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Happiness Inequality: How Much is Reasonable?

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Abstract We compute the Gini indexes for income, happiness and various simulated utility levels. Due to decreasing marginal utility of income, happiness inequality should be lower than income inequality. We find that happiness inequality is about half that of income inequality. To compute the utility levels we need to assume values for a key parameter that can be interpreted as a measure of relative risk aversion. If this coefficient is above one, as many economists believe, then a large part of happiness inequality is not related to pecuniary dimensions of life.

Keywords Income inequality · Happiness · Relative risk aversion

1 Motivation

The most relevant conceptual difference between left and right wing political parties relates to the different weights assigned to economic growth and income distribution. Implicit in this discussion is the assumption that faster growth can only come with increasing income inequality. For instance, progressive tax structures are good from an inequality reduction perspective, but distort the optimal allocation of resources and therefore hamper growth.

This discussion mimics the philosophical debate between utilitarianism and egalitarianism. The purest utilitarian view is concerned with the maximization of individual well-being while the purest egalitarian view puts the emphasis on the reduction of inequality. Due to the traditional skepticism of economists about subjective satisfaction indicators most of the utilitarian-egalitarian debate has been framed in terms of maximizing income or reducing income inequality. But neither from a utilitarian nor an egalitarian point of

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view is income an end in itself. Happiness research has picked up this debate and brought it closer to its original aims.[1]

In this paper we estimate how much happiness inequality is reasonable to expect from a given level of income inequality, and compare this with real measures of happiness inequality. The gap between these two measures is an indication of the effect on happiness of non-pecuniary dimensions of life.

The basic microeconomic textbook assumes that utility is a function of consumption and that consumers maximize utility subject to their budget constraint. This permits the representation of an indirect utility function that depends positively on income. Reported happiness levels are supposed to reflect utility levels, and therefore establish a theoretical link between income and happiness.[2]

Since utility depends on income, and income inequality is a stylized fact of modern economies, it is natural to expect happiness inequality. The textbook utility maximization model assumes that marginal utility decreases with income. This means that an extra dollar makes a poor person happier than a rich person. This implies that happiness inequality should be lower than income inequality. But how much lower?

2 Data and Methodology

2.1 Data

We use income and happiness data from the 2006 Gallup World Poll. The Gallup World Poll is probably the world's most comprehensive database of behavioral economic measures. It continually surveys citizens in more than 140 countries representing about 95% of the world's adult population. In this paper we use data for 113 countries.

The level of happiness in the Gallup World Poll is a personal assessment of general well-being. The question reads "Please imagine a ladder/mountain with steps numbered from zero at the bottom to ten at the top. Suppose we say that the top of the ladder/mountain represents the best possible life for you and the bottom of the ladder/mountain represents the worst possible life for you. If the top step is 10 and the bottom step is 0, on which step of the ladder/mountain do you feel you personally stand at the present time?"

Annual income data is reported in 29 brackets ($0, less than $1 a day, $1–$2 a day, more than $730 and less than $1,099 per year, more than $1,100 and less than $1,499 per year, etc.). We imputed the average of the bracket to each individual within the bracket. For the top bracket we imputed a value equal to double the previous imputed value (i.e. individuals in the bracket from $75,000 to $124,999 were assumed to have an annual income of $100.000 and individuals in the bracket of more than $125.000 were assumed to have an annual income level of $200.000).

2.2 Utility Levels

A common functional form for the utility function is

[1] See for instance Ott (2005), Borooah (2006), Duncan (2010) and Veenhoven (2005).

[2] Layard et al. (2008) take a similar approach to estimate how fast marginal utility of income decreases as income increases. Using a similar methodology Gandelman and Hernandez-Murillo (2011) estimate risk aversion from happiness data.

$$u(y) = \frac{y^{1-\rho}}{1-\rho} + k \quad \text{if } \rho \neq 1$$
$$u(y) = \log(y) + k \quad \text{if } \rho = 1 \tag{1}$$

where u is the utility level, y the income level and ρ and k are parameters.

For all positive values of ρ the utility function exhibits decreasing marginal utility. The larger ρ, the faster the marginal utility decreases as income increases. Therefore, the larger ρ the lower the level of inequality in utility levels. To compute individual utility level we need an estimate of ρ and k.

As explained in the appendix ρ bares a direct interpretation as a measure of relative risk aversion and has received a lot of empirical attention, especially in the financial literature. Many economists think that ρ is between 1 and 2, but there is a wide range of estimates, with some going up to 10 and others going as low as 0.2.

Another issue that we must address is that the inequality measure that we use (Gini) is defined only on the positives but the utility function can take negative values (when $k = 0$). In order to compute the Gini coefficient for utility we have to assume a positive value for k. The larger this parameter, the lower the level of inequality. Therefore, to make our computations as conservative[3] as possible we calibrate k so that the minimum utility level for each country equals 0.[4]

2.3 Measuring Inequality

There are several statistics that could be used to measure inequality. Kalmijn and Veenhoven (2005) discuss the pros and cons of nine different statistics for measuring happiness inequality. In particular, they consider the standard deviation and the Gini coefficient and conclude that the standard deviation is superior to the Gini for happiness inequality. Notwithstanding, in this paper we use the Gini to measure inequality in income, happiness and utility for the following reasons.

First, we need a measure of inequality that allows us to compare inequality in income, happiness and utility. As stated by Kalmijn and Veenhoven (2005), income is not expressed as a number only, but rather as the combination of a number and a unit of measure (dollars, euros, pesos, etc.). The inequality statistic needs to be dimensionless, i.e. changing the unit of measure must not change the inequality statistic. The Gini has this property but the standard deviation does not. This is one of the reasons why in the income inequality literature the preferred statistic is the Gini and not the standard deviation.

A second reason is that happiness inequality research is a very new field, while there is a much longer tradition of income inequality research. We do not have a large enough body of work to compare and draw conclusions about which standard deviation values imply large or small inequality levels. On the other hand, the availability of Gini estimates for almost every country in the world (and for several years) facilitates the comparison of our results.

A potential problem in measuring happiness and utility inequality is that both are ordinal concepts. Any inequality statistic implicitly treats these ordinal numbers as cardinal numbers, which means that happiness ratings are considered equidistant. That is to say, if individuals are given three options to rate their level of happiness (say 1, 2 and 3), the

[3] By conservative we mean that we are not inducing an artificially low level of utility inequality.

[4] Unlike ρ, k does not bear a direct interpretation. It is needed only to be able to compute the Gini.

distance from the second level to the first is the same as the distance from the third level to the second.[5] This problem is not solved by the choice of statistic.

To check the robustness of our results, we applied a variation of the POLS transformation of variables proposed by VanPraag and Ferrer-i-Carbonell (2004) and estimated the inequality of this transformed measures of happiness. The results (not reported) were almost identical to the results reported here.

Finally, inequality measures may be affected by the disaggregation level at which the data is handled. The reported statistics use data at the maximum disaggregation available (11 brackets for happiness and 29 brackets for income) but we also performed a robustness exercise where we reduced the number of income brackets. The results are almost identical to those presented here.

At this point it is useful to introduce some additional notation. The measure of income inequality will be denoted G_y, the Gini measure of happiness will be denoted G_h and the utility inequality will be denoted $G_u(\rho)$ to make it clear that the utility dispersion is a function of ρ as discussed below.

2.4 Implications

The value of ρ determines how close $G_u(\rho)$ is to G_y or G_h. Table 1 presents four possible cases. If $\rho = 0$, the utility level is equal to the income level. In this case $G_u(0) = G_y$. If there are other elements that contribute to happiness that are not correlated with income this implies that $G_h < G_u$ (case 1)

But when the utility function shows decreasing marginal utility of income ($\rho > 0$), the poorer the individual is, the larger an increase in utility an extra dollar generates. In this case $G_u(\rho) < G_y$. Suppose that initially every individual in a society has exactly the same income level and therefore the same utility level. Since there is no dispersion we have $G_u(\rho) = G_y = 0$. Now suppose that half of the population receives additional income. The difference in income produces differences in utility levels and therefore both Gini indicators are positive, $G_y > 0$ and $G_u(\rho) > 0$. Decreasing marginal utility of income implies $G_u(\rho) < G_y$. Moreover, the faster marginal utility decreases with income, the lower the dispersion in utility. Formally we have that $\frac{\partial G_u}{\partial \rho} < 0$. Therefore, it is likely that assuming a large enough ρ we could make the inequality measures of utility and happiness coincide. We denote the level of ρ that equalizes utility and happiness inequality as $\bar{\rho}$, i.e. $G_u(\bar{\rho}) = G_h$.

In Case 2, happiness inequality is equal to utility inequality. Since the only variable affecting utility is income; this means that happiness inequality can be explained simply by income differences

Cases 3 and 4 are the most interesting. Case 3 implies that income differentials generate a level of utility inequality above that of happiness inequality. Another interpretation of a situation when utility inequality is above happiness inequality is that there are other dimensions that affect the distribution of satisfaction with life as a whole that are not captured by an income based utility function. These non-pecuniary dimensions (e.g. satisfaction with family and friends) partially compensate for the differences in income so that in the end the differences in happiness levels are somewhat buffered.

Finally, in Case 4, happiness inequality is larger than the income derived utility inequality. This could be reinterpreted as a situation when the other dimensions of life that

[5] For a justification of this cardinality assumption see Van Praag and Ferrer-i-Carbonell (2004).

Table 1 Parameter implication of utility dispersion

Case 1	$\rho = 0 \Rightarrow G_h < G_y = G_u$
Case 2	$\rho = \bar{\rho} \Rightarrow G_h = G_u < G_y$
Case 3	$0 < \rho < \bar{\rho} \Rightarrow G_h < G_u < G_y$
Case 4	$\rho > \bar{\rho} \Rightarrow G_u < G_h < G_y$

Table 2 Gini income and Gini happiness by region

	Gini happiness		Gini income		Countries
	Gini	SD	Gini	SD	
By Geographic regions					
Western Europe	0.129	0.038	0.310	0.070	16
North America	0.127	0.019	0.353	0.090	2
Eastern Europe	0.216	0.035	0.398	0.085	28
Pacific Asia and Oceania	0.155	0.048	0.439	0.061	15
Latin America	0.225	0.046	0.418	0.070	23
South Asia	0.199	0.022	0.432	0.106	5
Middle East and North Africa	0.167	0.029	0.253	0.046	2
Sub Saharan Africa	0.233	0.033	0.516	0.082	26
By income level					
Low	0.221	0.047	0.504	0.083	29
Lower-middle	0.220	0.043	0.445	0.074	23
Upper-middle	0.216	0.043	0.412	0.083	29
High	0.153	0.047	0.340	0.078	36
World	0.199	0.054	0.419	0.100	117

Income classification follows World Bank http://data.worldbank.org/about/country-classifications. Low income ($995 or less)—lower-middle income ($996–$3,945)—upper-middle income ($3,946–$12,195)—high income ($12.196 or more)

are not captured by the utility function are also positively correlated with income and therefore produce more happiness inequality that what we should except based only on income differences.

3 Results

In the appendix we present our estimations at the country level and a scatter plot of happiness inequality versus income inequality. In most cases the income Gini computed from our data is close to published Gini estimations. Table 2 presents the average measures of income and happiness inequality by region. As expected on theoretical grounds, the happiness Gini is lower than the income Gini. Worldwide, the ratio between these two indicators shows that the level of income inequality is about two times the level of happiness inequality.

We observe that there is a clear difference between developed and less developed regions. Less developed regions show higher inequality both in income and happiness.

Table 3 Simulated levels of happiness inequality by region

	Gini coefficients for: $u(y) = \frac{y^{1-\rho}}{1-\rho} + k$					
	$\rho = 0.8$	$\rho = 0.9$	$\rho = 1.0$	$\rho = 1.1$	$\rho = 1.3$	$\rho = 1.5$
By Geographic regions						
Western Europe	0.121	0.101	0.083	0.068	0.043	0.026
North America	0.131	0.107	0.087	0.069	0.041	0.023
Eastern Europe	0.213	0.192	0.173	0.155	0.126	0.103
Pacific Asia and Oceania	0.177	0.151	0.127	0.107	0.075	0.051
Latin America	0.219	0.197	0.177	0.159	0.128	0.104
South Asia	0.212	0.190	0.170	0.151	0.120	0.096
Middle East and North Africa	0.096	0.081	0.067	0.055	0.035	0.022
Sub Saharan Africa	0.340	0.318	0.298	0.279	0.248	0.223
By income level						
Low	0.326	0.304	0.285	0.266	0.236	0.211
Lower-middle	0.238	0.215	0.195	0.176	0.144	0.119
Upper-middle	0.211	0.189	0.169	0.151	0.120	0.097
High	0.135	0.114	0.095	0.078	0.051	0.033
World	0.221	0.199	0.180	0.162	0.132	0.110

Income classification follows World Bank http://data.worldbank.org/about/country-classifications. Low income ($995 or less)—lower-middle income ($996–$3,945)—upper-middle income ($3,946–$12,195)—high income ($12.196 or more)

The higher the income level, the lower the income and happiness inequality. We performed *t* tests of mean equality that confirm that income inequality is statistically significantly different between income-defined-regions. On the other hand, it is not possible to reject the null hypothesis of same happiness inequality levels between low, lower-middle and upper-middle income countries. At conventional significance levels, happiness inequality in high income countries is statistically lower than in lower income countries.

As argued above, the fact that happiness inequality is lower than income inequality is a natural consequence of the decreasing marginal utility of income. To have an idea of how much happiness inequality is due to income inequality we use Eq. 1 to compute utility levels under different assumptions of ρ, i.e. degrees of decreasing marginal utility of income. In Table 3 we present inequality measures of these simulated utility levels. As expected, utility inequality decreases with ρ. Table 4 presents the ratio between the utility Gini and the happiness Gini. It can be interpreted as the part of happiness inequality that is accounted for income inequality.

It is striking that only in Sub-Saharian-Africa does the Gini for utility mimic the Gini for happiness for ρs above 1 (recall that the financial literature suggests that ρ is between 1 and 2).

If the true ρ is at least 1, this means that the non-pecuniary dimensions of life are also correlated with income (and utility) everywhere but in Sub-Saharian-Africa. Rich individuals are happier not only because they are rich and can consume more, but also because in other dimensions of life (e.g. family, social cohesion) they are more satisfied than poor people. This is case 4 in Table 1. It may be that family structure is more solid for richer individuals than poorer. This may also impact on family relations and health. Which are

Table 4 How much happiness inequality is reasonable? G_u (ρ)/G_h

	$\rho = 0.8$	$\rho = 0.9$	$\rho = 1.0$	$\rho = 1.1$	$\rho = 1.3$	$\rho = 1.5$
By Geographic regions						
Western Europe	0.981	0.820	0.675	0.548	0.347	0.210
North America	1.024	0.842	0.679	0.538	0.322	0.182
Eastern Europe	1.007	0.909	0.818	0.736	0.596	0.487
Pacific Asia and Oceania	1.222	1.039	0.875	0.731	0.502	0.341
Latin America	1.002	0.900	0.807	0.723	0.579	0.467
South Asia	1.085	0.971	0.868	0.774	0.617	0.494
Middle East and North Africa	0.600	0.505	0.418	0.343	0.222	0.138
Sub Saharan Africa	1.472	1.375	1.287	1.206	1.069	0.960
By income level						
Low	1.509	1.402	1.304	1.215	1.064	0.944
Lower-middle	1.118	1.010	0.911	0.822	0.669	0.549
Upper-middle	1.000	0.894	0.798	0.711	0.565	0.452
High	0.937	0.787	0.652	0.534	0.346	0.217
World	1.130	1.010	0.901	0.803	0.642	0.521

Income classification follows World Bank http://data.worldbank.org/about/country-classifications. Low income ($995 or less)—lower-middle income ($996-$3,945)—upper-middle income ($3,946–$12,195)—high income ($12.196 or more)

the non pecuniary dimensions producing this result and how this is channeled is beyond the scope of this paper.

Table 4 implies that for ρs above 1, about half of the happiness inequality can be accounted for by differences in income (with $\rho = 1.0$ it accounts for between 40 and 86% of the difference). The rest must come from other dimensions.

4 Conclusions

In this paper we report that happiness inequality is much lower than income inequality. This is a natural consequence of the decreasing marginal utility of income. This marginal utility of income can be calibrated using estimates of relative risk aversion (ρ), but the empirical literature on risk aversion has not yet achieved consensus on its value. Unfortunately, this precludes us from giving a definitive answer to the question of how much happiness inequality should be expected given a certain level of income inequality. If the coefficient of relative risk aversion is above one, as much of the financial literature mentioned earlier indicates, then there is a sizable part of happiness inequality that is not related to income inequality, and therefore governments should be interested in addressing the causes of these non-pecuniary inequalities. Our results are in line with earlier studies that found only a modest correlation (Ott 2005) between income and happiness and studies on change over time that observed a trend to lower inequality of happiness in spite of rising inequality of incomes (Veenhoven 2005).

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Appendix: Relative Risk Aversion

The first and second derivatives of the utility function are:

$$u'(y) = y^{-\rho} \tag{2}$$

$$u''(y) = -\rho y^{-\rho-1}. \tag{3}$$

A risk neutral individual is indifferent between receiving a payment of $\$x$ and a lottery that pays either $\$x + \$z$ or $\$x - \$z$ with a probability of 0.5 for each outcome. A concave utility function represents risk averse individuals that strictly prefer the payment of $\$x$ over participating in the lottery. A commonly used measure of risk aversion is the Arrow–Pratt coefficient of relative risk aversion, r_R.

$$r_R = y\frac{u''(y)}{u'(y)}. \tag{4}$$

Substituting (2) and (3) in (4) we get:

$$r_R = \rho. \tag{5}$$

By now there have been almost 30 years of applied research in risk aversion. Surprisingly, there is not yet a commonly accepted estimate of the coefficient ρ. Although many economists probably believe that the coefficient of relative risk aversion is between 1 and 2, there is a wide range of measures for this coefficient (Table 5).

The following list is not an exhaustive survey of the literature on risk aversion, instead representing only a small portion of the research efforts in this area. Friend and Blume (1975),

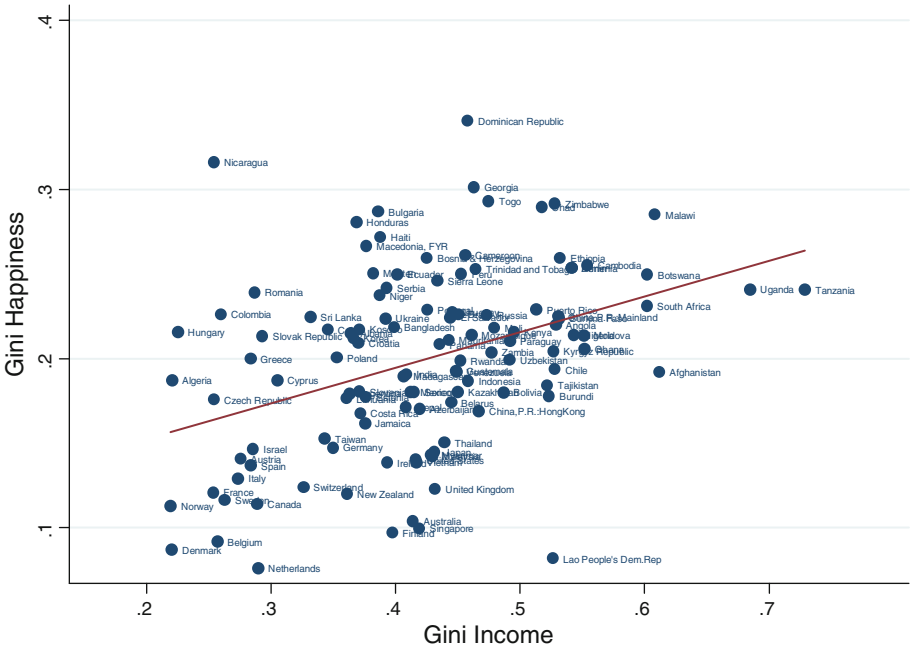

Fig. 1 Happiness inequality versus income inequality

Table 5 Gini income

	Income classification	Gini Income (official statistics)	Our estimations		
			Gini income	Gini happiness	Observations
Western Europe					
Austria	4	0.291*	0.276	0.141	665
Belgium	4	0.330*	0.257	0.092	751
Cyprus	4	0.290**	0.305	0.187	824
Denmark	4	0.247*	0.220	0.087	768
Finland	4	0.269*	0.397	0.097	738
France	4	0.327*	0.253	0.121	741
Germany	4	0.283*	0.350	0.147	932
Ireland	4	0.343*	0.393	0.139	608
Italy	4	0.360*	0.273	0.129	575
Netherlands	4	0.309*	0.289	0.076	768
Norway	4	0.258*	0.219	0.113	843
Portugal	4	0.385*	0.425	0.229	718
Spain	4	0.347*	0.284	0.137	457
Sweden	4	0.250*	0.263	0.116	863
Switzerland	4	0.337*	0.326	0.124	823
United Kingdom	4	0.360*	0.432	0.123	931
North America					
Canada	4	0.326*	0.289	0.114	1,232
United States	4	0.408*	0.416	0.140	912
Eastern Europe					
Albania	3	0.330*	0.364	0.215	816
Armenia	2	0.338*	0.541	0.253	906
Azerbaijan	3	0.365*	0.419	0.170	894
Belarus	3	0.279*	0.444	0.174	922
Bosnia and Herzegovina	3	0.358*	0.425	0.259	1,686
Bulgaria	3	0.292*	0.386	0.287	818
Croatia	4	0.290*	0.370	0.209	839
Czech Republic	4	0.258*	0.254	0.176	838
Estonia	4	0.360*	0.376	0.177	810
Georgia	2	0.408*	0.463	0.301	931
Greece	4	0.343*	0.283	0.200	836
Hungary	4	0.300*	0.225	0.216	923
Kazakhstan	3	0.339*	0.450	0.180	882
Kosovo	2	0.300**	0.371	0.217	959
Kyrgyzstan	1	0.329*	0.527	0.204	946
Lithuania	3	0.358*	0.361	0.176	839
Macedonia FYR	3	0.390*	0.376	0.267	995
Moldova	2	0.356*	0.551	0.214	917
Montenegro	3	0.300**	0.382	0.251	605
Poland	4	0.349*	0.353	0.200	825

Table 5 continued

	Income classification	Gini Income (official statistics)	Our estimations		
			Gini income	Gini happiness	Observations
Romania	3	0.315*	0.287	0.239	964
Russia	3	0.375*	0.473	0.226	1,721
Serbia	3	0.260**	0.393	0.242	1,382
Slovak Republic	4	0.258*	0.293	0.213	826
Slovenia	4	0.312*	0.371	0.181	865
Tajikistan	1	0.336*	0.522	0.184	905
Ukraine	2	0.282*	0.392	0.224	982
Uzbekistan	2	0.367*	0.492	0.199	916
Pacific Asia and Oceania					
Australia	4	0.352*	0.414	0.104	888
Cambodia	1	0.407*	0.554	0.255	1,000
Hong Kong	4	0.434*	0.467	0.169	662
China P.R.:Mainland	2	0.415*	0.531	0.225	3,352
Indonesia	2	0.394*	0.458	0.187	1,156
Japan	4	0.249*	0.431	0.145	803
South Korea	4	0.316*	0.366	0.212	900
Laos	1	0.326*	0.526	0.082	998
Malaysia	3	0.379*	0.429	0.142	897
Myanmar	1	0.400***	0.429	0.143	1,042
New Zealand	4	0.362*	0.361	0.120	883
Singapore	4	0.425*	0.419	0.100	837
Taiwan	4	0.326***	0.343	0.153	829
Thailand	2	0.425*	0.439	0.150	1,396
Vietnam	2	0.378*	0.417	0.139	825
Latin America					
Argentina	3	0.500*	0.363	0.179	802
Bolivia	2	0.582*	0.487	0.180	895
Brazil	3	0.550*	0.450	0.226	981
Chile	3	0.520*	0.528	0.194	875
Colombia	3	0.585*	0.260	0.226	869
Costa Rica	3	0.472*	0.372	0.168	781
Cuba	3	0.300***	0.346	0.217	923
Dominican Republic	3	0.500*	0.458	0.341	835
Ecuador	2	0.544*	0.401	0.250	1,045
El Salvador	2	0.497*	0.444	0.224	840
Guatemala	2	0.537*	0.449	0.192	901
Haiti	1	0.595*	0.388	0.272	474
Honduras	2	0.553*	0.368	0.281	654
Jamaica	3	0.455*	0.376	0.162	345
Mexico	3	0.481*	0.412	0.180	777
Nicaragua	2	0.523*	0.254	0.316	860

Table 5 continued

	Income classification	Gini Income (official statistics)	Our estimations		
			Gini income	Gini happiness	Observations
Panama	3	0.549*	0.435	0.208	977
Paraguay	2	0.532*	0.492	0.210	953
Peru	3	0.496*	0.453	0.250	864
Puerto Rico	4	0.564****	0.513	0.229	456
Trinidad and Tobago	4	0.403*	0.464	0.253	312
Uruguay	3	0.462*	0.446	0.227	934
Venezuela	3	0.434*	0.449	0.192	814
South Asia					
Afghanistan	1	0.600***	0.612	0.192	942
Bangladesh	1	0.310*	0.399	0.219	1,046
India	2	0.368*	0.409	0.191	2,027
Nepal	1	0.473*	0.408	0.171	986
Sri Lanka	2	0.411*	0.331	0.225	1,029
Middle East and North Africa					
Algeria	3	0.353*	0.220	0.187	1,041
Israel	4	0.392*	0.285	0.146	708
Sub Saharan Africa					
Angola	2	0.586*	0.529	0.220	557
Benin	1	0.386*	0.541	0.254	859
Botswana	3	0.610*	0.602	0.250	800
Burundi	1	0.333*	0.523	0.178	956
Cameroon	2	0.446*	0.456	0.261	981
Chad	1	0.398*	0.518	0.290	892
Ethiopia	1	0.298*	0.532	0.260	826
Ghana	1	0.428*	0.552	0.206	694
Kenya	1	0.477*	0.495	0.216	862
Madagascar	1	0.472*	0.406	0.190	994
Malawi	1	0.390*	0.608	0.285	977
Mali	1	0.390*	0.479	0.218	968
Mozambique	1	0.471*	0.461	0.214	936
Niger	1	0.439*	0.387	0.237	961
Nigeria	2	0.429*	0.543	0.214	777
Rwanda	1	0.467*	0.452	0.199	1,477
Senegal	2	0.392*	0.415	0.180	659
Sierra Leone	1	0.425*	0.434	0.246	986
South Africa	3	0.578*	0.602	0.231	784
Tanzania	1	0.346*	0.729	0.241	714
Togo	1	0.344*	0.475	0.293	977
Uganda	1	0.426*	0.685	0.241	827
Zambia	1	0.507*	0.477	0.204	818
Zimbawe	1	0.501*	0.528	0.292	914

Table 5 continued

	Income classification	Gini Income (official statistics)	Our estimations		
			Gini income	Gini happiness	Observations
Burkina Faso	1	0.396*	0.532	0.224	878
Mauritania	1	0.390*	0.443	0.211	960
Total				106,345	

Sources * World Bank (2009), **Central Intelligence Agency (2009), *** Institute for Economics and Peace (2010), **** Segarra (2006)

Income classification follows World Bank, http://data.worldbank.org/about/country-classifications. *1* Low income ($995 or less) *2* lower-middle income ($996–$3,945) *3* upper-middle income ($3,946–$12,195) *4* high income ($12.196 or more)

studying the demand for risky assets, find that relative risk aversion generally exceeds 1 and probably is above 2. Weber (1975), using expenditure data, and Szpiro (1986) using data on property insurance, estimate relative risk aversion to be in the range between 1.3 and 1.8. Using consumption data, Hansen and Singleton (1983) report lower estimates, between 0.68 and 0.97. Also using data on consumption, Mankiw (1985) finds much larger estimates in the range of 2.44–5.26. Halek and Eisenhauer (2001), using data on life insurance, estimate demographic differences in risk attitudes. They find an average relative risk aversion coefficient of 3.75, but a much lower median risk aversion coefficient of 0.9. Bartunek and Chowdhury (1997) use data from index option prices and estimate low risk aversion coefficients in the range of 0.2–0.3. The authors go into great pains to explain why their results are so different from the rest of the literature. The reasons provided suggest that their results are biased downwards.

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