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Inequality of Happiness: Evidence of the Compression of the Subjective-Well-Being Distribution with Economic Growth

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8.1 Introduction

The use of Subjective Well-Being (SWB) measures in economics research has grown markedly (Kahneman and Krueger 2006). This has come about for at least two reasons. First, the measures have been systematically validated as reliable for examining a range of questions. Second, economists have long relied on income as a proxy for wellbeing. However, research shows that there are potentially large slippages between economic indicators and wellbeing (Diener and Seligman 2004). Thus, SWB measures have become an important alternative proxy for wellbeing. Indeed, SWB measures have also caught the attention of policy makers. The OECD launched the Better Life Index in 2011 as an alternative wellbeing measure; and the former French President Nicolas Sarkozy formed the Stiglitz Commission in 2008 to identify the limits of gross domestic product (GDP) as a measure of wellbeing and to identify alternative measures (Stiglitz, Sen, and Fitoussi 2010).

When studying the distribution of income, economists have long recognized the importance of examining measures of central tendency and dispersion, as the latter are necessary to understand income inequality and poverty (Stiglitz, Sen, and Fitoussi 2010). Thus, there is a vast literature analyzing both the first and second moments of the distribution of income. For example, the Lorenz and Kuznets curves try to model the distribution of income, and the Gini coefficient summarizes the entire distribution in a scalar (see Atkinson 1970; Gastwirth 1972; Gini, 1921; Gottschalk and Smeeding, 1997; Kuznets, 1955; and Lorenz, 1905). In contrast, the vast majority of SWB research focuses on mean SWB. Given the current interest in SWB measures, and recognizing that

the entire distribution of SWB merits study, we believe it is important to study SWB inequality (dispersion) as well as mean SWB.

In this paper, we contribute to the emerging SWB literature by investigating the relationship between economic growth and SWB inequality using data from the World Values Survey (WVS) and the World Bank's World Development Indicators (WDI). The results suggest that economic growth is inversely related to SWB inequality in cross-sectional analysis. There is also some evidence from time series analysis that countries that experience greater economic growth rates also experience the greater decreases in SWB inequality, although this pattern does not hold for two of the fastest-growing countries in the data set. This is important because it indicates that economic growth may reduce SWB inequality over time, even if it does not increase mean SWB. The paper proceeds as follows. Section II reviews the related literature. Section III describes the data. Section IV presents the results. Section V concludes.

8.2 Literature review

The vastness of the income inequality literature illustrates the importance of studying income's distribution (for example, Atkinson 1970; Gastwirth 1972; Gini 1921; Gottschalk and Smeeding 1997; Lorenz 1905). In contrast, there are only a few papers that have studied SWB inequality.[1] Stevenson and Wolfers (2008b) examine trends in happiness inequality in the United States from 1972 to 2006 using the General Social Survey. They find that happiness inequality decreased during this period. The authors juxtapose their finding with the concurrent rise in income inequality in the United States but do not examine the relationship between happiness inequality and economic growth.

Easterlin (2012) studies SWB inequality in developed capitalist countries and in countries that transitioned from socialism to capitalism using the WVS. He finds that developed capitalist countries (with the exception of the Nordic welfare states) had greater SWB inequality than "Soviet-style" socialist countries before the transition. This pattern reverses after the transition, with the increase in SWB inequality in former socialist countries resulting from decreased SWB among low-income individuals. Easterlin et al. (2012) find the same pattern in China after the restructuring of state-owned enterprises (SOEs) and trimming of social safety nets.

Finally, Veenhoven (2005a) attempts to refute the "The Great U-Turn:" the return of social inequality in modern society.[2] Veenhoven examines trends in SWB inequality using the standard deviation of life satisfaction between 1973 and 2001 in Eurobarometer data. He shows that in that time period SWB inequality decreased. In his analysis, Veenhoven does not examine the relationship between SWB inequality and economic growth. He does, however, examine the relationships between SWB inequality and modernity using data

from the WVS. To do so, he plots SWB inequality against several measures of modernity, such as purchasing power, freedom in private life, urbanization, and education. He concludes that as countries "modernize," SWB inequality decreases. His analysis, however, is limited to a cross-sectional analysis using only two waves of data from the WVS. Our paper builds upon Veenhoven's (2005a) paper in two important ways. First, we use all five waves of the WVS, and second, we compare SWB inequality and per capita GDP (GPDpc) using both cross-sectional and time-series analysis. This is important since, as discussed below, many researchers believe that the relationship between mean SWB and GDPpc is different in cross-section than in time-series.

Cross-sectional analysis indicates that there is a positive relationship between mean SWB and GDPpc within a country and also across countries (Easterlin 1974; Stevenson and Wolfers 2008a; and Stevenson and Wolfers 2013). That is, within a country, individuals with higher income have higher SWB, on average, than individuals with lower income; and countries with higher average income have higher mean SWB. However, many researchers believe that this relationship vanishes in time series; this is the "Easterlin Paradox," introduced in Easterlin (1974) (see also Easterlin 1995; Easterlin 2013; and Easterlin et al. 2010). Various explanations have been proposed for the divergent results, for example, that relative income, not absolute income, is associated with SWB, or that individuals adapt to higher income over time. After the publication of the Easterlin Paradox, a heated debate has developed regarding the validity of Easterlin's finding, as many find it hard to believe that mean SWB does not increase with per capita income within a country over time. To determine if the paradox exists, the important variable to consider appears to be the time frame of the analysis. When Easterlin first proposed the paradox, he found that in long-term time series, the correlation between mean happiness and per capita income disappeared. A thorough critique of the paradox is by Stevenson and Wolfers (2008a), who examine multiple shorter time series to demonstrate that the association between mean happiness and per capita income does exist. The main difference between these two analyses is that Stevenson and Wolfers consider shorter time series and Easterlin considers longer time series. It is important to note that the existence of the Easterlin Paradox is a subject of active debate (for example, Stevenson and Wolfers 2008a; Stevenson and Wolfers 2013; and Easterlin et al. 2010). For the purpose of this paper, we can remain agnostic.

We contribute to the SWB inequality literature by performing a systematic analysis of the relationship between SWB inequality and economic growth. We examine the relationship between SWB inequality and economic growth in both a cross-sectional and time series analysis. Because our results are for the most part consistent across these two analyses, they do not present the challenge that the Easterlin paradox does. Our research also suggests that, despite

the controversy the Easterlin paradox presents, there may be an additional benefit from increasing per capita income within a country: namely, decreasing SWB inequality.

8.3 Data

The SWB data for this study come from the WVS, the most comprehensive data set, in terms of years and countries covered, available for studying SWB. It has been administered five times. The first wave, administered between 1981 and 1984, includes 21 countries and the fifth wave, administered between 2005 and 2008, includes 56 countries. In total, there are over 350,000 respondents; the survey has been administered in 98 countries at least once; and there are 248 country-wave pairs (for example, the United States – Wave 1).

The WVS includes a standard Life-Satisfaction (LS) question as well as a happiness question. The former asks: "All things considered, how satisfied are you with your life as a whole these days?" where "1" is defined as "dissatisfied" and "10" is defined as "satisfied;" Figure 8.1a presents a histogram of the LS data. Like Veenhoven's study, our analysis uses the standard deviation of the LS question rather than the happiness question. Its response scale is larger (10 possible responses versus 4) and the standard deviation is greater than is the standard deviation of happiness (2.45 versus 0.74). Further, the LS question is believed to be better for making cross-country comparisons than the happiness question (Di Tella et al. 2010). Of the 248 country-wave pairs in the WVS, there is LS data for 246; LS data are missing for Korea 1996 and Pakistan 1997. Also, Indian LS data is considered invalid and is dropped, as the response scale changed between waves (Easterlin and Sawangfa 2010). This leaves 242 country-wave pairs.

The unit of analysis throughout the study is the country-wave pair. For each country-wave pair, we calculate the mean and Standard Deviation of LS (SD_{LS}). The latter is our measure of SWB inequality.[3] Figure 8.1b presents a histogram of the standard deviation of LS by country-wave pair. For each country-wave pair, we also calculate the percentage of respondents who are female, married, not parents, unemployed, and did not complete high school as well as the mean age.

The GDPpc data come from the World Bank's WDI. All GDPpc figures are in 2000 U.S. dollars. Of the 242 country-wave pairs in the analysis, there are GDPpc data for 237. GDPpc data are missing for Northern Ireland 1981, 1990, and 1999, and Taiwan 1994 and 2006; the World Bank does not recognize the countries for political reasons. We drop these country-wave pairs.

Finally, given that we are studying SWB inequality and that SWB inequality might be related to income inequality, we attempt to collect data regarding income inequality for the country-wave pairs in our data set. There is income

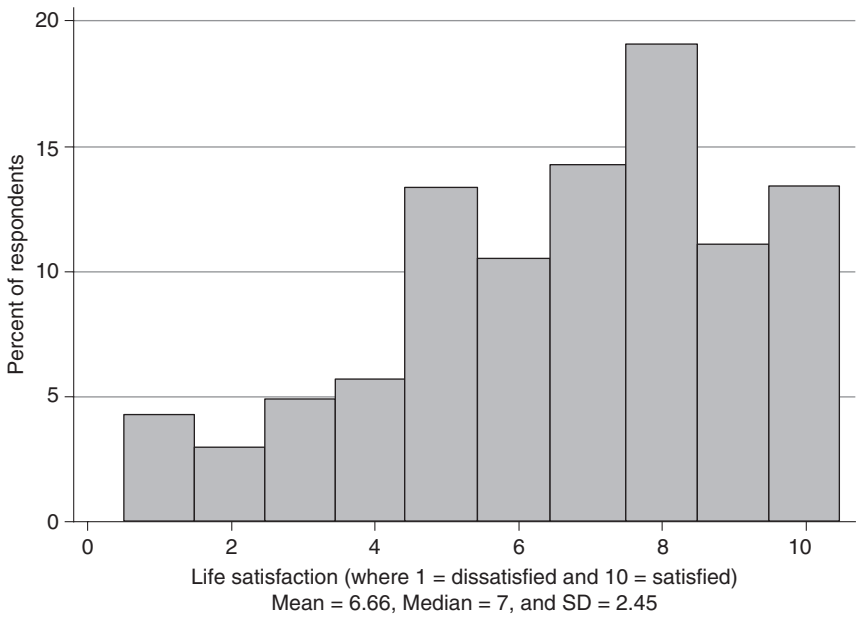

Figure 8.1a Distribution of LS responses in WVS (341,198 observations)

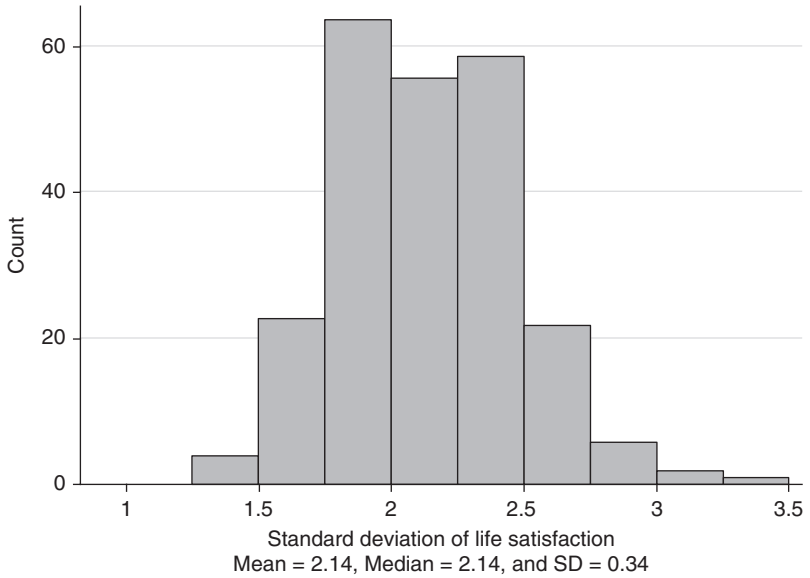

Figure 8.1b Distribution of standard deviation of LS by country-wave pair (237 observations)

inequality data (Gini coefficient) in the WDI for only 127 of the country-wave pairs, and we could not find a more complete source of income inequality data than the WDI. Thus, we use the Gini coefficient to measure income inequality only as a robustness check. As our primary measure of income inequality, we use, for each country-wave pair, the standard deviation of WVS respondents' self-reported income decile into which their household falls. We have this measure of income inequality for 227 country-wave pairs; it is missing for the following pairs: Argentina 1984 & 2006; Finland 1981; Hungary 1982 & 1998; Jordan 2007; Philippines 1996; Portugal 1999; Slovenia 1995; and Sweden 1990.

Table 8.1 presents the countries that are included in the data set, sorted by the average SD_{LS} across all the waves; it also shows for each country the number of WVS waves that were administered, the first and last year the WVS was administered, and the mean of LS and GDPpc across all the waves. Interestingly, the vast majority of the countries with the lowest (highest) SD_{LS} have high (low) GDPpc; the mean GDPpc of the 20 countries with the smallest (greatest) SD_{LS} is above $20,000 (below $2,000). Pakistan is a clear exception to this pattern; it has the lowest SD_{LS}, 1.46, and has an average GDPpc of $526. Further, the SD_{LS} decreases (and GDPpc increases), as one progressively restricts the sample to OECD countries to country-wave pairs with GDPpc greater than $10,000 and $20,000; Table 8.2 presents the mean SD_{LS}, LS, and other characteristics for country-wave pairs).

Table 8.1 Countries in WVS sorted by the standard deviation of life satisfaction (n=97)

Country	Administered			Across all wave		
	# waves	First year	Last year	Mean LS	SD of LS	GDPpc (2000usd)
Pakistan^	2	1997	2001	4.85	1.46	526
Netherlands^^^^	4	1981	2006	7.77	1.48	20,986
Iceland^^^^	3	1984	1999	8.04	1.60	26,674
Andorra^^^^	1	2005	2005	7.14	1.62	20,783
Finland^^^^	5	1981	2005	7.81	1.65	21,002
Switzerland^^^^	3	1989	2007	8.10	1.73	34,130
Sweden^^^^	5	1982	2006	7.82	1.75	25,133
Norway^^^^	4	1982	2008	7.80	1.75	31,561
Canada^^^^	4	1982	2006	7.82	1.77	21,370
Malaysia	1	2006	2006	6.84	1.79	4,792
Singapore^^^^	1	2002	2002	7.24	1.80	22,571
Thailand^^^^	1	2007	2007	7.21	1.81	2,592
Australia^^^^	3	1981	2005	7.59	1.81	18,623
Northern Ireland^^, ^^^^	3	1981	1999	7.85	1.82	–

(*continued*)

Table 8.1 Continued

Country	Administered			Across all wave		
	# waves	First year	Last year	Mean LS	SD of LS	GDPpc (2000usd)
Malta^^^^	3	1983	1999	8.15	1.84	7,079
Denmark^^^^	3	1981	1999	8.21	1.85	24,239
Spain^^^^	5	1981	2007	6.94	1.86	12,468
Japan^^^^	5	1981	2005	6.64	1.86	33,814
Luxembourg	1	1999	1999	7.81	1.87	43,421
United Kingdom^^^^	5	1981	2006	7.52	1.87	22,304
United States^^^^	5	1982	2006	7.60	1.88	30,375
Austria^^^^	2	1990	1999	7.95	1.88	21,188
Ireland^^^^	3	1981	1999	7.96	1.88	15,894
Hong Kong^^^^	1	2005	2005	6.41	1.93	30,395
Germany^^^^	5	1981	2006	7.10	1.94	20,719
Belgium^^^^	3	1981	1999	7.47	1.94	18,745
New Zealand^^^^	2	1998	2004	7.80	1.95	13,513
Colombia	2	1997	2005	8.31	1.97	2,579
Vietnam	2	2001	2006	6.81	1.98	500
France^^^^	4	1981	2006	6.84	1.99	19,739
Ethiopia^^^^	1	2007	2007	4.99	2.01	175
Taiwan^^, ^^^^	2	1994	2006	6.61	2.02	–
Cyprus^^^^	1	2006	2006	7.35	2.03	14,719
Albania	2	1998	2002	4.97	2.03	$1,167
Portugal^^^^	2	1990	1999	7.05	2.05	9,609
Czech Republic^^^,^^^^	3	1990	1999	6.72	2.06	5,301
Uruguay	2	1996	2006	7.30	2.07	7,127
Guatemala	1	2005	2005	7.95	2.09	1,762
Puerto Rico^^^^	2	1995	2001	8.30	2.09	15,178
Italy^^^^	4	1981	2005	7.00	2.10	16,971
Mexico^^^^	5	1981	2005	7.86	2.10	5,515
Indonesia^^^^	2	2001	2006	6.93	2.11	905
Slovenia^^^	4	1992	2005	6.81	2.11	9,184
Rwanda^^^^	1	2007	2007	4.97	2.11	290
Argentina	5	1984	2006	7.19	2.13	7,348
Chile	4	1990	2005	7.21	2.14	4,530
Morocco	2	2001	2007	5.66	2.17	1,499
Israel	1	2001	2001	7.03	2.17	19,366
Burkina Faso^^^^	1	2007	2007	5.57	2.18	260
Greece	1	1999	1999	6.67	2.19	11,043
Estonia^^^	3	1990	1999	5.64	2.20	3,535
Korea (South)^, ^^^^	5	1982	2005	6.16	2.20	9,247
Bangladesh	2	1996	2002	6.09	2.21	324
Belarus^^^	3	1990	2000	4.89	2.22	1,211
Croatia	2	1996	1999	6.43	2.22	4,421
Trinidad And Tobago^^^^	1	2006	2006	7.26	2.23	10,217
Saudi Arabia^^^^	1	2003	2003	7.28	2.27	9,266
Azerbaijan	1	1997	1997	5.39	2.29	513

(*continued*)

Table 8.1 Continued

Country	Administered			Across all wave		
	# waves	First year	Last year	Mean LS	SD of LS	GDPpc (2000usd)
Slovak Republic^^^, ^^^^	3	1990	1999	6.24	2.29	5,236
Bosnia And Herzegovina^^^^	2	1998	2001	5.61	2.30	1,407
Serbia^^^^	3	1996	2006	5.77	2.31	1,368
Poland^^, ^^^	4	1989	2005	6.55	2.32	4,112
Moldova	3	1996	2006	4.58	2.33	427
China^^^, ^^^^	4	1990	2007	6.85	2.35	970
Latvia^^^	3	1990	1999	5.29	2.35	3,148
Peru	3	1996	2008	6.61	2.35	2,309
Armenia	1	1997	1997	4.32	2.37	520
Hungary^^^, ^^^^	4	1982	1999	6.15	2.39	4,103
Ukraine	3	1996	2006	4.77	2.39	747
Brazil	3	1991	2006	7.39	2.40	3,712
Iran^^^^	2	2000	2007	6.40	2.41	1,861
Bulgaria^^^	4	1990	2006	5.10	2.41	1,697
Iraq^^^^	2	2004	2006	4.84	2.41	711
El Salvador	1	1999	1999	7.50	2.43	2,174
Georgia	2	1996	2008	4.82	2.43	891
Philippines	2	1996	2001	6.75	2.44	951
Macedonia	2	1998	2001	5.41	2.45	1,673
Dominican Republic	1	1996	1996	7.13	2.47	2,227
Uganda	1	2001	2001	5.65	2.47	258
Russian Federation^^^, ^^^^	4	1990	2006	5.16	2.48	2,120
Romania^^^	4	1993	2005	5.43	2.49	1,767
Zambia^^^^	1	2007	2007	6.06	2.50	374
Turkey^^^^	4	1990	2007	6.41	2.50	3,992
Nigeria	3	1990	2000	6.68	2.52	362
Lithuania^^^	3	1990	1999	5.40	2.54	3,458
South Africa^^^^	5	1982	2007	6.62	2.56	3,279
Kyrgyz Republic	1	2003	2003	6.48	2.57	306
Mali	1	2007	2007	6.09	2.59	287
Ghana	1	2007	2007	6.12	2.63	313
Jordan	2	2001	2007	6.40	2.65	2,091
Venezuela	2	1996	2000	7.12	2.75	4,912
Zimbabwe^^^^	1	2001	2001	3.95	2.79	576
Algeria	1	2002	2002	5.67	2.86	1,874
Egypt^^^^	2	2000	2008	5.57	3.02	1,604
Tanzania	1	2001	2001	3.87	3.22	283

^Missing LS data from WVS: Korea 1996; and Pakistan 1997.
^^Missing GDPpc from WDI: Northern Ireland 1981, 1990, & 1999; and Taiwan 1994 & 2006. Poland 1989 GDPpc data from 1990 (1989 data missing).
^^^Transition country.
^^^^Missing Gini coefficient from WDI for at least one wave.

Table 8.2 Mean characteristics by country-wave pairs

	All (1)		OECD (2)		GDPpc > $10,000 (3)		GDPpc > $20,000 (4)	
Mean LS	6.69	(0.07)	7.23	(0.06)	7.48	(0.05)	7.55	(0.07)
SD_{LS}	2.14	(0.02)	1.96	(0.02)	1.85	(0.02)	1.80	(0.02)
GDPpc (in 2000usd)	$10,283	(691)	$17,154	(945)	$22,201	(813)	$27,509	(848)
Income inequality+	2.22	(0.03)	2.37	(0.04)	2.41	(0.04)	2.50	(0.06)
Age	42.07	(0.39)	44.00	(0.47)	44.56	(0.55)	45.73	(0.88)
Female	0.52	(0.00)	0.52	(0.00)	0.53	(0.00)	0.52	(0.00)
Married	0.58	(0.01)	0.58	(0.01)	0.57	(0.01)	0.56	(0.01)
No children	0.25	(0.01)	0.23	(0.01)	0.25	(0.01)	0.27	(0.02)
Unemployed	0.08	(0.00)	0.05	(0.00)	0.05	(0.00)	0.05	(0.00)
Did not complete high school	0.45	(0.01)	0.45	(0.02)	0.41	(0.03)	0.43	(0.03)
Number of countries	93		34		32		21	
Number of country-wave pairs	237		120		90		50	

Standard error in parenthesis.
+Standard deviation of reported income deciles

8.4 Results

To examine the relationship between SWB inequality and income we first treat the data as repeated cross-sections. This analysis provides strong evidence that the two are negatively correlated, indicating that countries with higher income have lower SWB inequality. Next, we treat the data as time series. This analysis provides some evidence that countries with the greatest economic growth rates experience the greatest decrease in SWB inequality. However, the time series analysis is far from conclusive.

A Cross-section analysis

Figure 8.2a plots the SD_{LS} and the Natural Log of GDPpc (LGDPpc) for each country-wave pair. There appears to be a negative relationship. That is, SD_{LS} is smaller in country-wave pairs with greater LGDPpc (Figure 8.2b illustrates that the relationship is similar but less linear when one compares SD_{LS} and GDPpc). Given that log income is generally used when studying the relationship between mean SWB and income, we use LGDPpc in the subsequent analysis, unless noted otherwise.

To estimate the relationship between SWB inequality and income, an equation of the following form is estimated:

$$SD^{LS}_{c-w} = a\, LGDPpc_{c-w} + \beta \bullet X_{c-w} + \varepsilon_{c-w} \quad (1)$$

where SD^{LS}_{c-w} is the SD_{LS} for each country-wave pair, $c-w$; $LGDPpc_{c-w}$ is the natural log of GDPpc in 2000 US dollars for each $c-w$ pair; and X_{c-w} is a matrix of

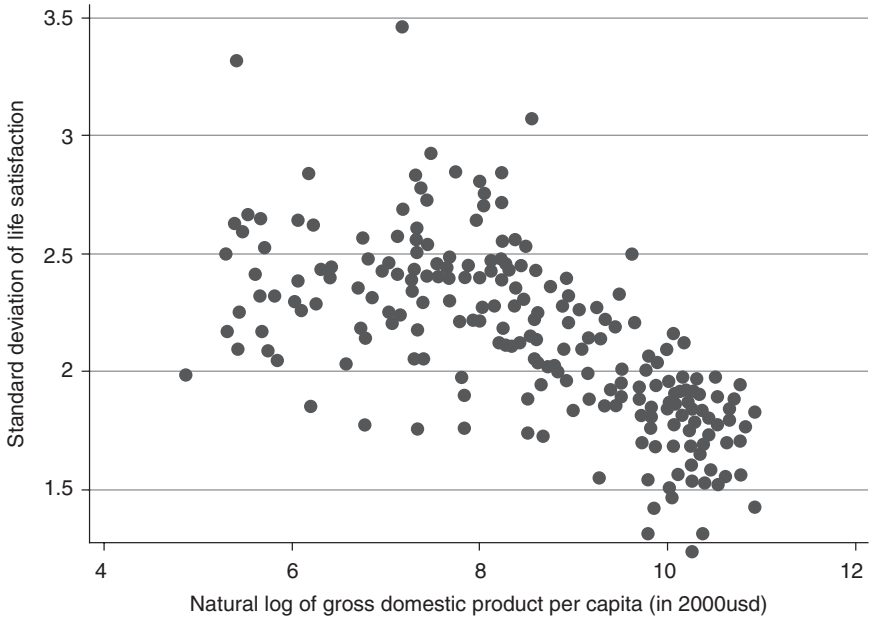

Figure 8.2a Scatterplot of standard deviation of life satisfaction and natural log of per capita GDP (in 2000USD)

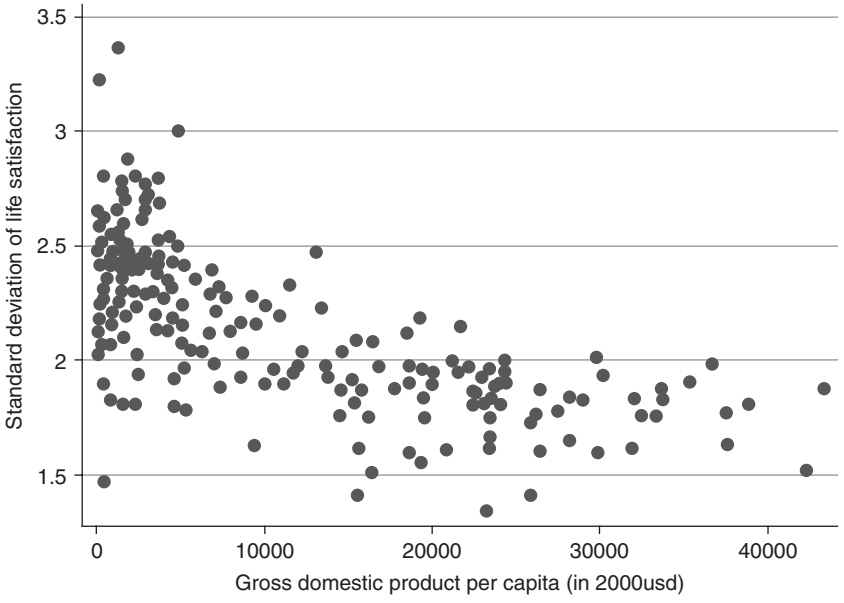

Figure 8.2b Scatterplot of standard deviation of life satisfaction and gross domestic product per capita (in 2000USD)

characteristics for each *c*−*w* pair including mean LS, income inequality, mean age, and percent of respondents who are female, married, childless, unemployed, and not high school graduates.[4] Equation (1) is estimated using OLS using country fixed effects.

Estimating equation (1) without covariates, the coefficient on LGDPpc is negative and highly statistically significant, confirming the negative relationship between SD_{LS} and LGDPpc that is apparent in Figure 8.2a (Column 1 of Table 8.3). Column 2 shows that this finding is robust to adding income inequality (using the SD of reported income), mean LS, and the other regressors discussed above (results from the progressive addition of these regressors are shown in Table 8.4). The magnitude of the coefficient indicates that doubling GDPpc is associated with a 0.19 reduction in SD_{LS}, or a 9 percent (=0.19/2.14) reduction from mean SD_{LS}. This is equivalent to moving from 46th (Chile, SDLS=2.14) to 27th (New Zealand, SD_{LS}=1.95) in the SWB inequality ranking. The coefficient on income inequality is positive but statistically insignificant, which indicates that the negative relationship between SD_{LS} and GDPpc is not simply an artifact of a negative relationship between GDPpc and income inequality. Finally, the coefficient on mean LS is negative and statistically significant, indicating that as mean LS increases, SD_{LS} decreases. These results are not driven by the transition economies: Columns 3 and 4 of Table 8.3 show that the result is robust to, and indeed strengthened by, the exclusion of transition countries.

Table 8.3 Ordinary least square estimates of equation (1) where the dependent variable is the standard deviation of life satisfaction

	All (1)	**All (2)**	**Non-transition countries (3)**	**Non-transition countries (4)**
LGDPpc	–0.187***	–0.192**	–0.255***	–0.351***
	(0.058)	(0.082)	(0.072)	(0.116)
Income inequality[+]		0.024		0.019
		(0.033)		(0.042)
Mean LS		–0.085**		–0.086*
		(0.040)		(0.052)
Includes:				
Country fixed effects	Yes	Yes	Yes	Yes
Other covariates[++]	No	Yes	No	Yes
Observations	237	237	191	191
Number of countries	93	93	80	80

Standard errors in parenthesis.
*, **, *** signifies p<0.10, 0.05, 0.01, respectively.
[+]For each country-wave pair, the standard deviation of income.
[++]For each country-wave pair, mean age; percent of respondents did not complete high school; and percent of respondents who are female, married, not parents, and unemployed.

Table 8.4 Ordinary least square estimates of equation (1) where the dependent variable is the standard deviation of life satisfaction

	All (1)	**All (2)**	**All (3)**	**All (4)**	**All (5)**	**Non-transition countries (6)**	**Non-transition countries (7)**
Log GDP per capita	–0.157***	–0.187***	–0.181***	–0.130**	–0.192**	–0.255***	–0.351***
	(0.016)	(0.058)	(0.058)	(0.061)	(0.082)	(0.072)	(0.116)
Income inequality+			0.045	0.044	0.024		0.019
			(0.033)	(0.032)	(0.033)		(0.042)
Mean LS				–0.084**	–0.085**		–0.086*
				(0.037)	(0.040)		(0.052)
Includes:							
Country fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Other covariates++	No	No	No	No	Yes	No	Yes
Observations	237	237	237	237	237	191	191
Number of countries	93	93	93	93	93	80	80

Standard errors in parenthesis.
*, **, *** signifies p<0.10, 0.05, 0.01, respectively.
+For each country-wave pair, the standard deviation of income.
++For each country-wave pair, mean age; percent of respondents did not complete high school; and percent of respondents who are female, married, not parents, and unemployed.

The above analysis is repeated, using the 127 country-wave pairs with Gini information. Table 8.5 compares the coefficients on LGDPpc and income inequality using as measures of income inequality the SD of reported income (as in Table 8.3) and the country-wave Gini coefficient. While the restricted sample entails a loss of statistical power when other covariates are added (Columns 4 and 5 of Table 8.5), the coefficient on LGDPpc is stable across specifications (ranging from –0.225 to –0.314) and statistically significant in the absence of covariates (Columns 2 and 3). Thus the results appear robust to the choice of income-inequality metric.

To determine whether the decrease in SD_{LS} associated with greater GDPpc results from fewer reports of "low LS" or "high LS," we estimate equation (1) with corresponding binary variables in place of SD^{LS}_{c-w}. Specifically, *Low LS*, equals one if LS equals 1, 2, 3, or 4, and zero otherwise, and *High LS* equals one if LS is 9 or 10, and zero otherwise. Higher GDPpc is associated with a statistically significant reduction in low LS. With country fixed effects and no other covariates, doubling GDPpc is associated with a 9.2 percentage point reduction in a respondent's likelihood of reporting low LS (Column 1 of Table 8.6). The corresponding specification shows no statistically significant relationship between GDPpc and high LS (Column 4). Next, in columns 2 and 5, we include the controls described above; importantly, these include mean LS, which is known to be a positive correlate of income in cross-sectional analysis. A noteworthy result emerges: now, higher GDPpc is associated with a statistically significant decrease in both low and high LS (Columns 2 and 5).

Table 8.5 Ordinary least square estimates of equation (1) where the dependent variable is the standard deviation of life satisfaction, using WDI data and comparing the standard deviation of reported income to the Gini coefficient

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
LGDPpc	–0.305***	–0.290**	–0.314**	–0.251	–0.225
	(0.118)	(0.122)	(0.121)	(0.182)	(0.168)
SD of reported income		0.026		–0.029	
		(0.051)		(0.063)	
Gini coefficient			0.003		0.001
			(0.007)		(0.009)
Includes:					
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Other covariates[+]	No	No	No	Yes	Yes
Observations	127	127	127	127	127
Number of countries	69	69	69	69	69

Standard errors in parenthesis.
*,**,*** signifies p<0.10, 0.05, 0.01, respectively.
[+]For each country-wave pair, mean LS, mean age, and percent of respondents who are female, married, not parents, unemployed, and not high school graduates.

Table 8.6 Ordinary least square estimates of equation (1) where the dependent variable is low and high levels of life satisfaction

	Low LS (1)	**Low LS (2)**	**Low LS Non-transition countries (3)**	**High LS (4)**	**High LS (5)**	**High LS Non-transition countries (6)**
LGDPpc	–0.092***	–0.026**	–0.032**	0.015	–0.060***	–0.087***
	(0.018)	(0.011)	(0.015)	(0.019)	(0.019)	(0.028)
Income inequality+		0.009*	0.007		0.008	0.010
		(0.005)	(0.006)		(0.008)	(0.010)
Mean LS		–0.124***	–0.113***		0.106***	0.120***
		(0.005)	(0.007)		(0.009)	(0.013)
Includes:						
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Other covariates++	No	Yes	Yes	No	No	Yes
Observations	237	237	191	237	237	191
Number of countries	93	93	80	93	93	80

Standard errors in parenthesis.
*, **, *** signifies $p<0.10$, 0.05, 0.01, respectively.
+For each country-wave pair, the standard deviation of income.
++For each country-wave pair, mean age; percent of respondents did not complete high school; and percent of respondents who are female, married, not parents, and unemployed.

Interestingly, as GDPpc increases, high LS decreases, indicating that after controlling for mean LS, high LS actually decreases with GDPpc. Excluding transition countries increases the magnitude of the LGDPpc coefficient (Columns 3 and 6), indicating that the pooled results are not driven by these countries.

Finally, as shown in Table 8.7, restricting the sample to more developed countries, either the OECD countries or those countries with GDPpc greater than $10,000 or $20,000, increases the magnitude of the coefficient on LGDPpc. This indicates that the negative relationship between SD_{LS} and GDPpc is more negative for higher income countries.

B Time series analysis

The negative relationship between SWB inequality and income that is apparent in cross-sectional analysis may or may not persist in time series analysis. To investigate we examine the evolution over time of SD_{LS} and GDPpc in individual countries. First we focus on countries with the longest time series, that is, the ten countries for which we have fives waves of LS data, providing a 22+ year time series for each: Argentina, Finland, Germany, Japan, Mexico, South Africa, Spain, Sweden, the United Kingdom, and the United States. Of these countries, all experience weakly increasing GDPpc over the time period. Figure 8.3 presents the time series of GDPpc and SD_{LS} for the United States.

Table 8.7 Ordinary least square estimates of equation (1) where the dependent variable is the standard deviation of life satisfaction and sample is limited to OECD countries and also countries with high GDP per capita

	OECD (1)	**OECD (2)**	**Per capita income > $10,000 (3)**	**Per capita income > $10,000 (4)**	**Per capita income > $20,000 (5)**	**Per capita income > $20,000 (6)**
Log GDP per capita	–0.200***	–0.318**	–0.214**	–0.448**	–0.388***	–0.530***
	(0.066)	(0.121)	(0.086)	(0.157)	(0.101)	(0.171)
Income inequality[+]		0.008		0.012		0.044
		(0.037)		(0.049)		(0.051)
Mean LS		–0.156***		–0.299***		–0.222*
		(0.048)		(0.096)		(0.109)
Includes:						
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Other covariates[++]	No	Yes	No	Yes	No	Yes
Observations	120	120	90	90	50	50
Number of countries	34	34	32	32	21	21

Standard errors in parenthesis.
*, **, *** signifies p<0.10, 0.05, 0.01, respectively.
[+]For each country-wave pair, the standard deviation of income.
[++]For each country-wave pair, mean age; percent of respondents did not complete high school; and percent of respondents who are female, married, not parents, and unemployed.

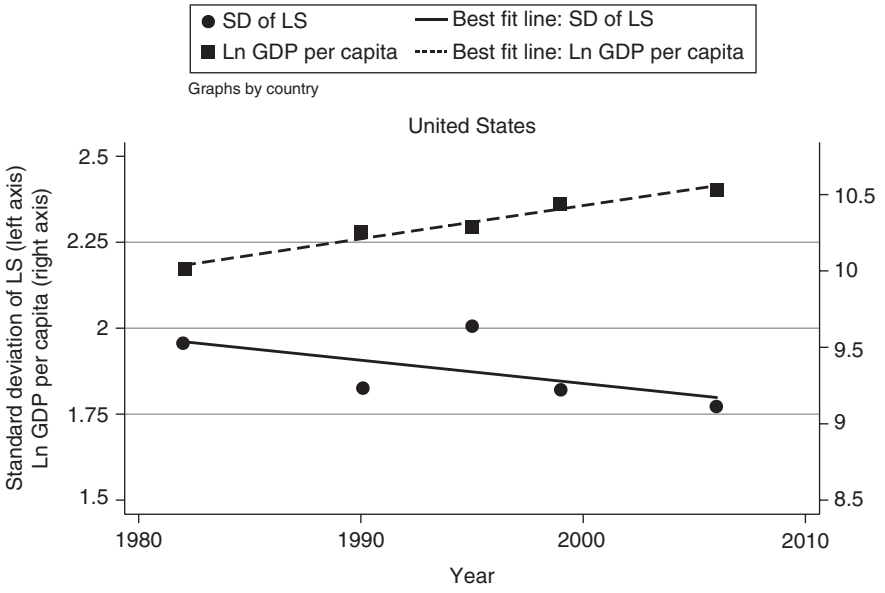

Figure 8.3 Time-series of US standard deviation of life satisfaction and the natural log of per capita GDP, 1982–2006

We calculate the average annual percentage change in the SD_{LS} and GDPpc between the first and last observation for each country. For example,

$$Avg\%\Delta SD_c^{LS} = \left(\frac{SD_{c,w=5}^{LS} - SD_{c,w=1}^{LS}}{SD_{c,w=1}^{LS}} \right) \Big/ years_c \qquad (2)$$

where $year_c$ is the number of years country, c, is in the time series. Figure 8.4 presents the scatterplot of these calculations for the ten countries that administered the WVS in all five waves. There appears to be a negative relationship, indicating that countries that experience the greatest average per-capita growth rate experience the greatest reduction in SD_{LS}.

Regressing $Avg\%\Delta SD_c^{LS}$ on $Avg\%\Delta GDPpc_c$, one finds a negative but statistically insignificant relationship (Column 1 of Table 8.8). However, the number of observations is small and there is one clear outlier, Finland (see Figure 8.4). Dropping Finland, one finds that the coefficient remains negative, grows in magnitude, and is statistically significant; this holds in the simple regression and with controls for the average annual percentage change in SD of reported income and mean LS (Columns 2 and 3). In summary, there is evidence that the countries that experience the greatest per capita economic growth also

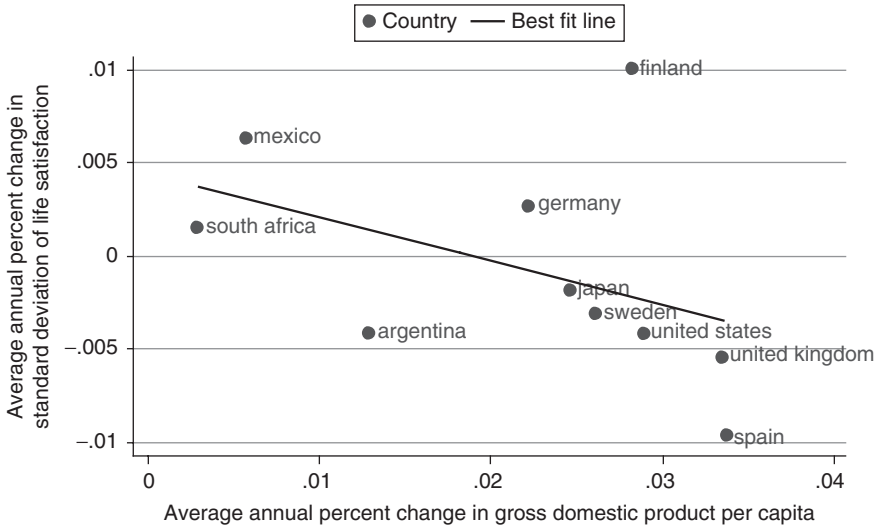

Figure 8.4 Scatterplot of average annual percent change in standard deviation of life satisfaction and average annual percent change in per capita GDP for countries in five waves of WVS

Table 8.8 Ordinary least squares estimates of regressing the average annual change in the standard deviation of life satisfaction on average annual per capita GDP growth

	In 5 waves (1)	**In 5 waves, except Finland (2)**	**In 5 waves, except Finland (3)**	**In 4+ waves, except China and Korea (4)**	**In 4+ waves, except China, and Korea (5)**
Avg%ΔGDPpc	–0.235	–0.319**	–0.315**	–0.164***	–0.181***
	(0.142)	(0.099)	(0.118)	(0.046)	(0.049)
Avg%ΔIncome			0.306		0.054
Inequality			(0.247)		(0.034)
Avg%ΔMean of LS			–0.875*		–0.414**
			(0.391)		(0.169)
Number of countries	10	9^	9^	23	21^

Standard errors in parenthesis.
*,**,*** signifies p< 0.10, 0.05, 0.01, respectively.
⁺For each country-wave pair, percent change from first to last wave.
^ Argentina (in 5 waves) and Hungary (in 4 waves) are dropped due to missing income inequality data.

experience the greatest decrease in SD_{LS}. The magnitude of the coefficient indicates that if GDPpc doubles, then SD_{LS} will decrease by 20–30 percent. This is equivalent to moving from 46th (Chile, SD_{LS}=2.14) to 6th (Switzerland, SD_{LS}=1.73) in the SWB inequality ranking.

Broadening the analysis to include countries with at least four waves of LS data provides a 12+ year time series for 25 countries (additional countries

include Bulgaria, Canada, Chile, China, France, Hungary, Italy, Korea (South), the Netherlands, Norway, Poland, Romania, Russia, Slovenia, and Turkey). Now there is a positive relationship between $Avg\%\Delta SD_c^{LS}$ and $Avg\%\Delta GDPpc_c$, as illustrated with the solid line in Figure 8.5. However, there are two outliers, China and Korea, whose growth rates are each more than twice as large as the next fastest-growing economies. Dropping the greatest outlier, China, from the figure materially changes the best-fit relationship (long-dashed line, Figure 8.5) to a negative one. Further, if one drops Korea, the country with the next fastest growth rate, then the negative relationship becomes greater (short-dashed line, Figure 8.5). In the next section, we briefly discuss why unusually high growth rates may be associated with increased SD_{LS}.

Regressing $Avg\%\Delta SD_c^{LS}$ on $Avg\%\Delta GDPpc_c$ for the countries in at least four waves of the WVS, one finds negative and statistically significant relationship with China and Korea excluded (Column 4 of Table 8.8). This result holds with the inclusion of controls for the average annual percent changes in both SD of reported income and mean LS. That is, excluding the two countries with the greatest economic growth rates, it appears that countries experiencing greater economic growth also experience greater decreases in SD_{LS}. An alternative explanation, for which we have no statistically significant support,

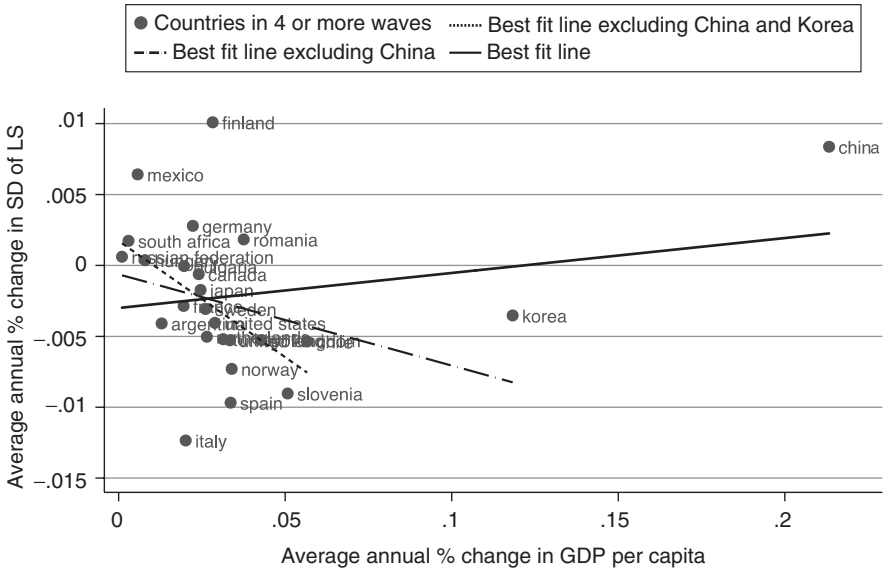

Figure 8.5 Scatterplot of average annual percent change in standard deviation of life satisfaction and average annual percent change in per capita GDP for countries in at least four waves of WVS

is that, in time series, there is a U-shaped relationship between economic growth and changes in SD_{LS}, wherein China and Korea lie on the upward-sloping part of the U.

8.6 Discussion

We present evidence that there is a negative relationship between SWB inequality and income in cross-sectional analysis; this result is stable regardless of the covariates included in the analysis. The results indicate that the doubling of income is associated with a 9 percent reduction in SD_{LS}, our measure of SWB inequality, from the mean. There is also time series evidence that for most countries, greater economic growth rates will also be associated with greater declines in SWB inequality over time. The results indicate that doubling income is associated with a 20–30 percent decrease in SWB inequality. Interestingly, this pattern is contradicted for the two countries in the data set with the greatest economic growth rates: China and Korea. Perhaps, exceptional economic growth rates do not lead to decreasing SWB inequality over time, as such growth rates might cause large changes that affect citizens' SWB in disparate ways. Such a relationship is corroborated for China in Easterlin et al. (2012), which documents that those people in the bottom third of the income distribution were the most hard-hit by the reduced job security, and associated benefits thereof, entailed by SOE restructuring.

The decrease in SWB inequality associated with economic growth seems to be associated with a decrease in low LS. This contrasts sharply with the recent positive correlation of economic growth and income inequality. For example, the United States and the United Kingdom have each experienced well-documented increases in income inequality during recent periods of economic growth. In contrast, economic growth appears to be negatively associated with high LS. The investigation of why greater income is associated with a compression of the LS distribution – for example, hedonic adaptation (Di Tella, Haisken-De New, and MacCulloch 2010) and negative side effects of attaining increased income on the high-LS end of the distribution, and improved social safety nets at the low-LS end of the distribution – is left for future research. To this end, Easterlin (1995) illustrates the relationship between social safety nets and mean LS.

Because our results are for the most part consistent across cross-sectional and time series analyses, they do not present the challenge that the Easterlin paradox does. Our research also suggests that, despite the controversy the Easterlin paradox presents, there may be an additional benefit – insofar as SWB equality is desirable – associated with increased per capita income within a country: namely, decreasing SWB inequality.

Notes

1. Clark, Flèche, and Senik (2012) was developed simultaneously and independently from this paper, on the same topic.
2. This article was published in a special issue of the Journal of Happiness Studies (volume 6, number 4), which includes four papers that focus on happiness inequality (Veenhoven 2005a; Kalmijn and Veenhoven 2005; Veenhoven and Kalmijn 2005; and Ott 2005). Veenhoven (2005b) introduces the series. The other three papers are more pertinent to methodology, one of which we cite in the data section.
3. Kalmijn and Veenhoven (2005) compare the effectiveness of eight SWB inequality measures, including a Gini coefficient, standard deviation, absolute mean difference, and inter-quartile range. After examining each statistic and empirically testing their sensitivity to various distributions, they determine that four statistics are adequate measures of SWB inequality, one of which is the standard deviation. Since the standard deviation is widely used and understood, we use it to measure SWB inequality.
4. To reduce omitted variable bias, it is standard to include these demographic controls when regressing mean-SWB on income, as they are well-documented correlates of SWB. Their inclusion here is to ensure that they are not driving any observed correlation between SWB-inequality and income. Excepting "percent married" in some specifications, they are not statistically significant determinants of SWB-inequality. The small existing literature on SWB-inequality often includes such demographic controls, but, to the authors' knowledge, nowhere has there been a systematic analysis of the relationship between them and SWB-inequality, and such an analysis is outside of the scope of this paper. Importantly, the paper's main results are robust to the inclusion of these controls.

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Why Focus on Subjective Wellbeing Inequality? Comments on "Inequality of Happiness: Evidence of the Compression of the Subjective Well-being Distribution with Economic Growth"

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Spawned by Easterlin, there is a large literature on the relationship between levels of income and levels of subjective wellbeing (SWB) and between economic growth and changes in SWB. This corpus reveals a positive relationship between levels of income and levels of SWB. But the positive relationship disappears when looking at the changes in income and changes in SWB. This is the Easterlin paradox and it has piqued the interest of the research community. Why? The positive relationship between levels of income and levels of SWB is unsurprising, but if it is very strong, it could be seen as supporting the idea that income and SWB are substitute measures of wellbeing or development. Such an idea would bewilder any microeconomist for whom income represents the budget constraint and SWB represents utility. To give one example of this framework in action: the work on the non-pecuniary costs of unemployment examines the relationship between SWB and unemployed, controlling for income. Such an idea would also bewilder development economists trained in the capabilities approach to development. Income is one enabler in achieving capabilities, albeit an important one in any market economy. Or, to give this statement its dynamic expression, GDP growth is only one component of development.

The fact that the cross-sectional and time series relationships reverse is, by definition, a paradox. But the fact this affirms a complicated relationship, even at the macro-level, between wellbeing and income is unsurprising and even comforting to development economists. Indeed, perhaps the most useful aspect of this corpus has been in pushing on from these empirical findings to uncover the particularly important impactors of mean SWB and changes in SWB, controlling for mean income or for growth.

The paper under discussion seeks to make a particular contribution to this literature. It moves away from an interrogation of the drivers of mean SWB and

its change to a focus on the inequality of SWB and its change and how these relates to GDP or the growth of GDP. In line with the first part of the Easterlin literature, the authors find that a doubling of income is associated with a noticeable (9 percent) reduction from its mean in the standard deviation of SWB. Moreover, the negative relationship between the inequality of SWB and the level of per capita GDP (GDPpc) strengthens for higher-income countries. There might be evidence of non-linearities but, unlike the microeconomics literature on happiness, they are not indicative of diminishing SWB returns to GDPpc. Importantly, when turning to the time series estimates of growth, the Easterlin paradox does not manifest. Consistent with the cross-sectional evidence, positive growth is associated with declines in SWB inequality and greater growth rates are associated with greater annual average declines in SWB inequality.

The authors conclude in the following way:

> Because our results are for the most part consistent across these two analyses, they do not present the challenge that the Easterlin paradox does. Our research also suggests that, despite the controversy the Easterlin paradox presents, there may be an additional benefit from increasing per capita income within a country: namely, decreasing SWB inequality.

This is quite tame. Certainly, the authors cannot be accused of overstating the importance of their research. They are clear that they see their core contribution as an empirical one; namely, a careful, best-practice replication of the Easterlin corpus but examining inequality of SWB rather than mean SWB. They are successful in this endeavour. Is this valuable? The best-case scenario is one in which these stylised facts stimulate debates and a flourishing research agenda as happened with the Easterlin paradox.

But I feel that the authors could be more proactive in motivating the importance of this approach. For my taste, they are too narrow and understated in the way that they frame the paper and discuss the results. In terms of framing, we are missing a discussion right up front as to why we would want to put inequality of SWB on the left-hand side of an Easterlin-type model in either its cross-sectional or time series versions. There are alluring reasons. Surely an index of the diversity of SWB in a country is potentially a more inclusive or encompassing proxy for a society's wellbeing or experience of development than mean SWB? Earlier I referred to the importance of the Easterlin paradox in terms of its affirmation that development is more than growth. Mean SWB is unlikely to be adequate in capturing this texture of growth. The inequality of SWB would seem to be first-order dominant as an indicator capturing the fact that there are winners and losers in every growth process. Here one thinks about the Kuznets curve literature. The reason why development economists

have invested so much time looking at the relationship between income inequality and economic growth is that this provides a canvas on which to document and understand the economic transformations that unfold as part of the process of economic growth. One can argue that the relationship between the inequality of SWB and economic growth is an alluring canvas too.

Perhaps I overstate in order to compensate for the understatement by the authors. Nonetheless I am comfortable using my comments to strengthen the case that there is a point to all of this careful data work and that this is an interesting and potentially important line of inquiry. If one is prepared to dig around a little in the paper, a fair amount of interesting evidence is presented to add to this case.

The authors themselves give a cogent example to back up my comparison with the Kuznets curve debates. They remind us of the contrast between the negative correlation between growth and inequality of SWB and recent evidence from the globalised world of the positive correlation between growth and income inequality. These orthogonal findings make it clear that the inequality of SWB is picking up something substantively different from income inequality. The modelling work in the paper pushes this point further. Income inequality is included as a control variable in nearly all specifications. The most important point for the authors is the fact that this control does not change the sign or the significance of the coefficient on income or growth. For me it is at least as important that the coefficient on income inequality is statistically insignificant in all cases. At one level this seems implausible. One would think that socio-economic polarization would impact the inequality of SWB independently of mean income or of growth. But the data work is careful and the result cannot be set aside. We are prodded to think hard about what might be going on in the relationship between the inequality of SWB and the inequality of income controlling for income.

Aside from inequality, there are other interesting controls that are included in the cross-sectional estimates. These include mean SWB, age and the percentage of respondents who are female, married, childless, unemployed, and not high school graduates. Again, these controls are motivated as a standard set of controls from the SWB literature. However, the shift to a focus on the inequality of SWB is substantive and I would have preferred a stronger motivation in this context. At the technical level, it seems to me that mean SWB is crucial in ensuring that this analysis of the inequality of SWB is not unwittingly picking up level effects. More substantively, there are many interesting controls that resonate loosely with the empirical literature on the microeconomics of happiness and seem to belong in an equation explaining the inequality of SWB. But do they belong and, aside from the fact that they have no impact on the income coefficient, what can we learn from their estimated effects? Perhaps their impact is mopped up already by the inclusion of the level of SWB on the right-hand side?

Right up front the authors review the thin preceding literature on the inequality of SWB. It is clear that this literature goes down this path because it is seen to add an additional dimension to the standard Easterlin framework. Veenhoven (2005) uses the inequality of SWB to argue for the end of the great U-turn and the return of social inequality in modern society. Then, Easterlin (2012) himself compares the inequality of SWB in capitalist societies and socialist societies before and after they transition to capitalism. Pre-transition, the capitalist societies have bigger SWB inequality, post-transition the socialist societies are bigger with a widening of the lower tail. This is taken as evidence of the unhappiness of those who lost out in the transition. He finds the same in China. These authors are explicitly using the inequality of SWB to pick up the broader texture of inclusion at a given levels of mean income and growth.

Indeed, similar support is introduced at the end of the paper. Having affirmed a compression of SWB with income growth that is robust across levels of development, the authors conclude:

> This pattern is contradicted for the two countries in the dataset with the greatest economic growth rates: China and Korea. Perhaps, exceptional economic growth rates do not lead to decreasing SWB inequality over time, as such growth rates might cause large changes that affect citizens' SWB in disparate ways.

This is exasperating but effective as an advertorial for this research program; a scene from a forthcoming attraction. In the main my comments have been directed at supporting the potential of the broader framework and arguing that there is more in the current attraction to make this case.

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