Income and subjective well-being: what can we learn from regional differences?

Abstract

In this paper, we look at the relationship between income and subjective well-being (SWB) at the aggregated level. From country-comparisons it is known that higher average income and higher levels of trust are positively correlated with higher SWB. Because there are many other characteristics that co-vary with average incomes the causality is in question. By using regional variation we can control for any relationship between incomes and social indicators at the country level. Controlling also for regional variation in equality and trust, we find no positive relationship between income and SWB, which we attribute to comparison effects and to the negative effects of greater economic activity, such as noise, pollution and the loss of local social cohesion.

Key-words: Subjective well-being, trust, income, aggregation issues.

1. Introduction

A long-standing controversy in the social sciences is the relationship between income and subjective well-being (SWB). As to the relationship at the individual level, there is little disagreement: higher incomes are definitely positively correlated with SWB, as has been shown in numerous surveys (see Argyle, 1999; Diener and Suh, 1997). From longitudinal studies, it also seems very likely that higher incomes lead to higher levels of satisfaction (e.g. Bradburn, 1969; Inglehart, 1990), though the effect seems small. The possible reasons for such a positive causality are that individuals and their families who are at higher income levels can better satisfy their basic needs, have more personal freedom and enjoy a higher level of social status due to their higher relative income.

At the national level, things are less clear-cut: although there is ample evidence to suggest that incomes and SWB are positively correlated at the national level (e.g. Diener, Diener and Diener, 1995; Veenhoven, 1991), causality is less clear. For one, SWB levels in many countries, including the US, have remained relatively stable over time despite large increases in income. Easterlin (1995) and others, drawing on the idea of the hedonic treadmill by Brickman and Cambell (1971),

argue that this shows that the most likely reason that richer individuals report higher SWB levels is because of their higher relative income. When all incomes rise in a country, there is then no effect on average SWB. If individuals also compare their income with those in other countries, even a positive relationship between the average income of an individual country and the average SWB of a country cannot be taken as evidence of a positive causal relationship at the world level. The positive correlation between income and average SWB is then due to the fact that there are many other social indicators that strongly correlate with income at the national level, such as human rights, equality, schooling, and a whole host of others (see Diener and Diener, 1996; Veenhoven, 1996). Hence it may not be the income level that causes the higher average level of SWB but one or more of the correlated social indicators. Given that the typical samples of 55 countries or less are too small to disentangle the effect from income from other social indicators (cf. Diener and Suh, 1999), other methods than country cross-sections have to be found to resolve this puzzle.

In this paper we attempt to add a piece of the puzzle by looking at the regional variation in SWB, rather than the cross-national or cross-sectional variation.

By de-aggregating the 55 countries in the World Value Survey into 375 regions[1],

[1]For several countries, such as Brazil and Argentina, the regional indicator variables exists but

we increase the sample size significantly. Most importantly, we can allow for country-specific effects which implies we control for all average social and cultural indicators. This probably means we control for the lion share of the importance of these social indicators: democratic decision making usually applies either to all regions in a country or to none at all; free primary education usually applies to all the regions or to none at all. Similarly, personal freedoms, laws, social security provisions, availability of medicines, etc., which are at the national level all highly correlated with average incomes, probably vary a lot more between countries than within countries as their provision is decided upon and maintained by national authorities. The effects of such indicators on individual SWB will be captured by the country-specific effect. Indeed, anything varying only at the national level is implicitly controlled for. Inflation, prices, national culture and what-have-you are in this sense all taken into account. What is left as a source of worry about causation is the effect of regionally varying social indicators that correlate with regional incomes and with SWB. We explicitly take account of two such social indicators that vary between regions, namely trust and equality.

Trust probably increases both income and satisfaction at the regional level:

is undocumented. We've taken each separately recorded region as a separate region. Countries with only one region (such as the Russian 1990 survey, which is a greater-Moscow survey) or with no recorded regions (such as Norway and Hungary) hence do not contribute to regional variation.

individuals who trust each other can more easily work together and share the advantages of the information held by others. Untrustworthy and untrusting individuals have to expend a lot of energy and money in precautionary activities. Inglehart (1997) indeed argues that high levels of trust are related to norms on reciprocity and membership of voluntary organization which are beneficial to average levels of wealth. On the aggregate, this means that high-trust regions should be richer than low-trust regions. At the individual level this means that the income of individuals will increase with regional levels of trust between people. The effect of the individuals's level of trust in others on his own income is not certain though, because it is well possible that at the individual level, someone who is more trusting gets taken advantage off more often. Hence a high individual level of trust may be beneficial to average income, if not to individual incomes.

We use a refinement of the concept of trust by considering both "trust in one's family" and "trust in other people". The first concept, henceforth called family trust, reflects the possibility that individuals can trust their family members and may thus be able to work more profitably together with them, for instance in family businesses. The second concept, henceforth called general trust, denotes the trust in individuals which the respondent doesn't know, and hence the trust we expect to work in the benefit of the aggregate incomes of a society. Now,

family trust will partly be a reaction to a low general trust: when an individual doesn't dare form efficient production relationships with individuals he doesn't known as a result of a lack of general trust, he may react by forming production relationships with individuals he does known, e.g., his family members. We thus expect a high degree of general trust in a region (or country) to increase regional incomes, whereas a high degree of family trust may reduce regional incomes. We expect all forms of trust to enhance group identify and individual's sense of belonging and hence to increase both individual satisfaction and regional averages of satisfaction (cf. Sullivan and Transue, 1999; DeNeve and Cooper, 1998). These interrelationships between trust and income and satisfaction, which are explicitly shown to be relevant, would bias our results on regional income and SWB if we wouldn't take account of them.

The relationship between SWB and equality (of household incomes) is less obvious. Veenhoven (1996) finds strong correlations between equality and SWB at the national level. For the same reasons why the relationship between income and SWB is problematic, this correlation is also hard to interpret: equality in household incomes is very probably related at the national level to an equal provision of education, or even to a democratic system per se (which is likely to depend on a large middle class and hence to low levels of inequality). Perhaps equality

even causes these beneficial circumstances. Yet, at the individual and regional level, inequality need not at all be positively causally related to SWB, given these national circumstances. In a very unequal community for instance, it is always possible to find someone else who is much worse off than oneself. If social comparisons are downward-looking, average social comparisons may hence turn out to be more beneficial in an unequal society. Also, inequality may be the outcome of many opportunities for individual advancement: in a communist community for instance where 'all animals are kept equal', no 'animal' has much incentive or possibility for individual expression. Indeed, average SWB in Japan or the former Eastern European countries (very egalitarian societies) has turned out to be unexpectedly low given its average income level, whereas average SWB has turned out to be unexpectedly high in Chili (very unequal), given average income levels (cf. Diener and Suh, 1999). Hence, insofar as inequality may reflect opportunities for individual expression, regional inequality may be positively related to the SWB of individuals and regions.

The organization of the paper is as follows. In the second section we describe the data set used and present the empirical findings. Section 3 concludes, followed by an appendix in which some measurement issues are discussed.

2. Data

We use the World Values Survey from 1990-1993, which has been extensively discussed in the literature (e.g. Inglehart, 1997), and whose cross-national variation in SWB has been extensively studied (e.g. Diener and Diener, 1995). In short, it is a cross-sectional survey of about 55 countries where individuals have been asked about their SWB, their attitudes to many aspects of their own situation and that of their community, and as to their individual circumstances and evaluations.

One item of special interest is the measurement of household income in this survey: individuals were not queried as to their precise household income but were asked about the range in which their household income fell. For some countries, such as Norway and Argentina, the format of the categories from which individuals could choose are not available but it is known whether the categories are ascending or descending. Furthermore, the question arises what income we should allocate to households for whom we only know that their income is below the minimum category or above the maximum category. The answer is important when we want to calculate regional averages of incomes from these individual measures. Our basic approach to these problems has been to use the fact that most national income distributions are known to be approximately log-normal (see e.g. Jones,

1997 and the references therein). This means that, given an average national income, we can compute the average expected income of someone as soon as we know his position in the income distribution. We can approximate this position by using information on how many individuals have incomes in higher brackets and how many have incomes in lower brackets. This gets us an income measure which will roughly approximate his actual income. At the individual level, there will be a lot of residual measurement error however due to the fact that we only know the bracket in which the income falls. This means that relationships between income and SWB will be biased downwards at the individual level. At the regional level however, such measurement errors will 'dampen out' and there should be no effect of this procedure on the relationship between income and SWB at the regional level. The appendix provides more details on the exact procedures.

2.1. Results

For Table 1 multivariate regression analyses were performed that yield estimates of

1. The determinants of individual satisfaction.
2. The determinants of regional satisfaction.
3. The determinants of individual incomes.

Table 1: Regional SWB and incomes in the World Value Survey

	SWB_i	t-val	SWB_j	t-val	$\ln(y_i)$	t-val
Regional variables						
regional income	-0.05	4.2	-0.06	30.7		
variance of regional income (=inequality)	0.02	0.9	0.07	25.4		
regional general trust	0.01	0.5	0.05	14.7	0.11	4.2
regional family trust	0.11	1.3	0.31	49.6	-0.80	15.8
regional family size			0.13	18.2		
rural	0.04	1.9	-0.001	0.4	-0.17	6.2
Individual variables						
$\ln(y_i)$	0.04	11.9				
trust in general	0.04	10.6			-0.001	0.2
trust in family	0.02	3.6			0.05	8.6
# adults in family	0.02	1.8			0.18	11.6
family size	-0.003	0.4			0.02	2.5
education	-0.008	1.4			0.15	21.0
ln(age)	-0.57	3.8			3.79	20.0
$\ln(\text{age})^2$	0.07	3.5			-0.56	21.5
R^2	0.30		0.84		0.07	
N	44568		53837		56047	

SWB_i denotes individual SWB. SWB_j denotes regional SWB. Education is in years attained. Rural denotes whether the individual lived in a rural community.

Table 2.1: All analyses include separate intercept terms for each country. Control variables not shown for individual satisfaction: religious intensity, satisfaction with home conditions, and 9 education dummies. The reason for the divergence in the number of observations is that there were many individuals with missing SWB who could not be used for the analysis of individual SWB but who could be used for the individual income regression and whose characteristics did contribute to the calculation of the regional averages.

At the individual level, there are no surprises regarding SWB: there are few significant explanatory variables of individual SWB and the overall fit is poor, as is usual when personality factors are not considered (see e.g. Cantril, 1965 or DeNeve and Cooper, 1998). The coefficient of individual income is a little low, but this is to be expected given the measurement error problem of household income. The fact that there is a strong negative effect of regional incomes on individual SWB is a strong indication that individuals evaluate their income relative to others in their region. Hence the validity of comparison theories is replicated here, which means there is good reason to mistrust any translation of the individual positive effect of household income to a positive relationship at the regional or national level. Inequality, proxied by the variance of income within a region, and regional levels of trust don't seem to matter much to individual SWB, though the extent to which an individual can trust his family and others is positively related to individual SWB. Of course, individual SWB has been studied in much greater depth elsewhere (see e.g. the survey of Argyle, 1999). These findings here are therefore only meant as a check on the validity of the data.

The explanation of regional SWB is more promising: the overall fit is exceedingly good, though it must be remembered that this regression includes the effect of country-specific circumstances. Nevertheless, most relationships are highly

significant. Regional levels of trust, both with family members and with other individuals, are strongly related to regional SWB, as expected. Regional levels of income are however significantly negatively related to regional SWB. This points to the possible negative effects of increased economic activity on regional SWB, for instance due to increased levels of noise and pollution. Income inequality, which is proxied by the variance of incomes in a region, is strongly positively related to regional SWB, directly contradicting the evidence of the relationships between SWB and equality at the national level.

The explanation of individual income confirms our hypothesis about the relations between income, SWB and trust: incomes of individuals are indeed positively related to regional levels of trust in others, but not markedly to the degree to which the individual himself trusts others. A high degree of regional trust with family members however indeed reduces individual and average incomes and most likely implies that in regions where individuals have to rely on family members in their economic relations, regional incomes are low. For the individual however, trust in his own family is positively related to his income, showing the discrepancy between what is good for the income of the individual and what is good for the income of the whole region. These strong effects imply that the inclusion of the trust variables in the regional SWB regression controls for an important

co-determinant of SWB that is strongly related to income.

3. Discussion and conclusions

The main purpose of this paper was to introduce regions as a level of analysis for the study of the relationship between satisfaction and incomes. The main advantage of looking at regional variation is that one can control for all the cultural, political, economic and social circumstances that vary at the national level, but do not vary at the regional level. Most notably, this means we can control for purchasing power, inflation, language, democratic institutions, national security, and other aspects that would seem to vary mostly at the national level. This of course does mean that any effect of income on satisfaction that works via nationally varying circumstances is ignored. Hence the positive effect of average incomes on satisfaction via the provision of public goods, the stability of the democratic institutions, etc., is ignored. In short, we obtain a different piece of the puzzle by looking at regional variation.

Using the World Value Survey to investigate the relationship between on the one hand regional SWB and on the other hand regional incomes, the main finding is a *negative* relationship between incomes and SWB at the regional level. We interpret this both as support for the hypothesis that individuals evaluate their

circumstances relative to others in their surroundings (for which we find direct evidence also), and as support for the hypothesis that higher levels of income can only increase SWB at the country level through changes in *other* social indicators: if income has a large positive effect on SWB, it must be through the effect of higher income levels on indicators such as human rights, the provision of public goods, literacy, the rule of law, etc. The negative effect of incomes at the *regional* level given these national circumstances may then be caused by regional circumstances that change adversely with higher levels of economic activity. Possible candidates for variables that mediate the negative effect of regional incomes on regional levels of SWB include "environmental factors" such as noise and pollution, but can also include psychological factors, such as the degree of "exclusivity" of a region: with more economic activity comes more interaction with other regions and more interaction between parts of the same region. This may be to the detriment of local cohesion and group identities. To go beyond such guesswork though, one needs data sets that are explicitly geared towards finding indicators for regionally varying circumstances.

4. Appendix

In this appendix the empirical problems with incomes are expanded upon after we show the wordings of the key variables:

The variable family trust is defined from the answers to the following questions:

"How much do you trust your family:

5=trust them completely

4=trust them a little

3=neither trust nor distrust them

2=do not trust them very much

1=do not trust them at all "

The variable general trust is defined in exactly the same way from the answers to the question "How much do you trust Americans (substitute the nationality of the respondent for 'American')".

The measurement of household income was derived from the following question (again we give as an example the American question):

"Here is a scale of incomes and we would like to know in what group your household is, counting all wages, salaries, pensions and other incomes that come in. Just indicate the group your household falls into, before taxes and other deductions:

1=Under $10,000 per year

2=$10,000-$14,999 per year

3=$15,000-$19,999 per year

4=$20,000-$29,999 per year

5=$30,000-$39,999 per year

6=$40,000- $49,999 per year

7=$50,000 and over per year

8= undocumented code

9= undocumented code

10= undocumented code"

The first problem is obvious: these income categories are rather large which means that the true income of a household may deviate substantially between the boundaries of the scale indicated by the respondent. The second problem is even more serious: the code book of the World Values Study Group (1994) is unclear as

to the categories, and many of the categories are undocumented. In the data, the income in each country is reported in 10 income categories. Therefore we opted for another way of defining household incomes. Our first observation was that we may not know precisely what the boundaries of the income scales are, but the codebook is clear about whether the scale is increasing or decreasing: we know whether a higher reported income number means a higher income category or a lower income category. Also we know that the income distribution in a country is approximately log-normal. We combine this information to give us a measure of the income of a household relative to the income levels in his country. Formally, we first recode all the income categories so that they are increasing. Then we denote j_i as the reported category in which a household i belongs, whereby j runs from 1,..,M-1. We then define x_j as the percentage of respondents who were reported to be in income category j or lower.

Now, if there are infinitely many categories and the income distribution of a country is exactly log-normal, then the household income of an individual (=$\ln(y_i)$) equals:

$$\frac{\ln(y_i)}{\sigma_{\ln(y),c}} + \frac{a_c}{\sigma_{\ln(y),c}} = N^{-1}(x_{j_i})$$

where a_c equals the average household log-income of country c, $\sigma_{\ln(y),c}$ equals the standard deviation of log-incomes in country c, and $N_c(.)$ equals the cumulative normal distribution.

The actual estimate for household income we use, which is based on merely 10 categories, equals

$$\widehat{\ln(y_i)} = N^{-1}(\hat{x}_{j_i} - \frac{\hat{x}_{j_i} - \hat{x}_{j_i-1}}{2})$$

this means we estimate household incomes relative to the standard deviation of incomes in a country. We essentially define the log-income of a respondent as the midpoint log-income of the incomes in his category. The fact that we ignore $\frac{a_c}{\sigma_{\ln(y),c}}$ is not a problem: as we include in all estimations an intercept for each country, this intercept will, inter alia, pick up the effect of the unknown $\frac{a_c}{\sigma_{\ln(y),c}}$. Although our estimate of household log-income may be a reasonable approximation of the true household log-income, we do introduce a lot of measurement error. Even without this procedure, measurement error was unavoidable because incomes were asked in categories in stead of as a continuous variable. Measurement error will bias the OLS-estimate of the effect of individual income on any dependent variable downwards towards zero by a factor $\frac{\sigma^2_{\ln(y)}}{\sigma^2_{\ln(y)}+\sigma^2_{\varepsilon}}$ where $\sigma^2_{\ln(y)}$ equals the true variance of relative log-incomes and σ^2_{ε} equals the variance of the measurement

error. Fortunately, the error of an OLS-estimate of the effect of regional income on regional endogenous variables is a factor $\frac{\sigma^2_{\ln(\bar{y})}}{\sigma^2_{\ln(\bar{y})}+\frac{1}{N}\sigma^2_{\varepsilon}}$, where N is the number of individuals in a region. Hence, the bias tends to zero for regional relationships as N is quite large for most regions (N is about 150 on average).

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