Wayne Zhu
5/15/2022
Honors Tutorial Final Paper

How Aspiration Moderates the Effect that Absolute and Relative Income has on Subjective Current and Expected Future Life Satisfaction Level

By Wayne Zhu

Advised by William Easterly

Abstract

This study seeks to investigate how life satisfaction and expected life satisfaction in five years, measured by the subjective survey from Gallup World Poll covering more than 140 countries from 2009 to 2020, is determined by absolute and relative income. The report on life satisfaction and income is aggregated on both the country level each year and each income quintile level within each country each year. The regressions are obtained from (1) current life satisfaction; (2) expected life satisfaction in 5 years; and (3) their difference as the dependent variables. These three dependent variables correspond to the three regressions we ran with each regression method—country fixed effect, country pooled effect and country between effects. Absolute and relative income are the independent variables. Our result shows that absolute income matters more than relative in determining life satisfaction when controlling for countries, although both exhibit a significant positive correlation with life satisfaction. When we do not control for countries, absolute income's effect on life satisfaction nearly triples. But rich people in poor countries—that is, people with high relative income controlling for absolute income—show decreased current life satisfaction but increased expected life satisfaction in five years.

Introduction

First, to understand the value of subjective report of life satisfaction, we need to understand whether it reflects one's overall well-being. The discussion of economic utility—at its core—is how much satisfaction or pleasure that a person can derive from economic activities. If the survey questions are phrased properly, the respondent should easily be able to identify that the question is asking about their life satisfaction—not their current mood. In Wolfers' paper, previous studies have found that reported life satisfaction strongly correlated with the expression of positive emotions like laughter and "independent evaluations by friends, self-reported health, sleep quality and personality." (Stevenson and Wolfers 2008; Diener, Lucas, and Scollon, 2006; Kahnman and Krueger, 2006).

While many policymakers around the world see GDP as a mean to the end of increased life satisfaction, the strategy of targeting GDP growth would be futile if there is no correlation between income and life satisfaction. I look forward to investigating how relative income and absolute income across countries affect subjective reports of life satisfaction levels—ranging from 1 to 10 from volunteering survey respondents around the world. Previous studies on how economic factors such as income and inequality affect life satisfaction fall broadly into two camps: The Richard Easterlin camp argues that absolute income does not lead to increase happiness overtime (relative income within each country is), and the Justin Wolfers camp argues that absolute income is the dominant factor of long run life satisfaction (Easterlin, 2000; Wolfers, Stevenson 2008). To further complicate the picture, the relative income effect essentially consists of two parts: the aspiration portion depending on each individual's aspiration and the purely relative portion that is entirely dependent on one's neighbors' income relative to one's own—for our interest, that is others living

in the same country. Our study raises more questions on how aspiration plays a nuanced role in suppressing current life satisfaction and raising expectations for the relatively rich.

But we really have no easy way to quantify individual's aspiration—some people, for example, want to be entrepreneurs while others are happy living as the middle class and are far less ambitious. These personal choices of what job to do or where to live or what to pursue in life furthermore complicate our regression because they are often the result of personalities, which will also affect perceived life satisfaction given the same circumstance. (Eugenio, Rustichini 2013). For example, previous studies have shown dwellers of wealthy cities like London, Brussels, or Paris to be naturally less satisfied despite their much higher income. Also, people living in South America are on average more satisfied when controlling for income (Bjornskov, 2008). There is, however, some hope of quantifying these psychological and social factors via the careful examination of aspirations. As Ray and Genicot(2020) point out in their paper, people with high aspirations—especially unobtainable aspirations—report significantly lower life satisfaction. If the survey question is phrased in such a way as to take into account their aspiration, we will come closer to eliminating the bias from the unaccounted aspiration effect. Previous studies have shown that different ways of phrasing the survey question might have a significant impact on the respondent internalizing or not internalizing their own aspiration. I will explain how one particular dataset's way of phrasing the questions will help us separate the pure relative income effect and the aspiration effect.

We hope to expand upon previous studies by examining not only the subjective life satisfaction now, but also the subjective expected future life satisfaction in 5 years, and the difference between them. As Easterlin mentions in his paper, people hedonistically adapt to higher standard of living as they get richer which causes stabilization of life satisfaction despite rising

income. By observing current and expected life satisfaction in 5 years and dividing people in each country into 5 quintile groups, we can better analyze pure relative income's effect, aspiration's effect, and absolute income's effect on life satisfaction. For example, a person with low expected current life satisfaction but high expected future life satisfaction could be a good indicator that the person has high and obtainable aspirations. Aspiration theory suggests that they expect to reach that goal in the coming years, after which they expect a boost in their happiness.

Now, a brief summary of the structure of the paper. In the literature review section, I will highlight the preexisting scholarly literature on relevant topics and how I come up with and refine my research question. In the data section, I will describe how and why those data are selected, and how they help me run my regression. In the Methodology and Results sections, I will explain in detail the evolution and revision of my regressions and how they answer my research question.

Literature Review

In his paper, Wolfers argued that Easterlin found post-WWII respondents' life satisfaction levels to be not affected by absolute income growth because—decades ago when Easterlin wrote his paper—he lacked cross-country, consistent, high-quality data. Today, not only do we have the Gini index from World Income Inequality Database (though it's an estimate that varies widely and is not collected every year) and GDP from Penn World Table, but we also have not one but two sets of international cross-country large-scale surveys—Gallup World Poll (GWP) and World Values Survey (WVS)—asking respondents personal questions on their life satisfaction, income, marital status, health, etc. They are published by two competing institutions and there is no overlap between their survey respondents. They provide invaluable insights and support for researchers in reevaluating how income affects life satisfaction across the world by allowing them to control for subjective variables like social trust on an individual level.

One caveat remains though. Plenty of past research on life satisfaction using WVS data failed to be replicated successfully using GWP data (Bjornskov 2008). According to Bjornskov, subjective reports are influenced by local political interference, respondents' aspiration level, the placement and phrasing of the question, etc. Even for rich countries where one would expect data to be collected ethically, the correlation of reported life satisfaction using WVS and GWP remained not statistically significant. Out of the 10 replications using life satisfaction as a dependent variable comparing WVS and GWP, a majority of them fail to be strongly correlated. Alas, there is not much I can do regarding the integrity of the data collection process as an NYU undergraduate. I will have to accept it as ethically collected for this study.

Yet Bjonskov identifies a primary reason why the two sets of life satisfaction data differ greatly—GWP internalizes aspiration while WVS doesn't. While WVS asked directly for respondent's life satisfaction, GWP employs the Cantril Ladder technique— "Please imagine a ladder, with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder do you feel you personally stand at the present time?" This approach to asking the question will ground the respondent's life satisfaction to their own imagined best possible life, taking into account their own aspiration instead of some absolute societal definition of success like being a billionaire or some societal fatalistic low expectations for one's future (Bjornskov 2008). To be clear, aspirations are highly individualized while expectations are often imposed by society onto individuals. GWP's question internalizes the aspiration of each individual, and it forces individuals to reflect on their own ideals. For example, Bjornskov observes the following: Latin Americans generally have middle income but society has regional lower expectations as well. In WVS, holding absolute income constant, Latin Americans report higher

life satisfaction because—the way the question is phrased—they might have interpreted it as asking about life satisfaction relative to societal expectations rather than aspirations. Bjornskov believes that this is because of some "region-specific fatalism, such that respondents usually do not expect to achieve much objective progress in their lives". So when GWP employs the Cantril ladder technique to ask Latin Americans to also take aspiration into account, the Latin American boost in life satisfaction disappears. Life satisfaction is itself a subjective concept, so it makes sense to incorporate subjective aspiration. The GWP is valuable in our study precisely because of it.

The effect of aspiration on life satisfaction is nuanced and different depending on income level as observed by many economists before. For poor and middle-income countries, they could always look up to rich countries as an anchor for their aspired best possible life, but the effect of aspiration is slightly more complicated for rich countries or rich people in fast-growing developing countries. According to Ray and Genicot (2000), even people in fast-growing countries are still constantly comparing themselves to their "cognitive neighbors" who are also generally much better off than before, so their life satisfaction might not improve as the entire country gets richer. Also according to Easterlin, human beings tend to hedonistically adapt to a higher standard of living as they get richer instead of remembering how poor they used to be and celebrating the present. The cognitive neighbor effect and Easterlin's Paradox are the primary reasons why relative income and other factors like social trust remain an important force in determining an individual's life satisfaction.

For rich countries, the correlation between GWP's and WVS' reported life satisfaction, 0.75, is not strong (Bjornskov 2008). Bjornskov theorizes that's because GWP's Cantril ladder aspiration-internalizing technique for rich countries might decrease reported life satisfaction since

objective improvement has ceased to be a major determinant of individual aspirations. Variables like social trust and inequality become important(Mikucka, Sarracino, and Dubrow 2017). I am including Gini as an indicator for inequality in most of my regressions. Alas, GWP itself doesn't provide a social trust variable, and I am unable to process the entire WVS data for that one variable due to time constraints. But future studies should include it. But overall and especially for poor and middle-income countries, GWP reports a stronger linear correlation between the log of income and life satisfaction (including Latin American nations) than WVS. I will verify this in my regression set I.

For richer countries, individual-level factors such as the environment you reside in(countryside vs urban), your health, your friendship, your family, your gender, your race, career choice, and even your political stance all start to affect life satisfaction. (Stutzer 2004; Blanchflower and Oswald 2000; Alesina, Tella, and MacCulloch 2001; Ball and Chernova 2007) I, however, opt to run the regression on a quintile or country-level in the hope that individual variations will cancel out since the sample is large enough. Other researchers who want to focus on the effect of individual lifestyle and choices should of course control for as much as possible given the available data, but I am primarily investigating the effect of relative and absolute income on life satisfaction across countries.

Data

My life satisfaction data—both on the country level and quintile level—comes from GWP. The dataset does a better job of internalizing the aspiration into subjective life satisfaction than WVS. Gallup Analytics—a private company—has been collecting GWP life satisfaction data in 140 countries for the last 10 years. Their sample size for each country each year ranges from 500 to 2000 individuals.

To control for country-level inequality or to calculate the absolute income of each quintile within each country, I will be relying on United Nations' World Income Inequality Database (WIID). The unprocessed WIID table is massive and contains duplicate rows because different agencies report different and varying estimates even within the same country. But WIID also published a dataset preprocessed by their data scientists for scholars whose study does not explicitly focus on income distribution, which I will be using. The major problem with the WIID table is that income distribution for each country is not measured every year—especially for small or less influential nations. That means I will end up with fewer data points. Under Professor Easterly's instruction, I eventually ran a between-effect regression to substitute the missing time series with a more reliable between-country comparison.

Same as Mikucka, Sarracino, and Dubrow(2017), I will be relying on Penn World Table for expenditure side GDP PPP per capita in USD for country-level comparison in regression set I. I pick the expenditure side GDP over the output side GDP because it better reflects the spending and consumption pattern of consumers. For the quintile level comparison between countries, I use the income distribution data and income data reported by the WIID table instead.

Regression Methodology

I ran 4 sets of regressions, with each set containing three separate regressions where their only difference being the dependent variable—life satisfaction now (LSNow), expected life satisfaction in five years (LS5Years), and their difference (LS5Years-LSNow) of either a quintile in a particular country or a country as a whole. A list of the variable name and their definitions will also be provided below.

For the I set of regressions, my independent variables are absolute income (logGDP) of a country, inequality(Gini) of a country, change in absolute income (ΔGDP)and the country and year fixed effect. On a country level, I merely want to replicate the previous study by first verifying that absolute income and income inequality will both affect life satisfaction linearly, fixing countries and years. This regression is not at the heart of my research question.

Below are my 3 proposed regressions on a country level:

(1) $LSNow_{cy} = B_0 + B_1 log\ (GDP_{cy}) + B_2 \Delta GDP_{cy} + B_3 Gini_{cy} + CountryFixed_c + YearFixed_y$

(2) $LS5Years_{cy} = B_0 + B_1 log\ (GDP_{cy}) + B_2 \Delta GDP_{cy} + B_3 Gini_{cy} + CountryFixed_c + YearFixed_y$

(3) $LS5Years_{cy} - LSNow_{cy} = B_0 + B_1 log(GDP_{cy}) + B_2 \Delta GDP_{cy} + B_3 Gini_{cy} + CountryFixed_c + YearFixed_y$

For the II set of regressions, I am dividing each country into five income quintiles—controlling for country and year. Naturally, the dependent variables all become quintile specific. The log of absolute income becomes quintile specific, while the income quintile becomes a fixed effect. The fixed effect variable is the same for each country (“Poorest 20%”, “Second 20%”, “Middle 20%”, “Fourth 20%”, and “Richest 20%”). The absolute income here refers to the

absolute income per capita for people of that quintile. Note that the change in GDP is not included because it doesn't seem to be significant in previous regressions.

(4) $QuintileLSNow_{cyq} = B_0 + B_1 \, log\left(AbsoluteIncome_{cyq}\right) + B_3 Gini + IncomeQuintileFixed_q + CountryFixed_c + YearFixed_y$

(5) $QuintileLS5Years_{cyq} = B_0 + B_1 \, log\left(AbsoluteIncome_{cyq}\right) + B_3 Gini + IncomeQuintileFixed_q + CountryFixed_c + YearFixed_y$

(6) $QuintileLS5Years_{cyq} - QuintileLSNow_{cyq} = B_0 + B_1 \, log\left(AbsoluteIncome_{cyq}\right) + B_3 Gini + IncomeQuintileFixed_q + CountryFixed_c + YearFixed_y$

The III set of regressions: Regression 7,8,9 are merely regression 4,5,6 without country fixed effect. We have about 3000 observations for each quintile in each country each year. That amounts to 600 observations for each country for each year, which amounts to less than 5 observations for each country during the research time span between 2010 and 2020. If we don't control for countries, we will have many more comparable data points. In this pooled effect regressions, we hope to compare different quintiles across different countries under the general and very likely unreliable assumption—which will be reexamined later—that income's effect is universal and constant.

(7) $QuintileLSNow_{cyq} = B_0 + B_1 \, log\left(AbsoluteIncome_{cyq}\right) + B_3 Gini_{cy} + IncomeQuintileFixed_q + YearFixed_y$

(8) $QuintileLS5Years_{cyq} = B_0 + B_1 \, log\left(AbsoluteIncome_{cyq}\right) + B_3 Gini_{cy} + IncomeQuintileFixed_q + YearFixed_y$

(9) $QuintileLS5Years_{cyq} - QuintileLSNow_{cyq} = B_0 + B_1 \, log\left(AbsoluteIncome_{cyq}\right) + B_3 Gini_{cy} + IncomeQuintileFixed_q + YearFixed_y$

The IV set of regressions—regressions 10, 11, 12—is the follow up to the III set. We ran between-effect regressions investigating the relationship between average income for each income quintile for each country over the years, and the average reported life satisfaction of that group over the same period of time. This way, we will have 128 different data points for each quintile. Compared to set III, between effect method allow us to examine the cross-country differences more carefully. Gini is no longer included because it doesn't seem significant after we include quintile fixed effect in regression set II.

(10) $QuintileLSAvg_{\mathrm{cyq}} = B_0 + B_1 \mathrm{QuintileIncomeLogAvg}_{\mathrm{cyq}} + IncomeQuintileFixed_q + YearFixed_y$

(11) $QuintileLSAvg5Years_{\mathrm{cyq}} = B_0 + B_1 \mathrm{QuintileIncomeLogAvg}_{\mathrm{cyq}} + IncomeQuintileFixed_q + YearFixed_y$

(12) $QuintileLSAvg5Years_{\mathrm{cyq}} - QuintileLSAvg_{\mathrm{cyq}} = B_0 + B_1 \mathrm{QuintileIncomeLogAvg}_{\mathrm{cyq}} + IncomeQuintileFixed_q + YearFixed_y$

Subscripts: c means country, y means year, and q means quintile(1^{st},2^{nd}, 3^{rd}, 4^{th}, and 5^{th}).

List of variables(dependent variables are listed first):

QuintileLSAvg	This variable is for between effects as well. For each quintile in each country, we calculate the *average of their life satisfaction* over all documented years—between 2010 and 2020.
QuintileLSAvg	This variable is for between effects as well. For each quintile in each country, we calculate the *average of their life satisfaction* over all documented years—between 2010 and 2020.
QuintileLSAvg5Years	This variable is for between effects as well.

	For each quintile in each country, we calculate the average *expected life satisfaction in 5 years* over all documented years—between 2010 and 2020.
LSnow	LSnow is the subjective reported life satisfaction level on a scale of 1 to 10. Available in WVS and GWP.
LS5Years	Holding everything the same, this question asks for the respondent's expected subjective life satisfaction level 5 years from now. Only available in GWP.
LS5Years-LSnow	The difference between the above two measures indicates whether the person expects life to be better or worse in 5 years.
log(GDP)	Log of expenditure side estimate of per capita PPP for each country as provided by Penn World Table. We use the natural log because it is less affected by outliers.
Gini	Preprocessed Gini Index for each country by World Income Inequality Database.
ΔGDP	Economic growth, GDP PPP per capita this year minus GDP PPP per capita last year as a percentage of overall GDP. Using log GDP here might be more accurate, but we didn't find change in GDP to be statistically significant anyway so it's not important.
CountryFixed	Country fixed effect to control for international variation such as genetics, culture and etc.
YearFixed	Time-fixed effect to control for international events such as the 2008 financial crisis.
log(AbsoluteIncome)	For each year in each country, World Income Inequality Database gathers the PPP per capita per decile. I use this to calculate the PPP per capita of each quintile in each

	country. I call this AbsoluteIncome. We again use log income.
IncomeQuintileFixed	It's a fixed effect variable for each quintile. ("Poorest 20%", "Second 20%", "Middle 20%", "Fourth 20%", and "Richest 20%")
QuintileIncomeLogAvg	We use this variable for between-effect regression. For each quintile in each country, we take the *average of their log income* over all documented years—between 2010 and 2020.

Results

I. Here are the results from the first set of regressions—regressions 1, 2, 3.

Regression 1,2,3 (Country and year fixed effects)

	Dependent variable:		
	LSNow	LS5Years	(LS5Years - LSNow)
	(1)	(2)	(3)
log(GDP)	0.798***	0.906***	0.109
	(0.110)	(0.133)	(0.095)
ChangeInGDP	-0.105	0.187	0.295*
	(0.180)	(0.218)	(0.156)
Gini	-0.029***	-0.042***	-0.013**
	(0.007)	(0.008)	(0.006)
Constant	-1.166	-0.271	0.865
	(1.060)	(1.283)	(0.918)
Observations	1,271	1,271	1,269
R^2	0.920	0.810	0.892
Adjusted R^2	0.910	0.785	0.878
Residual Std. Error	0.339 (df = 1123)	0.410 (df = 1123)	0.293 (df = 1121)
F Statistic	88.058*** (df = 147; 1123)	32.541*** (df = 147; 1123)	62.899*** (df = 147; 1121)
Significant levels			*p<0.1; **p<0.05; ***p<0.01

We see that both GDP now and expected GDP in five years are strongly correlated with life satisfaction. Higher income inequality in society decreases an average person's current and expected future life satisfaction. Macroscopically, this confirms Wolfers' previous study that absolute income's effect dominates and is linear(Wolfers, Stevenson 2008). Change of GDP seems to not be correlated with life satisfaction now or expected life satisfaction between countries—consistent with what is reported by Mikucka, Sarracino, and Dubrow (2017). This replication gives us confidence that our data is processed correctly. To further evaluate the necessity of including all the variables in the model, I've performed added-variable scatter plots for each of the regressions. I removed several outlier data points of Zimbabwe, which were affected by temporary geopolitical events beyond our controlled variables during those time periods.

II. This is the result of regression set 2—regression 4, 5, 6.

Regression 4,5,6 (Country and year and income quintile fixed effects)

	Dependent variable:		
	QuintileLSNow	QuintileLS5Years	QuintileLS5Years - QuintileLSNow
	(1)	(2)	(3)
Second 20%	0.154***	0.056*	-0.099***
	(0.029)	(0.034)	(0.023)
Middle 20%	0.281***	0.162***	-0.120***
	(0.038)	(0.045)	(0.030)
Fourth 20%	0.430***	0.319***	-0.111***
	(0.049)	(0.058)	(0.038)
Richest 20%	0.555***	0.444***	-0.112**
	(0.072)	(0.085)	(0.056)
log(AbsoluteIncome)	0.296***	0.295***	-0.0004
	(0.034)	(0.040)	(0.026)
Gini	-0.006	-0.002	0.003
	(0.005)	(0.006)	(0.004)
Constant	1.061***	1.804***	0.750***
	(0.354)	(0.421)	(0.279)
Observations	3,458	3,438	3,438
R^2	0.904	0.821	0.858
Adjusted R^2	0.899	0.812	0.852
Residual Std. Error	0.364 (df = 3306)	0.431 (df = 3287)	0.285 (df = 3287)
F Statistic	205.456*** (df = 151; 3306)	100.212*** (df = 150; 3287)	132.785*** (df = 150; 3287)
Significant levels			*p<0.1; **p<0.05; ***p<0.01

The “Poorest 20%” quintile variable is omitted because of collinearity. But it’s clear that both relative (income quintile fixed effect) and absolute income (log quintile absolute income) are significant variables predicting life satisfaction across all income levels within each country. The interpretation of log absolute income is the following: A one percent increase in absolute income will increase life satisfaction by 0.003—which is small but important on a scale of 10. Suppose a person doubles her income, that would result in a 0.3 increase in life satisfaction—which is the same effect as moving up 2 income quintiles. Because the income distribution within many countries is very uneven, this interpretation shows that absolute income dominates over relative income in its effect on life satisfaction. Predictions for expected life satisfaction in 5 years follow the same trend. However, as for the difference in expected life satisfaction in 5 years compared to life satisfaction today, only the “poorest 20%” are significantly more likely to believe that life satisfaction in 5 years will improve—suggesting a recent unfortunate event that catapults them into poverty or perhaps a general lack of information to make rational predictions about the future. All other income quintiles are equally pessimistic in their expectation of the future. Again, using added variable plots, outliers like Zimbabwe and South Africa during turbulent years are removed. Gini is no longer significant since now we have included the relative income fixed effect.

III. This is the result of regression set 3—regressions 7, 8, 9.

Regression 7,8,9 (year and income quintile fixed effects, no country fix effect)

	Dependent variable:		
	QuintileLSNow	QuintileLS5Years	QuintileLS5Years - QuintileLSNow
	(1)	(2)	(3)
Second 20%	-0.219***	-0.050	0.143***
	(0.041)	(0.049)	(0.027)
Middle 20%	-0.301***	-0.012	0.261***
	(0.043)	(0.052)	(0.028)
Fourth 20%	-0.364***	0.087	0.409***
	(0.045)	(0.055)	(0.030)
Richest 20%	-0.664***	0.080	0.688***
	(0.052)	(0.064)	(0.035)
log(AbsoluteIncome)	0.894***	0.480***	-0.392***
	(0.017)	(0.021)	(0.011)
Gini	0.024***	0.049***	0.025***
	(0.002)	(0.002)	(0.001)
Constant	-3.310***	0.157	3.286***
	(0.209)	(0.257)	(0.140)
Observations	3,458	3,173	3,438
R^2	0.597	0.291	0.573
Adjusted R^2	0.595	0.288	0.571
Residual Std. Error	0.729 (df = 3441)	0.846 (df = 3156)	0.486 (df = 3421)
F Statistic	318.829*** (df = 16; 3441)	81.135*** (df = 16; 3156)	286.541*** (df = 16; 3421)
Significant levels			*p<0.1; **p<0.05; ***p<0.01

We removed some years of South Africa and Afghanistan outliers according to the added variable plots. The result shows a strong negative correlation between relative income and reported life satisfaction now. Say there are two people, A and B, with the same absolute income living as the Poorest 20% in a rich country, and as the Richest 20% in a poor country. (1) If relative income is more important than absolute income, then person B should be more satisfied than person A; the income quintile and reported life satisfaction now should have a positive correlation. (2) However, if living in a poor country makes people much more unhappy for whatever reason we don't have control of, then person A would be happier. (3) It's also possible that these two

opposing effects cancel each other out and the effect of relative income is insignificant. Regression 7 clearly supports theory (2), and rich people in poor countries are significantly less happy compared to poor people in rich countries. The expected life satisfaction in 5 years seems not to be correlated to income—supporting the (3) theory of cancellation since it's significant for 4,5,6. The difference between future expectations and current life satisfaction is highest for the rich, and lowest for the poor—suggesting that elevated aspiration or careful planning that delays current gratification might be the main reason for the relatively rich's decreased current life satisfaction. Poor country's rich citizens might have higher aspirations that they expect to fulfill in 5 years, like immigrating to rich countries. Alternatively, they are painstakingly working right now to build up capital for later or save up for retirement. The relative component of income is not only dependent on one's income within the country, but also dependent on one's income aspirations and future goals. It's this heightened aspiration and hope for the future that makes rich people in poor countries unhappy despite higher income, and we will see that it becomes more apparent in the next set of regression.

IV. This is result of regression set 4—regressions 10, 11 and 12.

Regression 10,11,12 (Country Quintile Between effects model over the years)

	Dependent variable:		
	QuintileLSAvg	QuintileLSAvgin5	QuintileLSAvgin5 - QuintileLSAvgNow
	(1)	(2)	(3)
Second 20%	-0.149*	0.138	0.287***
	(0.084)	(0.100)	(0.067)
Middle 20%	-0.192**	0.271***	0.472***
	(0.085)	(0.102)	(0.068)
Fourth 20%	-0.224**	0.479***	0.703***
	(0.088)	(0.104)	(0.070)
Richest 20%	-0.485***	0.624***	1.111***
	(0.094)	(0.112)	(0.075)
QuintileIncomeLogAvg	0.741***	0.216***	-0.525***
	(0.020)	(0.024)	(0.016)
Constant	-1.085***	4.480***	5.566***
	(0.171)	(0.203)	(0.137)
Observations	677	675	675
R^2	0.705	0.259	0.616
Adjusted R^2	0.703	0.254	0.613
Residual Std. Error	0.681 (df = 671)	0.810 (df = 669)	0.546 (df = 669)
F Statistic	320.532*** (df = 5; 671)	46.862*** (df = 5; 669)	214.611*** (df = 5; 669)
Significant levels			*p<0.1; **p<0.05; ***p<0.01

Because of the overly general assumption of the pooled effect regressions (set III) and our suspicion of aspiration being the culprit of increased relative income and decreased current life satisfaction, Professor Easterly suggested that I looked deeper into this via a between-effect regression. The results are as follows:

Our result reconfirms regression 7,8,9's outcome that holding the quintile absolute income control, the current life satisfaction is negatively correlated with relative income. What is interesting, however, is that the expectation of future life satisfaction goes up with relative income. This means that the rich in each country feel less satisfied at the present but expect that their lives

will improve much more in five years. This outcome aligns with the aspiration theory of setting individual goals as a "salient dividing line between achievement and failure … that is central to the theory [of aspiration]" (Ray, Genicot 2020). It seems reasonable to suggest—based on the regression outcome—that rich people in each country have a heightened sense of aspiration, or a clearer definition of a goal that is presently unsatisfied, which leads to depressed present life satisfaction. They might also be intentionally delaying their gratification via careful planning for the future and working harder now. They expect themselves to reach those goals in five years—upon which their life satisfaction should be significantly improved. Future research should focus on how aspiration and delayed gratification moderates the effect of relative income on life satisfaction.

Similarly, as above, added variable analysis was performed on each quintile's average income, and there are only a few outliers. So, the absolute income does provide a significant amount of extra information given the existing relative income quintile. Also, we have not ruled out the possibility that there could be other uncontrolled events—war, corruption, low levels on the Human Development Index—that might contribute to the unhappiness of the rich in poor countries aside from the effect of aspirations. Future research should reexamine the dataset and remove countries with unreliable data points, or control for unfortunate events.

Conclusions

Based on the previous studies by Easterlin and Wolfers emphasizing either relative income or absolute income's effect on life satisfaction, I used the cross-country GWP data to reexamine such questions. The result shows that absolute income is more important than relative income—which is also statistically significant, and the absolute income's effect triples when not controlling for countries. Aspiration and delayed gratification seem to play a key role in the decreased current life satisfaction and the increased expected future life satisfaction of the relatively rich. This is due most likely to their heightened aspirations or meticulous planning for the future, though we did not explicitly control for geopolitical events and eliminate all biases. While absolute income's effect seems to be omnipresent, powerful, and clear, future researchers should focus on how aspiration and goal-setting mentality moderates the effect that relative income has on life satisfaction. Policies that induce the poor to aspire and create reachable targets would likely—in the long run—make them happier as well.

References

Alberto Alesina, Rafael Tella, and Robert MacCulloch (2001). Inequality and happiness: Are Europeans and Americans different? *NBER*.

Alois Stutzer, (2004). "The Role of Income Aspirations in Individual Happiness. *Journal of Economic Behavior & Organization*, North-Holland

Betsey Stevenson and Justin Wolfers, (2008) *Economic Growth and Subjective Well-Being: Reassessing The Easterlin Paradox*, NBER

Christian Bjornskov, (2008). How Comparable Are The Gallup World Poll Life Satisfaction Data? *Journal of Happiness Studies*, Springer Netherlands,

David Blanchflower and Andrew Oswald (2000). Well-being over time in Britain and the USA. NBER. Retrieved December 4, 2021

Garance Genicot and Debraj Ray (2020). Aspirations and Economic Behavior. *NYU Scholars*, Annual Reviews Inc.,

Malgorzata Mikucka, Francesco Sarracino, Joshua Dubrow (2017). When does economic growth improve life satisfaction? Multilevel analysis of the roles of Social Trust and income inequality in 46 countries, 1981–2012. *World Development, 93,* 447–459.

Proto Eugenio , Rustichini Arnold. (2013). A Reassessment of the Relationship between GDP and Life Satisfaction. *PLoS ONE*, *8*(11), e79358. https://doi.org/10.1371/journal.pone.0079358 2013

Richard Ball and Kateryna Chernova (2007). Absolute income, relative income, and happiness. Social Indicators Research.

Richard Easterlin (2000), Will Raising the Incomes of All Increase the Happiness of All? *Journal of Economic Behavior & Organization*, North-Holland