands	$42,023
9	Austria	$41,556
10	Australia	$40,847
11	Ireland	$40,838
12	Sweden	$40,705
13	Canada	$40,519
14	Germany	$38,077
15	Belgium	$37,781
16	Denmark	$37,048
17	United Kingdom	$36,522
18	Finland	$35,981
19	France	$35,068
20	Japan	$34,748

Table 4-17. Top 20 economies by GDP per capita.

It is apparent that there is a significant negative relationship between happiness and

inequality in the world's top economies. It is also true that there is no significant relationship

between wealth and happiness in these economies. This appears to show that once an economy passes certain levels of income for its citizens, increases in happiness come from sources other than income, perhaps showcasing that people begin to worry more about their relative levels of income as opposed to their absolute levels of income.

Source	SS	df	MS		Number of obs =	17
					F(7, 9) =	4.91
Model	2.98024543	7	.425749347		Prob > F =	0.0154
Residual	.780931647	9	.086770183		R-squared =	0.7924
					Adj R-squared =	0.6309
Total	3.76117708	16	.235073567		Root MSE =	.29457

happiness	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
loggdp	.5696939	.3849206	1.48	0.173	-.301057	1.440445
gini	.4422049	2.64518	0.17	0.871	-5.541607	6.426017
health	-.0193001	.0368664	-0.52	0.613	-.1026977	.0640975
epi	-.0013562	.0224603	-0.06	0.953	-.052165	.0494526
trust	.0060095	.0044617	1.35	0.211	-.0040835	.0161025
corrupt	.0085348	.0151957	0.56	0.588	-.0258403	.0429099
education	12.6282	4.631665	2.73	0.023	2.150647	23.10576
_cons	-10.60846	8.196359	-1.29	0.228	-29.14991	7.932997

Table 4-18. Regression of Happiness on lGDP, Gini, health, EPI, trust, corruption, and education for top 20 economies by GDP per capita.

Gini, however, is not a significant contributing factor in a model including the range of variables from health to education. In fact, the only significant contributing variable in such a model is education.

Source	SS	df	MS		Number of obs =	20
					F(1, 18) =	11.94
Model	.026763	1	.026763		Prob > F =	0.0028
Residual	.040346806	18	.002241489		R-squared =	0.3988
					Adj R-squared =	0.3654
Total	.067109807	19	.003532095		Root MSE =	.04734

gini	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
education	-1.103975	.3194921	-3.46	0.003	-1.775203	-.4327469
_cons	1.387703	.3074698	4.51	0.000	.7417329	2.033673

Table 4-19. Regression of Gini on Education for top 20 economies by GDP per capita.

Regressing Gini on education reveals that the two have significant negative correlation, so multicollinearity likely plays a major role in diminishing the role that inequality appears to have in this model.

Rounding out the lowest 20 economies by GDP per capita is the following list:

	Country	GDP per capita (PPP)
120	Uganda	$1,385
121	Rwanda	$1,334
122	Burkina Faso	$1,302
123	Nepal	$1,249
124	Haiti	$1,235
125	Sierra Leone	$1,132
126	Mali	$1,128
127	Ethiopia	$1,092
128	Mozambique	$1,090
129	Guinea	$1,086
130	Togo	$1,048
131	Afghanistan	$957
132	Madagascar	$944
133	Malawi	$851
134	Niger	$771
135	Central African Republic	$767
136	Liberia	$627
137	Burundi	$605
138	Zimbabwe	$515
139	Congo (Kinshasa)	$349

Table 4-20. Bottom 20 economies by GDP per capita.

These countries have the following regressions for happiness on both lGDP per capita and Gini:

```
      Source |       SS          df       MS              Number of obs =      20
-------------+------------------------------              F(  1,     18) =    0.80
       Model |  .552614514       1   .552614514           Prob > F      =  0.3826
    Residual |  12.4173853      18    .68985474           R-squared     =  0.0426
-------------+------------------------------              Adj R-squared = -0.0106
       Total |  12.9699998      19   .682631571           Root MSE      = .83057


   happiness |      Coef.   Std. Err.       t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      loggdp |   .4735117    .529052      0.90   0.383    -.6379853    1.585009
       _cons |   .9173255   3.616621      0.25   0.803    -6.680914    8.515565
```

Table 4-21. Regression of Happiness on lGDP for bottom 20 economies.

```
      Source |       SS          df       MS              Number of obs =      20
-------------+------------------------------              F(  1,     18) =    0.02
       Model |  .015845295       1   .015845295           Prob > F      =  0.8837
    Residual |  12.9541545      18   .719675253           R-squared     =  0.0012
-------------+------------------------------              Adj R-squared = -0.0543
       Total |  12.9699998      19   .682631571           Root MSE      = .84834


   happiness |      Coef.   Std. Err.       t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        gini |  -.3374933   2.274486     -0.15   0.884    -5.116011    4.441024
       _cons |   4.288288   .9510799      4.51   0.000     2.290143    6.286433
```

Table 4-22. Regression of Happiness on Gini for bottom 20 economies.

From the data here, it appears that neither GDP nor Gini has a significant effect on happiness for the bottom 20 economies (no significant correlation is found either between happiness and any other determinants). For low levels of income, our model is then unable to capture the determinants of differences in happiness.

What we have then determined is that inequality, across the range of all nations, does not have a significant role in determining happiness, though there is a slightly negative trend. Near the bottom of the income distribution (when regressing for the poorest economies by GDP per capita), there is almost no relationship between happiness and inequality. Near the top of the income distribution, the balance shifts to show that equality and happiness are linked, and that lower inequality leads to higher levels of happiness.

Chapter 5

Policy Implications

Today's policy is to a great extent already linked to happiness. The role of the liberal democracies has been to benefit the greater part of society, whether through economic growth, better healthcare, or improved governance. People generally favor policies that they feel will make them happier, irrespective of what the statistics say.

Nonetheless, the statistic representing happiness could better guide policy, or at least quantify happiness for better analysis (just as nations could still improve GDP even before it became a quantifiable statistic). Alongside GDP, it will be an excellent tool for policy analysis and evaluation.

Using quantifiable evidence, we are able to foresee whether or not certain policies will have the desired effects. In this case, it appears that wealth equality is not a major determining factor of happiness across the globe. Therefore, it does seem that class structures within countries are not detrimental or harmful to human well-being in general, as often proposed by those with left-leaning ideologies.

This does generally lend support to boosting economic growth, especially in the third world, even if it leads to increasing inequality within countries. Discussions about the focus of the Millennium Development Goals have made addressing inequality seem like a worthwhile goal of the global community when pursuing international development objectives (Melamed 2012; United Nations 2012). From the data gathered here, it seems that, contrarily, it does not.

Of course, if we want to maximize total happiness based on a utilitarian objective of doing the most good for society, it would be best to focus economic development in the lowest classes of society where the marginal utility of money is greatest, thus they would likely gain the

most happiness from increased economic circumstances. But the reduced inequality that such policies would lend to would be merely a side-effect of such development, and need not be pursued as an objective of development.

The picture does change somewhat in the developed world. Once GDP per capita becomes sufficiently high, it does not seem to affect well-being (the top 20 countries by GDP per capita reveal insignificant correlation between income and happiness, even when the log of income is taken). Inequality, on the other hand, does correlate quite negatively with happiness for the top economies.

Thus, it does seem that in general, outside of the developed world, increased equality would not be a worthwhile goal to pursue based on our current findings. Policy makers around the globe would of course do best to cater to specific circumstances among their constituencies. But for global policy, especially for development, it would not be worthwhile to improve the human lot by focusing on development efforts with inequality-reducing programs as an objective.

Chapter 6

Conclusion

It is clear that as happiness economics develops as a legitimate and respected field, more and better research will come out that will prove new interesting facts about improving the human condition. As more economists, psychologists, sociologists, and statisticians set out to explore this field, more and more insights into the causes of human happiness and how to analyze and predict it will hopefully be discovered. Even with some resistance to this new field, such criticisms will only keep the leading researchers on their toes to better refine and update their work to make better models.

In terms of where this paper falls in the happiness literature, it is merely a brief study of some of the data that has already been collected in hopes of finding new insights. This paper by no means acts as a definitive answer to the question that it set out to answer, but merely as a guide using certain bits of information that could be studied in a short period of time by one budding undergraduate economist. It is possible that new data will come out ruling this data obsolete, or that the ever-changing human mindset will change human values to the point where things which once did not significantly affect human happiness will ultimately act as a major contributor to social well-being.

To repeat the question that this paper set out to answer: Is wealth distribution a significant contributor to levels of happiness, or does it not make as much of a difference on absolute levels of happiness within countries? The answer derived from the statistics analyzed in this paper is largely a "No," but not without some interesting insights that can be derived from this analysis.

Inequality seems to affect different countries differently. There is a clear correlation among the wealthiest of countries, with inequality affecting happiness. Perhaps this is why the Occupy movement has largely been limited to the developed world, as happiness and inequality become more linked once countries pass a certain threshold of wealth. This could further explain why Easterlin found that income growth has not increased happiness in the United States since the 1970's, a period marked by rising income but also rising inequality (Baker 2006; DeNavas-Walt 2009).

Perhaps the idea that happiness is affected by inequality is because of the idea of economic inequality itself, as opposed to actual inequalities. As Bjørnskov et al. showed in their 2010 paper, the link between happiness and economic inequality perhaps lies in perceived levels of social mobility, where people do not mind inequality as much if they feel that it is within their own power to rise in economic status. If such relationships hold true, then it seems that inequality itself only really affects happiness if people see themselves locked into their current status, even if inequality itself is the same.

Such perception-based happiness, where happiness is based on perceptions of wealth, does not speak to inequality as having any intrinsic effect on happiness, as it is only when people think of their relative income that they begin to become unhappy with the system, even if their absolute income may be more than enough to provide them with a modest lifestyle.

If this is the case, it seems the cause of unhappiness could in fact be linked more with philosophical disagreement, as a right-leaning society would be more apt to leave inequality as it naturally arises with the people more accepting of it, while a left-wing society would want to combat inequality and may actually do something about it. When there is disagreement in society, one side or the other won't get what it wants, thus leading to either the right-wing feeling that there is unfair income redistribution, or the left-wing feeling that there is unfair inequality.

Since happiness will inherently be based off of human perception, at least where people already have modest enough income to live, it is up to economists not to get too embroiled in the political battles that may change where happiness comes from, but merely to study how happiness is affected by the aspects of modern society and to inform the populace, policy makers, and business leaders on their findings. Such statistics will be constantly evolving in the factors that cause them, as health, education, or other life factors become more or less important to society.

For developing economies, while it will always remain good to improve the lot of the lowest classes, it is still possible that economic growth for upper classes may do an economy good, even if it leads to increased inequality. The main Y variable that is to be affected by development initiatives must remain to be happiness, and if a development initiative that leads to a utilitarian sort of increased happiness helps (increasing happiness for some while not decreasing it for any others) even while increasing inequality, then so be it.

Economists must then remain vigilant in accounting for the changing economic, psychological, and social conditions of society. Perhaps the Occupy movement will leave a legacy that will make economic equality a driving force in determining happiness. The results of this paper may change with time, and so it is up to future economists to remain on top of this field and always revisit and adjust their findings with the most modern and recent statistics available to come up with new conclusions as to the relationship between happiness, income, equality, and the many other determinants of well-being.

Chapter 7

Afterword

In March 2013, Alex Cobham and Andy Sumner developed a new statistic for measuring inequality, which they believe could replace Gini (2013). The statistic, which they call the Palma after economist Gabriel Palma, measures inequality by dividing the wealth of the wealthiest 10% of society by that of the poorest 40% of society. Cobham and Sumner claim that this statistic is more relevant to policy based on poverty reduction. While not used as the primary source of analysis in our paper due to the wide acceptance of the Gini coefficient in the discipline, it is still a worthwhile statistic to consider briefly, as perhaps alternative measures could provide different conclusions. Thus, we will provide a brief data analysis using this coefficient for the reader to derive their own conclusions from.

Cobham and Sumner have only compiled Palma statistics for a select group of developing countries. Either way, it would be expected that increases in inequality would lead to decreased happiness. However, regressions show an opposite trend:
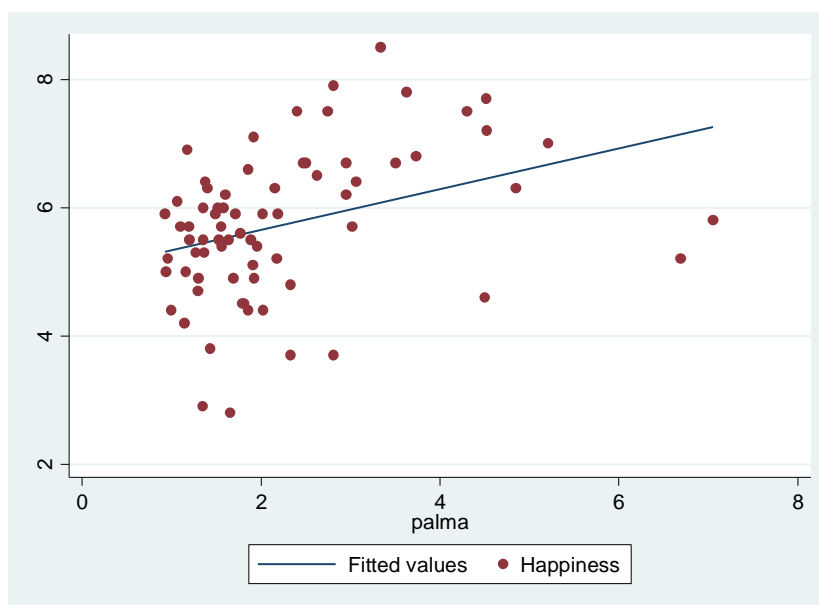
Figure 7-1. Scatterplot of Happiness on Palma.

Source	SS	df	MS		Number of obs =	72
					F(1, 70) =	10.21
Model	11.9263171	1	11.9263171		Prob > F =	0.0021
Residual	81.7968761	70	1.1685268		R-squared =	0.1273
					Adj R-squared =	0.1148
Total	93.7231932	71	1.32004497		Root MSE =	1.081

happiness	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
palma	.3179502	.0995234	3.19	0.002	.119457	.5164434
_cons	5.015254	.2587408	19.38	0.000	4.499212	5.531296

Table 7-1. Regression of Happiness on Palma.

```
      Source |      SS          df       MS              Number of obs =      56
 ------------+------------------------------             F(  7,    48) =   17.37
       Model | 45.8603518       7  6.55147883            Prob > F      =  0.0000
    Residual | 18.1017913      48  .377120653            R-squared     =  0.7170
 ------------+------------------------------             Adj R-squared =  0.6757
       Total | 63.9621431      55  1.16294806            Root MSE      =  .6141


 ------------+----------------------------------------------------------------
   happiness |     Coef.   Std. Err.      t     P>|t|    [95% Conf. Interval]
 ------------+----------------------------------------------------------------
      loggdp |  .0995227   .2055639      0.48   0.630    -.3137913    .5128367
       palma |   .453478   .063254       7.17   0.000     .3262974    .5806587
      health |  .1164556   .0171375      6.80   0.000     .0819984    .1509129
         epi |  .0038818   .0123809      0.31   0.755    -.0210116    .0287753
       trust |  .0000478   .0042389      0.01   0.991    -.0084751    .0085707
     corrupt | -.0143689   .0088113     -1.63   0.109    -.0320852    .0033474
   education | -.6735093   .9480749     -0.71   0.481    -2.579742    1.232723
       _cons | -3.119659   1.119923     -2.79   0.008    -5.371414   -.8679032
 ------------+----------------------------------------------------------------
```

Table 7-2. Regression of Happiness on lGDP, Health, EPI, Trust, Corruption, and Education.

Here, happiness is seen increasing with inequality. Our regression shows that there is a significant positive correlation. Even when running a more complete regression including the log of GDP per capita, health, EPI, trust, corruption, and education a positive correlation with Palma and health are given as the only significant variables in our regression.

Again, we will not draw any conclusions here. This data only includes 72 selected developing countries, none with GDP per capita over $30,000 at PPP. But future analysis would definitely be interesting to explain why such correlations exist, or to further analyze to see if different data provides different results. Either way, based on the principle of diminishing returns alone, it seems unlikely that higher inequality, which places more of the wealth in the hands of those who already have much, would have any intrinsic effect of providing more happiness.

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