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Are happier people better citizens?

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Abstract

This paper presents evidence on causal influence of happiness on social capital and trust using German Socio-Economic Panel. Exploiting the unexplained cross-sectional variation in individual happiness (residuals) in 1984 to eliminate the endogeneity problem, the paper finds that happier people trust others more, and importantly, help create more social capital. Specifically, they have a higher desire to vote, perform more volunteer work, and more frequently participate in public activities. They also have a higher respect for law and order, hold more association memberships, are more attached to their neighborhood, and extend more help to others. Residual happiness appears to be an indicator of optimism, and has an inverse U-shaped relationship with social capital measures. The findings also suggest that the relationship between happiness and social capital strengthened in the world in the last decade.

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1 Introduction

"The pursuit of happiness" is explicitly called upon in the American Declaration of Independence. The Kingdom of Bhutan also endeavors to maximize "Gross National Happiness" as a macroeconomic aggregate. On the other hand, international organizations such as the OECD and the World Bank have done considerable work on happiness, together with a number of national statistical agencies such as the Statistics of Canada and the Office of National Statistics in the United Kingdom pursuing better measures of well-being. From 2001 to 2005, more than 100 papers were written to analyze the data on self-reported life satisfaction or happiness, according to a tabulation of EconLit, up from just four in 1991-1995 (Kahneman and Krueger 2006). But, does happiness really pay? Is happiness really *that* important?

Frey and Stutzer (2002) argue that happiness plays a key role in economic outcomes. For instance, happiness is found to increase personal income and health (Graham et al. 2004). Studies have also shown that using regional and country-level data, measures of social capital and trust are strongly *correlated* with happiness (Bjrnskov 2006, 2008; Helliwell 2006; Helliwell et al. 2009). Findings from the psychology literature also suggest that happier people smile more often during social interactions; are more prepared to initiate social contacts; are more inclined to respond to requests for help, and are more likely to exhibit morale (Frank 1997). Dunn and Schweitzer (2005) find that emotions, specifically happiness, are significantly and positively correlated with trust in experimental settings.

The potential of social capital to make a positive contribution to outcomes in diverse areas of social concern such as health, community safety and education has

attracted strong attention from policy makers, social analysts, and researchers (see Economic Journal 112 (483) for more information on social capital). OECD (2001) describes social capital as "networks, together with shared norms, values and understandings which facilitate cooperation within or among groups." (See Paldam (2000) for more discussion on the definition and measurement of social capital.) Social capital may improve household welfare by enabling families to smooth consumption (Jacobsen 2006); may cause growth through innovation (Dinda 2008; Akcomak and Weel 2008; Beugelsdijk and van Schaik 2004) and higher levels of investment (Knack and Keefer 1997); and affect stock market participation (Zingales et al. 2005). At the same time, certain aspects of social capital are widely perceived to be beneficial for the economy, particularly in terms of its potential to decrease transaction costs, encourage cooperative behavior and trust (Furst et al. 2001; Zingales et al. 2004).

This paper studies the *causal* relationship between self-reported happiness and measures of social capital such as trust and doing volunteer work, using individual level data from the German Socio-Economic Panel (GSOEP). The GSOEP is a longitudinal survey interviewing around 15000 individuals in Germany every year since 1984.[1] It provides self-reported measures of well-being, i.e., responses to questions about how satisfied individual respondents are with their lives, along with a number of individual characteristics. In addition, unlike most other longitudinal studies, it monitors the indicators of social capital (volunteer work, participation in community events, social gatherings, local politics, religious events, cultural events

[1]Sobel (2002), Durlauf (2002), Glaeser et al. (2002) argue that aggregation is a problem in studies which use regional or national social capital measures because of interpersonal externalities. This paper overcomes this problem by using individual level data.

and attachment to neighborhood) every year. The GSOEP also includes various measures of individual trust, although available only for the year 2003 (See table 9 for the definitions of these variables.)

This study makes several novel contributions to the literature. First, it investigates the causal relationship running from happiness to social capital using an innovative empirical technique that tackles with the endogeneity problem. Specifically, the paper exploits the cross-sectional differences in "unexplained or residual happiness" for the year 1984, obtained through an OLS regression of happiness on individuals' characteristics, providing a measure of happiness which is not correlated with time-invariant individual characteristics. Then, measures of social capital and trust are found to be affected by individual characteristics and the 1984 residual happiness in later periods. Likewise, trust is also estimated to be a function of individual characteristics and the residual happiness from 1984. In order to hedge against spurious conclusions due to persistent unobserved individual characteristics, the paper controls in this analysis for the initial level of social capital.

This investigation finds that, considering various measures of social capital, happiness causes people to exhibit higher morale and help create more social capital. It is also found that happiness induces a higher level of trust to others. Happier people are found to have higher respect for law and order, help others more, have more memberships, and also importantly, have a higher desire to vote. The analysis also finds that happier people perform more volunteer work, are more attached to their neighborhoods, and participate more in community events, social gatherings, cultural events, local politics, and religious events.

As a second contribution, the paper investigates possible underlying factors as to why happiness matters for social capital. Psychology studies argue that this can be due to optimism or self-esteem. Although a comprehensive measure of self-esteem does not exist in the GSOEP, respondents' answers about their general optimism (general view on life and future) are available for 1999 and 2005. It is found that optimism is strongly correlated with happiness, and therefore impacts social capital even after controlling for individual fixed effects. Moreover, the residual happiness in 1984 is highly correlated with the level of optimism in 1999 and 2005. Residual happiness is found to be an indicator of optimism (residual happiness is positive for "optimistic" people and negative for "pessimistic" people as shown in table 6) and has an inverse U-shaped relationship with social capital measures.

Thirdly, the paper presents evidence on the relationship (only correlation not causation) between happiness and social capital using surveys that cover multiple countries.[2] Using the U.S General Social Survey (GSS), World Values Survey (WVS) and the European Social Survey (ESS), it is found that measures of general trust are significantly correlated with happiness. The following is found for happy people using all three surveys: have more association memberships, more likely to vote in the elections, and more frequently perform volunteer work. The results suggest that happier people in the U.S *importantly* donate more blood and more money for charity. By using the 5th wave (2004-2008) in the WVS [3], the paper also shows that happiness is significantly correlated with not only general trust but

[2]The paper uses person level regressions for the analysis of these surveys.

[3]This wave has recently been made available to public, and to the best of our knowledge, it has never been analyzed before.

also with different aspects of trust such as trust in strangers.[4] The results altogether also suggest that the relationship between measures of trust and happiness is significant around the globe and have *strengthened strikingly* during the period 2002-2007.

Lastly, the paper investigates the relationship between trust and happiness controlling for different measures of willingness to take risks. Happiness is significantly correlated with trust even after controlling for risk-taking behavior. The results show that personal trust is highly correlated with willingness to take risk in trusting others and financial matters as well. The lottery question is also significant in explaining trust. The general risk question can not explain personal trust but interestingly, is significant in explaining caution while dealing with strangers. Other aspects of willingness to take risks are also found to be most significant in explaining caution while dealing with strangers (among measures of personal trust) which imply that personal trust might be a risky behavior.[5]

Section 2 provides an overview of the economic literature on well-being and social capital. Section 3 discusses the data and the construction of the variables used in the paper. Section 4 presents the basic framework and estimation strategy while Section 5 presents the empirical findings of the paper. Section 6 concludes.

[4]Dunn and Schweitzer (2005) find that emotions do not influence trust when individuals are aware of the source of their emotions or when individuals are very familiar with the trustee.

[5]Eckel and Wilson (2004) find no statistical relationship between the behavioral risk measures and the decision to trust.

2 Related Literature

2.1 Correlates of happiness

The concept of happiness has been a major research area in psychology for a long time. However, it was not until 1974 that it was noticed by economists (Easterlin, 1974), since when they have been exploring the relationship between *individuals' characteristics* and happiness. Own *income* and relative income have been found to be important for individual happiness (Clark et al. 2008). Specifically, economists have identified a U-shaped relationship between *age* and happiness (Oswald, 1997; Blanchflower and Oswald, 2004). In the studies on *race* in the United States, findings show that blacks are less happy than whites. When people are asked to evaluate the importance of various aspects of their lives, good *health* receives the highest ratings. *Marriage* is correlated with higher levels of happiness, as has been found in a large number of studies covering different countries and periods. The level of *education* bears little relationship with happiness. Education may indirectly contribute to happiness by allowing a better adaptation to changing environments, but it also tends to raise aspiration levels. See the survey by Frey and Stutzer (2002) for more discussion on these issues.

2.2 What is social capital?

Robert Putnam (1995) defines social capital as features of social organization such as norms, networks and trust that facilitate cooperation and coordination for mutual benefits. Social capital is relational rather than a property of any individual, whereas some other forms of capital either belong to or be appropriated by indi-

viduals or businesses. Also, social capital is produced by societal investments of time and effort, but in a less direct fashion than is human or produced economic capital. Rather, social capital is the result of historical, cultural and social factors which give rise to norms, values and social relations that bring people together in networks or associations which result in collective action. Social capital also increases if used, through reinforcing the networks, norms and values, and decreases otherwise. It takes a lot of positive effort to be built up incrementally, but can be quickly reduced. Though there is no universal definition of social capital, there appears to be a general agreement on the importance of networks, trust[6], reciprocity and other social norms to social capital. Much attention has been paid to formal networks in the community and formal forms of social engagement, such as that occurring through civic associations, religious and spiritual groups, political parties, sports clubs, unions and the like. However, the informal social networks that operate in a community are also important components of social capital. Trust has an important role in reducing social and business "transaction" costs (Bowles and Gintis 2002).

3 Data

The *German Socio-Economic Panel Study* (GSOEP) is a wide-ranging representative longitudinal study of private households. The same private households, persons, and families are surveyed annually since 1984. The GSOEP includes information on objective living conditions, place of residence, values, willingness to

[6]The Journal of Economic Behavior and Organization devotes a whole issue (55:4) to trust.

take risks, the changes currently being undergone in various areas of individuals' life, and about the relationships and dependencies among these areas. Happiness is a categorical variable taking values 0-10 (where 0 is totally unhappy and 10 is totally happy) and is available for every year in the survey. There are 15397 people who were interviewed in 1984 in the GSOEP. The data cover the people of West Germany for 1984-1991 and and of united Germany after 1992. Therefore, the paper employs the 1992 panel where 12726 people from West-Germany and 5780 people from East-Germany were surveyed. The income variable is real monthly total household income. Annual number of doctors visits is used as the measure of health which is available for every year. Measures of trust are available in 2003 and **very importantly**, frequency of volunteer work, attendance in cultural events, attendance in social gatherings, involvement in local politics, attendance at religious events, and involvement in community events are monitored every year between 1984 and 2007. Attachment to neighborhood is available every year for 1991-1999. GSOEP also includes information on individual optimism (optimism: what is your attitude towards future (4= totally optimistic, 3=more optimistic than pessimistic, 2=more pessimistic than optimistic, 1=totally pessimistic) for 1999 and 2005. The following lists the measures of social capital used in the paper:

attachment to neighborhood

attendance at community events

attendance at religious events

attendance at cultural events

desire to vote

helping others

membership of organizations

respect for law and order

social participation

trust1: on the whole do you trust people

trust2: nowadays can't trust anyone

trust3: caution when dealing with strangers

trust4: most people are exploitive or fair

trust5: most people are helpful or act in own interest

volunteer work

4 Empirical Framework

First, the paper estimates a panel-data model for happiness, covering the period 1984 and 2007, with the right-hand side variables including gender, age, age-squared, health status, real household income, marital status, work status, years of schooling, household size, and the number of children. Since happiness is a categorical variable of ordered in nature, the usual method to estimate the model is ordered probit. On the other hand, the coefficients and t-statistics from OLS and ordered probit estimations appear to be quite similar as well.

Using OLS to estimate the afore-mentioned panel model, the paper identifies a serial correlation in the idiosyncratic error term.[7] This suggests that residual

[7]While a number of tests for serial correlation in panel-data models have been proposed, a new test discussed by Wooldridge (2002) is very attractive because it requires relatively few assumptions and is easy to implement. Wooldridge shows that under the null of no serial correlation, the coefficient of the lagged residuals in a regression of the current residuals on the lagged residuals

happiness is highly correlated over time, indicating persistence in the happiness behavior. The paper exploits this persistence, an effect which is free of the influence of individual specific factors, to address the reverse causation from social capital to happiness. It must be noted that the residuals would solve the endogeneity problem if they are obtained from a cross-sectional model rather than a panel model. [8] Next, the following cross-sectional model of happiness is estimated using the 1984 data to retrieve the residuals:

$$Happiness^{*}_{i,1984} = \phi X_{i,1984} + \xi_{i,1984} \ ,$$

where the column vector $X_{i,1984}$ includes individual specific variables, ϕ is a row vector of coefficients, and $(\xi_{i,1984})$ are the residuals *unrelated* to the individual characteristics $(X_{i,1984})$.

The paper next examines the impact of residual happiness on social capital outcomes later in life:

$$Socialcapital^{*}_{i,t} = \phi X_{i,t} + \xi_{i,1984} + Socialcapital_{i,1984} + \zeta_{i,t} \ ,$$

where the column vector $X_{i,t}$ includes individual specific variables and ϕ is a row vector of coefficients. $Socialcapital^{*}_{i,t}$ is the level of social capital in year t later in life (for instance, when the dependent variable is the level of trust in 2003, t equals

should be -0.5. One can then perform a Wald type test of this hypothesis. In our case, the F-statistic is found to be (F(1, 29260))=673.262 and the coefficient on lagged residuals is 0.6. See Wooldridge (2002) for more discussion on this test and Drukker (2003) for the implementation of this test in Stata.

[8] The residuals in a panel model are correlated over time and can not be used to solve reverse causation. Thus, the panel model is estimated only to infer a panel serial correlation in the happiness behavior, and hence, the persistence.

2003), $\xi_{i,1984}$ is the residual happiness in 1984 and $Socialcapital_{i,1984}$ is the level of social capital in 1984.

If the measure of social capital is a binary variable, such as whether or not a person has voted in the general elections, then the model is estimated with probit. If the measure is a categorical variable taking more than two values and ordered in nature, such as the frequency of volunteer work (a four category variable—every week, every month, less frequently, never), the model is estimated with ordered probit. Nevertheless, the OLS coefficients are also reported for the reasons specified above. Marginal probabilities are reported after probit and ordered probit estimations. Marginal probabilities after ordered probit are estimated at the second outcome for all regressions.

The paper also reports simple transition probabilities for happiness and optimism. This is, for instance, the probability of having middle level of happiness (optimism) in 2005 conditional on having low level of happiness (optimism) in 1999. Individual optimism and happiness variables are both available in a panel form in 1999 and 2005. The paper studies the relationship between the *change* in optimism, social capital measures, and the *change* in happiness using individual fixed effects. The relationship between residual happiness (as an indicator of optimism) and social capital capital measures is also analyzed using lowess smoothing which enables non-linear relationship between the dependent variable and the explanatory variable of interest.

5 Empirical Results and Robustness

Tables 10 and 11 display summary statistics for the variables used in the paper for the years 1984 and 1992, respectively. Table 9 supplies information on the definition of the variables used in the GSOEP. Table 1 reports the coefficients from an OLS regression of self-reported happiness (0-10) on usual determinants in 1984 and 2005. Happiness decreases with age and increases with age-squared (U-shaped as found in the literature). The relationship is stronger in 2005. Education does not seem to be important for happiness in 1984 but is very significant in 2005. Income is positively correlated with happiness and the relationship is much stronger in 2005. Regarding the number of children in the family, people get happier with more children. Females are on average happier than males. Consider employment status: working full-time is the omitted category. People who work part-time and not working are less happy than people who are working full- time. The role of not working is less in 2005. The happiness difference between part-time and full-time workers disappear in 2005. On the other hand, people who are in vocational training are happier than full-time workers. For marital status, the omitted category is being divorced. Married people are much happier than divorced people and the happiness difference between these categories is smaller in 2005. Health status is a very strong predictor of of happiness. Annual doctor visits is strongly negatively related to happiness. One more doctor visit decreases happiness by 0.02 in both years.

5.1 Distribution of residual happiness in Germany

The paper estimates residual happiness in 1984 after the OLS regression of self-reported happiness on usual individual characteristics. One wonders about the distribution and the time series properties of residual happiness in Germany.[9] Figure 1 presents the distribution of residual happiness in Germany in 1984, 1992, 2000 and 2007. The figure shows the value of residual happiness on the x-axis and the frequency of this value on the y-axis. It is clear that the distribution of residual happiness has become tighter and normal over time, with the extreme values having disappeared. As pointed out below, residual happiness might be an indicator of optimism - this interpretation makes this figure more interesting. It can be said that the number of very pessimistic people in Germany in 1984 was very high, however, over time the number of less optimistic people has declined, so did the over-optimism. That residual happiness becomes normally distributed variable over time might suggest that happiness inequality has declined in Germany. Also, after the unification in 1991, a clear increase in optimism and decrease in pessimism is observed compared to 1984.

5.2 Is happiness correlated with social capital?

GSOEP is unique in the sense that it enables longitudinal study of social capital measures. Table 12 studies the correlation between social capital measures and happiness over the life cycle. First, ordered probit estimates show that, doing volunteer work, social participation and attachment to neighborhood is very highly

[9]This information is very important for the analysis here since cross-sectional variation in residual happiness enables identification in the results.

correlated with the happiness measure (the lowest t-statistic is 26 and the highest is 53) after controlling for year fixed effects and other individual characteristics. Secondly, the correlation between happiness and social capital remains significant even after controlling for individual fixed effects. [10] The results show that at one point in time happiness is positively correlated with social capital and the correlation remains significant over time.

5.3 Causality from happiness to social capital

Tables 2, 3, 4 and 5 focus on the main question; namely, estimating the role of self-reported happiness (residual happiness) in explaining social capital differences across individuals. Table 3 investigates the influence of residual happiness in 1984 on measures of social capital in 1992, 1999, and 2007. It is found that happier people more frequently perform volunteer work, participate more in community events, cultural events, religious events and social gatherings, and are more attached to their neighborhoods. Next, table 4 presents results for the influence of residual happiness in 1992 which is the period just after the unification in Germany. Unlike 1984, the survey in 1992 includes people from East-Germany as well as West-Germany. The results confirm the findings above - happier people are found to help create more social capital. Next, Table 5 examines the importance of happiness for obeying law and order, helping others, and desire to vote, with all results being in the affirmative.

[10] OLS fixed effects is used as the estimation strategy since individual fixed effects model for an ordered dependent variable does not exist.

5.4 Causality from happiness to trust

Table 2 investigates the impact of happiness on different measures of personal trust using the same empirical strategy explained above. However, controlling for initial level of trust is not possible since trust variables are available only in one year in 2003. Residual happiness 1984 and 1992, on the other hand, are the residuals from the individual happiness regressions in Table 1. The dependent variables and all independent variables, except residual happiness, are from 2003. The first three dependent variables are ordered in nature, taking values 1-4 (1=totally disagree, 4=totally agree). Therefore, the coefficients are from an ordered probit estimation. The results show that one percent increase in "1984 residual happiness" (1992) leads to 12 (19) percent increase in the probability of being in the "slightly trusting" category (second choice). These confirm the finding that happiness increases personal trust. Another measure of trust is the answer to the question whether one has caution dealing with strangers. Happier people in 1984 are found to be less cautious dealing with strangers with a t-statistics of 4.1. Residual happiness in 1992 is nearly significant at the 1 percent, with the reinforcing implication that happy people are less cautious in dealing with strangers.

Fourth and fifth dependent variables are binary variables, with the associated marginal probabilities obtained from a probit estimation. It is found that happy people believe that most people are fair (not exploitative) and most people are helpful (do not act in their own interest).

5.5 Optimism and happiness

The evidence suggests that there are persistent happiness differences across individuals in Germany, which lead to differences in social capital. Why does the residual happiness in 1984 affect personal trust in 2003? Psychologists attribute such differences to optimism or self-esteem. However, due to lack of data, this has not been studied extensively in the economics literature. Tables 7, 13, and 19 display the relationships between happiness and optimism (optimism is a 4 category variable, where 4= totally optimistic, 3=more optimistic than pessimistic 2=more pessimistic than optimistic 1=totally pessimistic). In the GSOEP, respondents are asked about their view on life and future in general in 1999 and 2005. First, table 7 studies whether persistent differences in happiness are due to optimism. The estimates show that residual happiness is the strongest predictor of individual optimism in 1999 and 2005. Marginal probabilities, estimated with ordered probit, suggest that one unit increase in residual happiness increases the probability to be "optimistic" by 0.02 in 1999 and 0.09 in 2005. Since the data for optimism are available for 1999 and 2005, table 13 uses the panel nature of the data to study the relationship between the changes in optimism and changes in happiness. The estimates are coefficients from OLS regressions since happiness is a 10 category variable. R-squared in most happiness regressions in the literature are found to be around 0.03 or at most 0.1. However, in the reported regression, optimism increases the R-squared to 0.35.

The results show that optimism and self-reported health are the most significant predictors of happiness and can explain 35 percent of the happiness variation across individuals. The fixed effects regression presents evidence that optimism can also

explain happiness differences for an individual over time. Evidence suggests that happiness and optimism may both have a permanent and a transitory part which are correlated to each other. One unit increase in optimism (out of 4) leads to a 0.69 units increase in happiness (out of 10) across people and 0.39 units increase in happiness within an individual over time. Self-reported health is the strongest predictor for happiness. The results in Table 13 imply that optimism and happiness are highly correlated within and across individuals. Table 7 shows that optimism can explain the differences in happiness across individuals. The table shows simple transition probabilities. Happiness and optimism appear to be quite persistent over time. People are mostly happy and optimistic in 1999 and 2005. Consider the diagonals in the matrices: Average of the diagonals is around 45 in happiness and 46 in optimism. Transition probabilities in the categories of happiness and optimism are very close.

5.6 Residual happiness as an indicator of optimism

Table 6 shows that residual happiness, on average, is positive for optimistic people and becomes more positive as optimism increases. However, residual happiness is negative for pessimistic people and becomes more negative as pessimism increases. Positive and negative residuals can be interpreted as follows: some people are "happier" than expected (where the latter is given by the objective individual-specific determinants used in the happiness regressions), with the indication being these people are "optimistic". However, some people are associated with negative residuals, which implies that they are "less happier" than expected - hence they are "pessimistic". This interpretation of residual happiness is also supported with

the findings in table 7.

5.7 Is there a non-linear relationship between optimism and social capital?

As shown in table 2, the relationship between residual happiness and social capital is not linear (the coefficients on different happiness quantiles are different). Therefore, the paper investigates the non-linear relationship between residual happiness (as an indicator of optimism) and social capital. Firstly, the residuals are recoded as a binary variable taking the value 1 if the respondent is optimistic (residual happiness is positive in 1984), 0 if the respondent is pessimistic (residual happiness is negative in 1984). Then, the paper investigates the impact of residual happiness dummy (being optimistic versus pessimistic in 1984) on social capital measures later in life and finds that it has a significant positive impact as shown in tables 14 and 15. Secondly, the paper examines size of the impact of residual happiness at the extreme levels of pessimism (optimism) and moderate levels of pessimism (optimism). In order to do so, the paper investigates the impact of "absolute" value of residual happiness in 1984 on social capital later in life. *Interestingly*, the absolute value of residual happiness is found to have a negative impact on social capital as shown in tables 16 and 17. The findings suggest that social capital might have an inverse U-shaped relationship with optimism (residual happiness). The lowess smoothing results confirm the findings shown in figures 2 and 3. Figure 2 shows that there is an inverse U-shaped relationship between trust measures in 2003 and residual happiness in 1984. The same relationship is found for the other measures of social capital in figure 3 as well. The inverse U-shaped

relationship between social capital and optimism (residual happiness) might suggest that on average, too much optimism and too much pessimism is costly for the society leading to less social capital.

5.8 Evidence from cross-country surveys

Table 8 presents micro evidence (estimates from individual level regressions) on the relationship (correlation not causation) between individual happiness and measures of social capital around the world. The estimates are from three surveys; the GSS, WVS, and ESS. In all three surveys, happier people are significantly more likely to vote in the general elections. The estimates show that happy people have, on average, more memberships. Happiness is also significantly correlated with higher volunteer work. Consider also the measures of trust: Happiness is positively correlated with higher trust. Happiness is also a strong predictor of general trust measure in all three surveys. Two other measures of trust (people look out themselves, and people take advantage) both confirm the findings, but for the case of Germany. Concerning different aspects of personal trust, the estimates show that happy people trust more to people in their neighborhood and family, the people they know personally, and the people they meet for the first time. Happy people also trust more to people from other religions and nationalities. *Interestingly*, the results suggest that happiness is also positively correlated with blood donation and money donation in the U.S.[11]

[11]Blood donation and voting behavior are used as exogenous instruments for social capital by Zingales et al. (2004).

5.9 Robustness

The paper checks the robustness of the results on a number of grounds.[12] Note that the paper uses the information on respondents who were surveyed uninterruptedly between 1984 and 2007. Given the German unification in 1992, the paper explores evidence for individuals who were surveyed 1992 between 2007 as well. The results are robust to changes in the sample. Also, one may argue that the happiness-social capital relationship may be affected by health conditions of individuals (in addition, happiness may itself be affected by health). Annual number of doctor visits is available for every year in the survey as a health measure. The results are robust to the use of this measure as well as other measures available in different frequencies (i.e., self-reported health, being disabled, hospital stays, hospital visits). The results are also robust to the inclusion of the presence of chronic illnesses of the respondents in 1984 (the respondents were asked whether they have any form of chronic illness in the GSOEP 1984-1991). The correlations among the independent variables are checked for all covariates and no correlations between two variables are found to be higher than 0.3, suggesting absence of multicollinearity. Finally, a random sample of the respondents in 1984 is also used in the analysis in order to check for sample selection and the results are found to be robust to random sampling.

5.9.1 Controlling for risk-taking behavior

Table 18 investigates the relationship between measures of trust and happiness controlling for different behavioral risk measures. In the GSOEP, aspects of will-

[12]These results are not reported to save space but they are available upon request.

ingness to take risks are available for the year in 2004 and personal trust variables are available for the year 2003. The results are from the regression of trust measures in 2003 on the independent variables in 2003 and personal risk measures from the year 2004. Self-reported happiness is least significant in explaining caution while dealing with strangers, but is a very strong predictor of other measures of personal trust. Willingness to take risks in trusting others is a strong predictor of personal trust. Financial risk-taking can also explain personal trust measures. The risk measure after the lottery question is also very strongly related to personal trust measures. As found in Eckel and Wilson (2004), general risk-taking measure is nearly insignificant in explaining general trust. In addition, the paper finds that general risk-taking measure is very significant in explaining trust in strangers. Interestingly, behavioral risk measures are most significant in explaining caution while dealing with strangers as well.

6 Conclusion

The paper presents causal evidence on the impact of happiness on social capital and personal trust using the German Socio-Economic Panel. Exploiting the cross-sectional variation in individual happiness among people who were surveyed in 1984 to tackle the endogeneity problem, the paper finds that people with higher "residual happiness" in 1984 have higher desire to vote, perform more volunteer work, and participate more frequently in community activities, religious events, cultural events and social gatherings. Happier people have also higher respect for law and order and help others more. The paper also shows high levels of

correlations between happiness and trust using a range of variables. The paper also makes use of cross-country surveys of individuals (i.e., the U.S General Social Survey, World Values Survey and the European Social Survey). The following is found for the happier people in all three surveys: they trust others more, have more memberships, are more likely to vote in the elections, and more frequently perform volunteer work. Importantly, the estimates suggest that happier people in the U.S donate more blood and donate more money to charities. Then, the paper investigates possible explanations to understand why unexplained happiness in 1984 matters for social capital. Optimism matters for well-being even after controlling for individual fixed effects. Moreover, residual happiness in 1984 is highly correlated with the level of optimism in 1999 and 2005. Residual happiness appears to be an indicator of optimism and has an inverse U-shaped relationship with social capital measures. Optimism increases the R-squared in happiness regression to 35 percent. The results from the cross-country surveys suggest that the relationship between measures of social capital and happiness is significant around the world and has strengthened in the world in the last decade.

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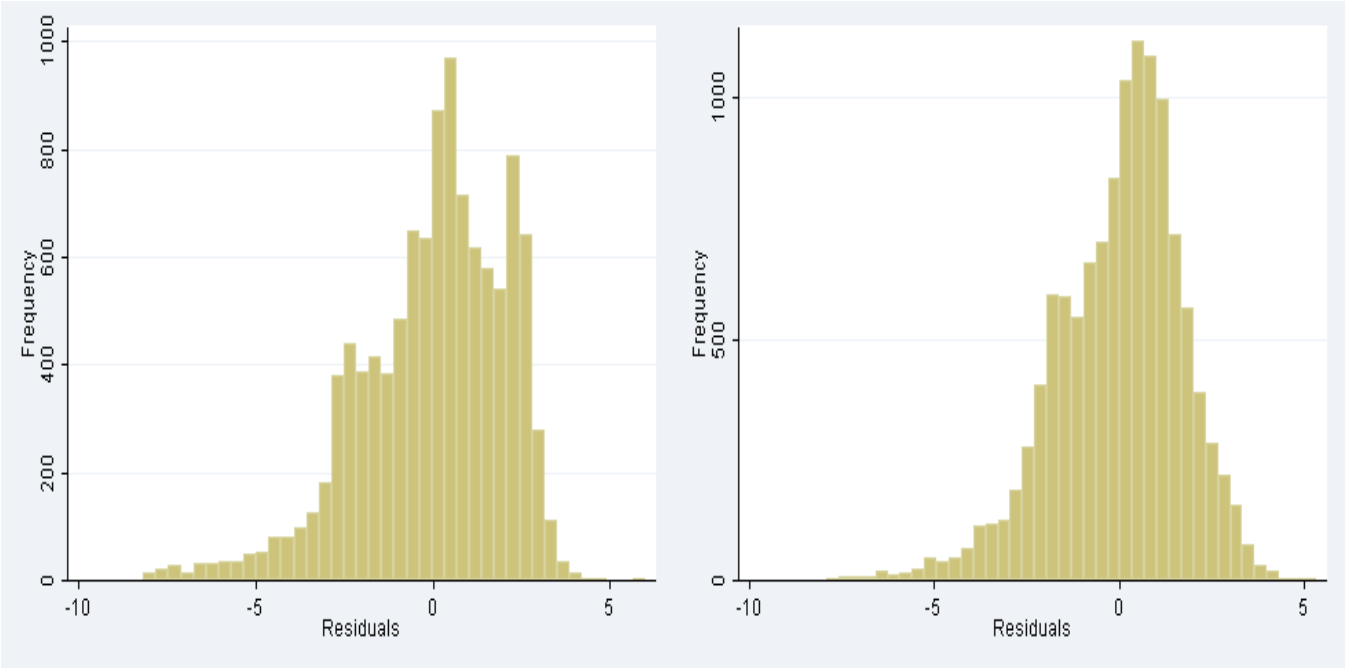
Table 1: **The correlates of happiness in 1984 and 2005**

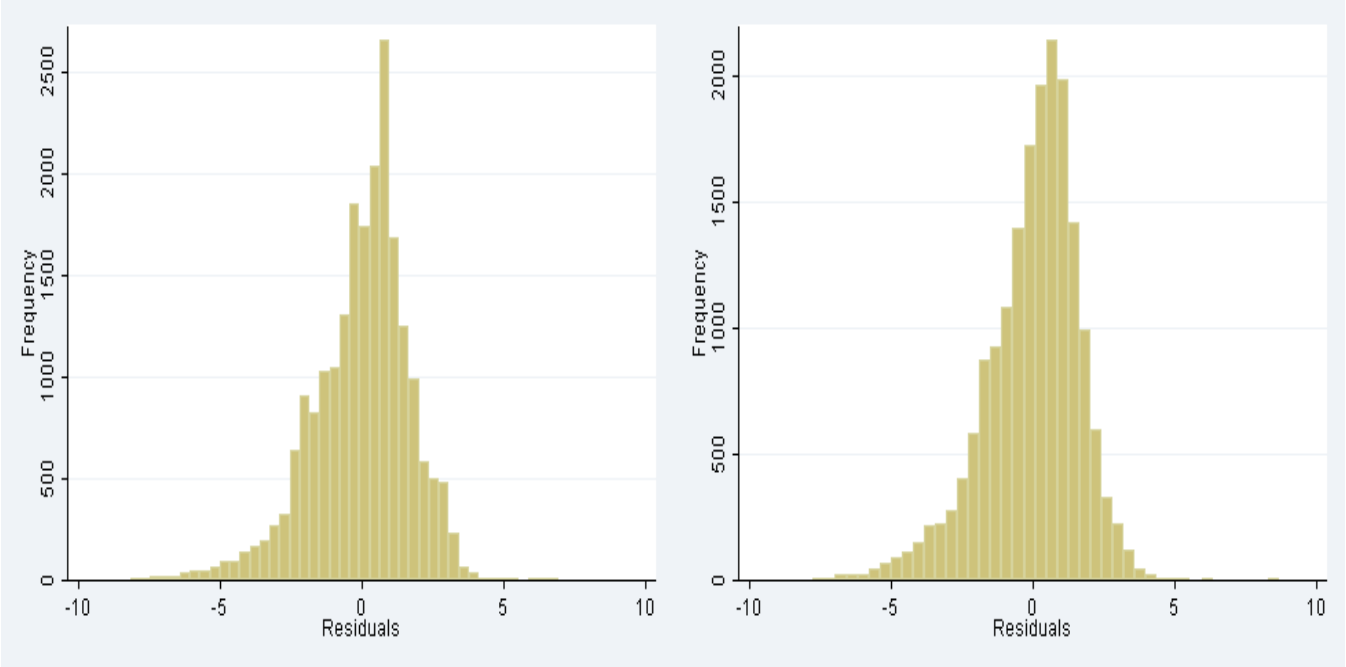
Dependent Variable	Self-reported happiness			
	OLS			
Independent variable	1984		2005	
	Coefficient	t	Coefficient	t
age	−0.03	3.5	−0.07	13.4
age-squared	0.37	4.5	0.75	13.88
education years	0.02	2.3	0.03	5.2
household size	−0.23	9.2	−0.31	16.8
log income	0.65	13.4	0.95	32.0
children	0.19	5.9	0.25	10.7
female	0.23	5.0	0.16	5.7
working part-time	−0.21	2.2	0.01	0.2
vocational training	0.34	2.9	0.25	2.5
irregular part-time	−0.41	3.2	−0.12	1.8
not working	−0.31	5.9	−0.21	5.8
married	0.29	4.2	0.16	3.4
annual doctor visits	−0.02	13.1	−0.02	20.5
R-squared	0.06		0.12	
Observations	10814		18078	

Notes: The regression of happiness on individual characteristics in 1984 and 2005. Happiness takes values 0-10, where 0 is totally unhappy and 10 is totally happy. Log income is the log of real monthly household income. Full-time working, divorced, and male are omitted categories. t denotes t-statistics.



(a) 1984

(b) 1992



(c) 2000

(d) 2007

Figure 1: Distribution of residual happiness in Germany since 1984

Table 2: **The impact of happiness on trust**

Dependent Variable: Measures of trust

Independent Variable:	Residual happiness 1984		Residual happiness 1992	
	Marginal Prob.	t	Marginal Prob.	t
1) On the whole trust people	0.12	4.6	0.19	8.6
second quantile happiness	0.58	3.9	0.41	3.4
third quantile happiness	0.51	3.4	0.71	5.9
fourth quantile happiness	0.52	3.4	0.92	7.6
2) Nowadays can't trust anyone	-0.09	3.9	-0.17	8.5
second quantile happiness	-0.49	3.6	-0.45	4.6
third quantile happiness	-0.45	3.3	-0.67	6.9
fourth quantile happiness	-0.40	2.9	-0.75	7.7
3) Caution when dealing with strangers	-0.09	4.1	-0.04	2.1
second quantile happiness	-0.26	2.1	-0.12	1.4
third quantile happiness	-0.47	3.8	-0.17	1.9
fourth quantile happiness	-0.37	3.0	-0.17	1.9
4) Most people are fair or exploitive	0.25	5.3	0.36	9.2
second quantile happiness	0.59	3.3	1.11	8.7
5) Most people are helpful or act in own interest	0.19	4.2	0.26	7.1
second quantile happiness	0.50	2.9	0.69	5.6
Number of observations	3178		6429	

Notes: Each row reports the estimates for various outcomes. The residual happiness 1984 (1992) is the residuals after basic happiness regression in 1984 (1992) in Table 1. All other independent variables are from 2003. The first rows in the regressions report the estimates when residual happiness is treated as a continuous variable and the next three rows when it is split into four quantiles. The dependent variables are the categorical variables: 1-3) 1=totally disagree, 2=disagree slightly, 3=agree slightly, 4=totally agree. 4) 0 or 1 5) 0 or 1. Marginal Prob. is the effect of a one unit increase in happiness on the predicted probability of the outcome (calculated at the second outcome for the regressions 1-3) and multiplied by 10. Control variables: age, age-square, labor force status, years of schooling, annual doctor visits, number of children, real household income, household size, gender, and marital status. t denotes t-statistics.

Table 3: **The impact of happiness on social capital: 1984 Panel**

Independent Variable:	Residual happiness 1984					
	1992		1999		2007	
	Marginal Prob.	t	Marginal Prob.	t	Marginal Prob.	t
Dependent variable:						
1) volunteer work	0.05	5.8	0.06	6.2	0.05	3.8
control for volunteer work 1984	0.04	4.7	0.05	4.8	0.03	2.4
2) attend community events	0.05	5.6	0.05	4.2	0.05	2.9
control for community events 1984	0.04	4.9	0.05	3.8	0.04	2.4
3) attend cultural events	0.06	3.8	0.05	4.2	0.05	2.8
control for cultural events 1984	0.05	2.9	0.03	3.4	0.04	2.3
4) social involvement	0.05	3.2	0.05	2.2	0.05	2.0
control for social involvement 1984	0.03	1.8	0.04	1.7	0.04	1.7
5) attend religious events	0.03	5.5	0.03	4.9	0.02	2.7
6) neighborhood attachment	0.07	6.6	0.03	5.7		
Number of observations	5859		4073		2401	

Notes: Each row reports the estimates for various outcomes. The residual happiness 1984 is the residuals after basic happiness regression in 1984. The estimates are the marginal probabilities of residual happiness and the second rows show the estimates controlling for the initial values of social capital. The dependent variables are the categorical variables taking values 1-4. Marginal Prob. is the effect of a one unit increase in happiness on the predicted probability of the outcome (calculated at the second outcome) and multiplied by 10. Control variables: age, age-square, labor force status, years of schooling, annual number of doctor visits, number of children, real household income, household size, gender, and marital status. t denotes t-statistics.

Table 4: **The impact of happiness on social capital: 1992 Panel**

Independent Variable:	Residual happiness 1992			
	1999		2007	
	Marginal Prob.	t	Marginal Prob.	t
Dependent variable:				
1) volunteer work	0.05	5.7	0.04	3.8
control for volunteer work 1992	0.03	3.5	0.02	1.9
2) attend community events	0.06	4.5	0.04	2.2
control for community events 1992	0.05	2.6	0.03	1.4
3) attend cultural events	0.09	6.0	0.05	3.2
control for cultural events 1992	0.06	3.7	0.03	1.6
4) social involvement	0.17	8.4	0.16	6.9
control for social involvement 1992	0.10	4.7	0.12	4.7
5) attend religious events	0.10	9.4	0.09	7.2
control for religious events 1992	0.09	5.6	0.08	3.9
6) neighborhood attachment	0.02	5.9		
control for neighborhood attachment 1992	0.02	3.1		
Number of observations	8045		5041	

Notes: Each row reports the estimates for various outcomes. The residual happiness 1992 is the residuals after basic happiness regression in 1992. The estimates are the marginal probabilities of residual happiness and the second rows show the estimates controlling for the initial values of social capital. The dependent variables are the categorical variables taking values 1-4. Marginal Prob. is the effect of a one unit increase in happiness on the predicted probability of the outcome (calculated at the second outcome) and multiplied by 10. Control variables: age, age-square, labor force status, years of schooling, annual number of doctor visits, number of children, real household income, household size, gender, and marital status. t denotes t-statistics.

Table 5: **The impact of happiness on other measures of social capital**

Independent Variable:	Residual happiness 1984		Residual happiness 1992	
	Marginal Prob.	t	Marginal Prob.	t
Dependent variable:				
1) help friends or neighbors	0.06	2.8	0.04	2.3
2) desire to vote	0.08	5.8	0.06	6.5
3) memberships to organizations	0.10	2.3	0.14	3.4
Number of observations		2911		5768
4) respect law and order	0.08	4.9		
5) help others	0.06	3.2		
Number of observations		5792		

Notes: Each row reports the estimates for various outcomes. The residual happiness 1984 (1992) is the residuals after basic happiness regression in 1984 (1992). The estimates are the marginal probabilities of residual happiness. The dependent variables are the categorical variables: 1) 4. every week 3. every month 2. less frequently 1. never 2) 1. in no case 5. in any case 3) Member of an organization (trade union, professional associations, staff council, environmental group, any other organization) or not (0-1). 4) Everyone has certain goals and expectations in life. How important are the following things in your life? (Use a scale of one to seven where one is the least important and seven the most important . Marginal Prob. is the effect of a one unit increase in happiness on the predicted probability of the outcome (calculated at the second outcome) and multiplied by 10. Control variables: age, age-square, labor force status, years of schooling, annual number of doctor visits, number of children, real household income, household size, gender, and marital status. t denotes t-statistics.

Table 6: **What is the relationship between optimism and residual happiness?**

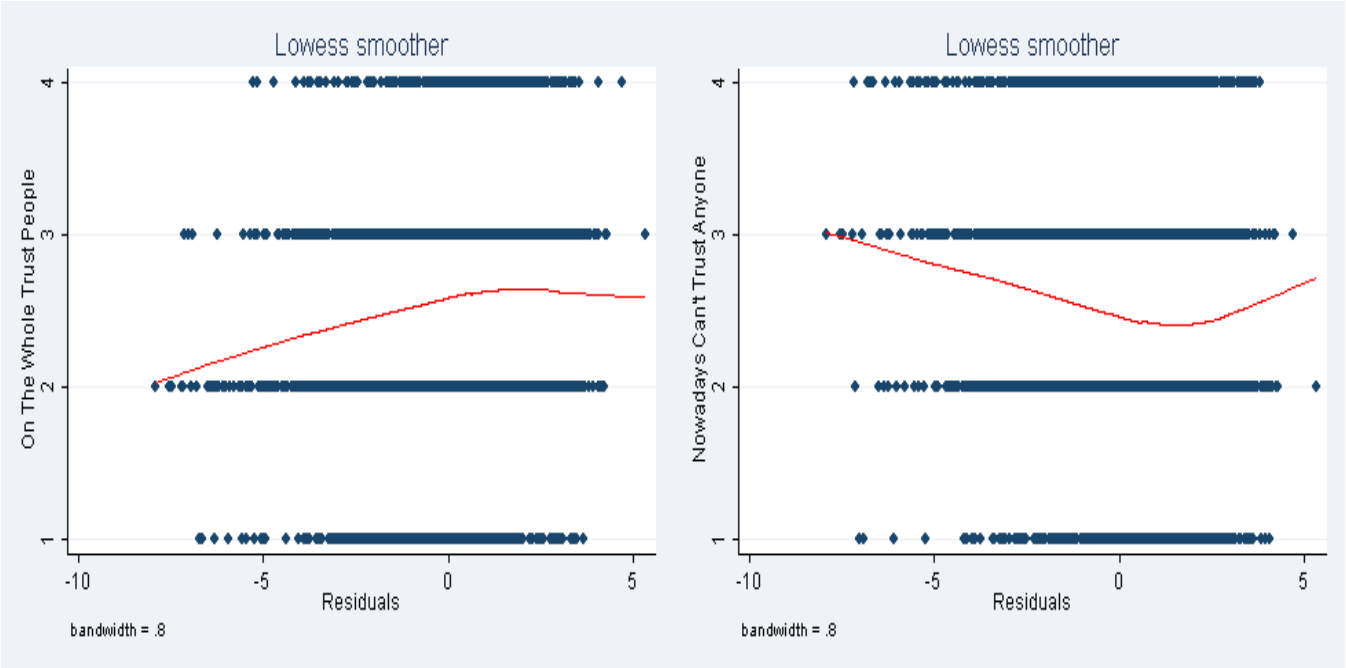
	1999		2005	
	number of observations	mean residuals	number of observations	mean residuals
totally optimistic	3503	0.70	3546	0.80
more optimistic than pessimistic	5911	0.07	8560	0.25
more pessimistic than optimistic	2495	-0.79	4859	-0.66
totally pessimistic	473	-1.91	1035	-1.65

Notes: This table shows averages of residual happiness in 1999 and 2005 for different levels of optimism. Residual happiness is the residual of basic happiness regression in the corresponding year. Optimism takes values 1-4 (4=totally optimistic, 3=more optimistic than pessimistic, 2=more pessimistic than optimistic, 1=totally pessimistic). -1.91 means that the average of residuals from the happiness regression in 1999 is -1.91 for 473 people who are totally pessimistic.

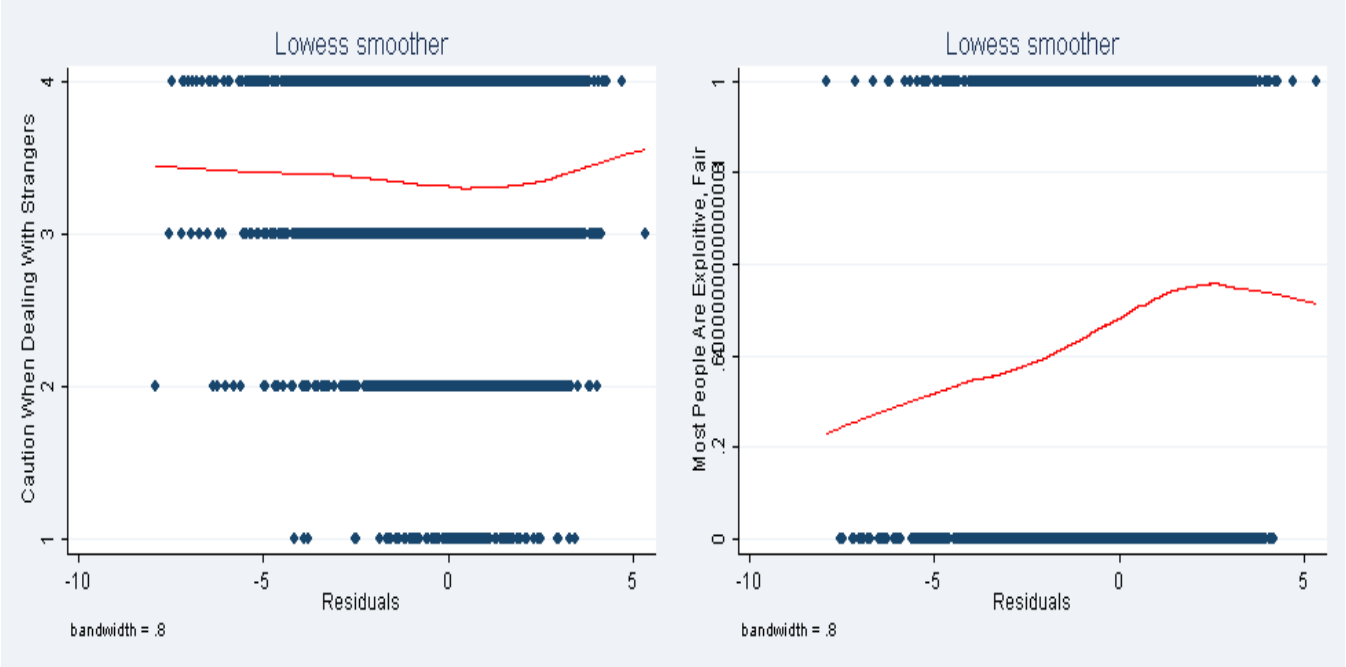
Table 7: **Can optimism explain persistent cross-sectional differences in happiness?**

Dependent Variable	Optimism			
	Ordered Probit			
	Optimism 1999		Optimism 2005	
	Marginal prob.	t	Marginal prob.	t
residual happiness 1984	0.21	8.3	0.97	6.0
age	−0.09	3.0	−0.06	0.2
age-squared	0.01	2.3	0.01	0.5
education years	0.01	0.5	0.23	1.6
household size	−0.27	3.8	−0.31	1.9
log income	0.38	2.8	0.29	3.6
children	0.28	2.8	0.14	2.1
female	0.09	0.7	0.08	1.2
working part-time	−0.25	1.3	0.14	1.1
vocational training	0.25	1.7	0.23	0.1
irregular part-time	−0.27	0.9	−0.05	0.3
not working	−0.32	2.1	−0.33	3.4
married	0.29	1.3	0.16	2.6
annual doctor visits	−0.02	8.2	−0.08	4.9
R-squared	0.03		0.03	
Number of observations	4193		2908	

Notes: The residual happiness 1984 is the residuals from the basic happiness regression in 1984. Other independent variables are from 1999 and 2005, respectively. Optimism takes values 1-4 (4=totally optimistic, 1=totally pessimistic). Log income is the log of real monthly household income. Self- reported health takes values 1-5 and treated as a continuous variable. Full-time working, divorced, and male are omitted categories. Marginal Prob. is the effect of a one unit increase in happiness on the predicted probability of the outcome (calculated at the second outcome) and multiplied by 100. Marginal probabilities of log income, children, and labor force are multiplied by 10. t denotes t-statistics.

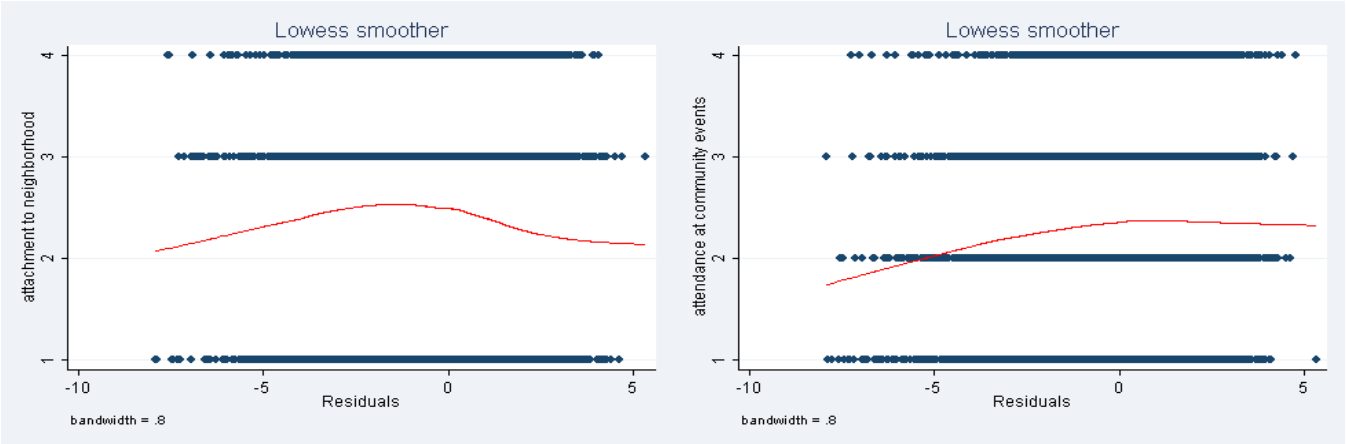


(a) 2003 (b) 2003

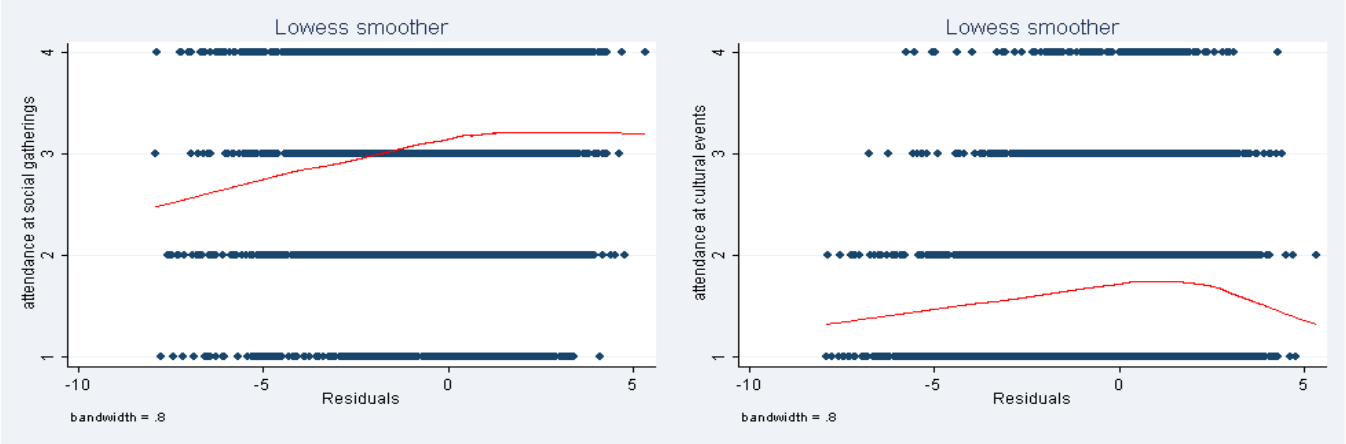


(c) 2003 (d) 2003

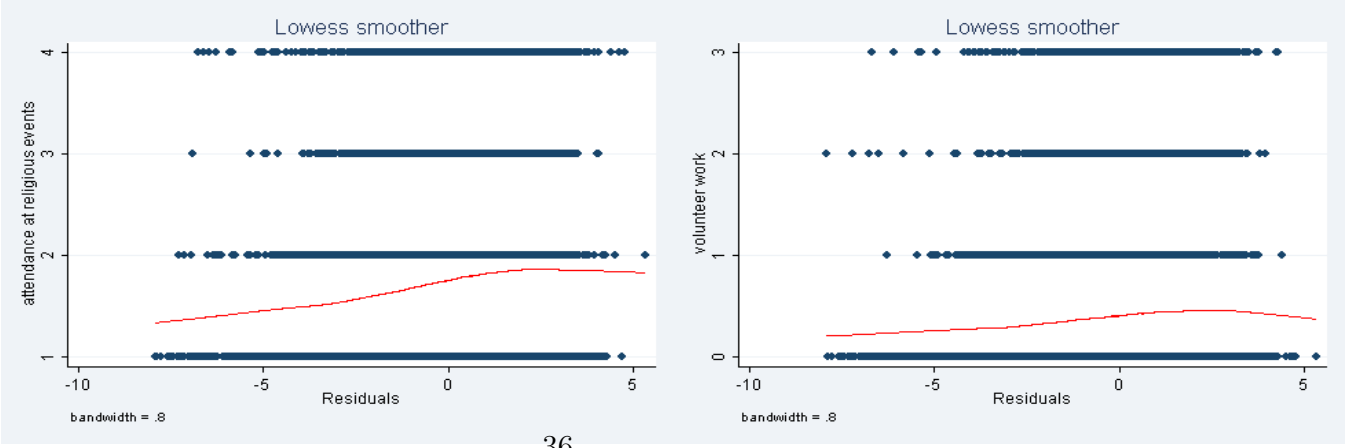
Figure 2: Non-linear relationship between trust and 1984 residual happiness



(a) 1992 (b) 1992



(c) 1992 (d) 1992



(e) 1992 (f) 1992

Figure 3: Non-linear relationship between social capital measures and 1992 residual happiness

Table 8: **Happiness and social capital: Micro evidence from cross-country surveys**

	U.S. General social survey 1972-2004	World values survey 1982-2008		European social survey 2002-2007	
Independent variable	happiness	happiness	life satisfaction	happiness	life satisfaction
Dependent variable					
1) vote	0.02 (2.2)^a	0.01 (4.3)^a	0.005 (5.3)^a	0.01 (10.7)^a	0.01 (11.6)^a
trust people:					
2) in own country			0.003 (4.3)^b		
3) in general	0.04 (8.7)^b	0.02 (7.7)^a	0.008 (16.1)^a	0.18 (30.1)^c	0.19 (35.9)^c
4) in family		0.04 (20.9)^b	0.008 (15.1)^b		
5) in neighborhood		0.004 (12.7)^b	0.001 (12.3)^b		
6) you know personally		0.04 (14.6)^b	0.002 (16.3)^b		
7) you met first time		0.01 (7.3)^b	0.006 (9.4)^b		
8) another religion		0.02 (9.6)^b	0.006 (8.1)^b		
9) another nationality		0.002 (8.0)^b	0.006 (7.2)^b		
10) people take advantage	−0.04 (9.4)^b	−0.04 (11.7)^a	−0.009 (8.2)^a	−0.22(37.5)^c	−0.21 (41.3)^c
11) people look out themselves	−0.05 (11.6)^b			−0.18 (29.7)^c	−0.17 (33.1)^c
12) memberships	0.15 (5.2)^b	0.16 (11.6)^c	0.06 (13.8)^c		
13) volunteer work	0.06 (2.3)^b	0.11 (6.6)^c	0.03 (7.3)^c		
14) donate blood	0.04 (2.2)^b				
15) donate money	0.04 (2.8)^b				

Notes: The individual regressions of social capital measures on happiness (life satisfaction) and other control variables. Happiness takes values 1-3 in the GSS, 1-4 in the WVS, and 0-10 in the ESS. Life satisfaction takes values 0-10 in the WVS and the ESS. a: estimated with probit and marginal probabilities are reported with t-statistics in parentheses. b: estimated with ordered probit and marginal probabilities are reported with t-statistics in parentheses. c: estimated with OLS and coefficients are reported with t-statistics in parentheses. The dependent variables are the answers to the following questions with categories in parentheses: GSS: 1) 5889 observations, voted in the elections (0-1, author's calculation) 2) 18245 observations, people can be trusted or you cannot be too careful (1-3) 10) 17765 observations, people try to take advantage of you, or try to be fair (1-3) 11) 17832 observations, people helpful or mostly looking out for themselves (1-3) 12) 10829 observations, number of memberships to volunteer organizations 13-15) 1598 observations, how frequently: do volunteer work, donate blood, give charity (1-6) WVS: 1) 51728 observations, voted in the general elections (0-1) 2) 4750 observations, trust other people in country (1-5) 3) 173238 observations, most people can be trusted or you can't be too careful (0-1) 4-9) 52684 observations, how much do you trust people: in your family, in your neighborhood, you know personally, you meet for the first time, from another religion, from another nationality (1-5) 10) 40171 observations, most people try to take advantage of you, or try to be fair (0-1) 12) 58504 observations, number of memberships to volunteer groups (author's own calculation) 13) 27379 observations, number of volunteer work done in different volunteer groups (author's own calculation). ESS: 46,246 observations 1) voted in the elections or not (0-1) 3) most people can be trusted or you can't be too careful (0-10) 10) most people try to take advantage of you, or try to be fair (0-10) 11) most of the time people helpful or mostly looking out for themselves (0-10). Control variables: age, age-square, labor force status, years of schooling, self-reported health, number of children, real household income, household size, gender, marital status, country (if applicable) and year fixed effects.

7 SUPPLEMENTARY APPENDIX

The *U.S General Social Survey* (GSS) consists of cross-sectional surveys which have been conducted by the National Opinion Research Center (NORC) in the United States annually during 1972-1994, except for the years 1979, 1981, and 1992 and biennially beginning in 1994. Happiness variable is the response to the question "Taking everything all together, how happy are you with the overall life?" The response is coded as a categorical variable taking the values 1, 2, and 3 which in order refers to the "not too happy," "pretty happy," and "very happy" categories. The data contains information on respondent's trust (3 different questions), voting behavior in the general elections, and number of memberships to voluntary organizations. Unlike other survey data, respondents have been asked how frequently they donate blood, donate money to the charity organizations, and do volunteer work.

The *World Values Survey* (WVS) series was designed to enable a cross-national, cross-cultural comparison of values and norms on a wide variety of topics and to monitor changes in values and attitudes across the globe. The data contain the survey data from the five waves (of the World Values Surveys and European Values Surveys, carried out in 1981-1984, 1990-1993, 1995-1997, and 1999-2004, 2006-2008. The fifth wave is recently made available to the public. The paper uses the last wave in the estimations as well from 2006-2008 which has information on different *aspects of trust*. It includes information on respondents' trust to other people in the family, in the neighborhood, they know personally, they met first time, from another religion, and from another nationality. Happiness (life satisfaction) variable is a categorical variable taking values 1-4 (0-10) in the WVS.

The *European Social Survey* (ESS) is a biennial multi-country survey covering over 30 nations. The first round was fielded in 2002/2003, the second in 2004/2005 and the third in 2006/2007. The ESS aims to monitor change and continuity in a wide range of social variables, including media use, social and public trust; political interest and participation; socio-political orientations, governance and efficacy; moral, political and social values; social exclusion, national, ethnic and religious allegiances; well-being, health and security; demographics and socio-economics. Happiness and life satisfaction variables are both available taking values 0-10. Different measures of personal trust on a scale 0-10 and voting behavior of respondents are also available.

Table 9: Definition of variables in the German Socio-Economic Panel

Variable	Definition
age	age of respondent at time of survey in years
age-squared	age in years squared
attachment to neighborhood	(4. very strong 3. strong 2. not much 1. not at all)
attendance	do you attend community events, religious events, or
cultural events	(4. every week 3. every month 2. less frequently 1. never)
children	number of children
degree	highest degree earned
doctor visits	individual annual number of doctor visits
education years	number of years of education completed
gender	gender dummy (1=male, 2=female)
happiness	how satisfied with your life as whole (0=not at all, 10=fully)
help	how much do you help your relatives, friends or neighbors
	(4. every week 3. every month 2. less frequently 1. never)
high school	education categories with respect to high school
household size	number of people in the household
log income	real household income
marital status	six categories of marital status
membership of organizations	member of any organization or not (0-1)
optimism	what is your attitude towards future (4= totally optimistic,
3=more optimistic than pessimistic,	2=more pessimistic than optimistic, 1=totally pessimistic)
participation	involvement in a citizens' group, political party or
local government	(4=every week, 3=every month, 2=less frequently, 1=never)
respect for law and order	how important is the following in your life? (1.least 7.most)
risk1	willingness to take risks in general (0=not at all, 10=fully)
risk2	willingness to take financial risks (0=not at all, 10=fully)
risk3	willingness to take risks after winning lottery (0-6)
risk4	willingness to take risks in trusting others (0-10)
self-reported health	(5=very good, 1=bad)
trust1	on the whole trust people (4=totally agree, 1=totally disagree
trust2	nowadays can't trust anyone (4-1)
trust3	caution when dealing with strangers (4-1)
trust4	most people are exploitive or fair (0-1)
trust5	most people are helpful or act in own interest
	(1=people are helpful, 0=people act their in own interest)
volunteerism	how often do you perform volunteer work (4-1)
vote	if the next election to the German lower house of parliament
were next Sunday,	would you vote?(5=in any case, 4=probably, 3=possibly,
	2=probably not, 1=in no case)
work status	six categories of work status

Table 10: 1984 Panel: Independent variables' means, proportions, and standard deviations (in parentheses)

Variable	1984	1993	2003	2005
happiness	7.4 (2.1)	7.1 (1.8)	6.7 (1.8)	6.7 (1.9)
age	42.1 (16.9)	49.6 (15.1)	57.3 (13.4)	58.5 (12.9)
age-squared	2054.7 (1589.7)	2683.7 (1602.6)	3467.3 (1603.9)	3583.9 (1569.9)
log income	7.3 (0.5)	7.6 (0.5)	7.8 (0.5)	7.8 (0.6)
household size	3.2 (1.5)	2.9 (1.4)	2.6 (1.2)	2.5 (1.2)
children	0.8 (1.1)	0.6 (1.0)	0.4 (0.8)	0.4 (0.8)
male	49.2 (0.5)	48.8 (0.7)	47.7 (0.9)	47.6 (0.9)
female	50.8 (0.5)	51.2 (0.7)	52.3 (0.9)	52.4 (0.9)
working full-time	46.8 (0.5)	46.8 (0.7)	34.7 (0.8)	33.3 (0.9)
working part-time	5.4 (0.2)	9.3 (0.4)	9.9 (0.5)	9.0 (0.5)
vocational training	3.7 (0.2)	0.2 (0.1)	0.1 (0.1)	0.1 (0.1)
irregular part-time	2.7 (0.2)	2.1 (1.8)	3.6 (0.3)	3.8 (0.4)
not working	41.5 (0.5)	41.5 (0.6)	51.7 (0.9)	53.8 (0.9)
married	65.2 (0.5)	73.3 (0.6)	73.2 (0.8)	71.8 (0.8)
separated	1.1 (0.1)	1.3 (0.2)	1.5 (0.2)	1.7 (0.2)
never married	22.6 (0.4)	10.2 (0.4)	66.0 (0.4)	64.9 (0.5)
divorced	3.5 (0.2)	6.2 (0.3)	8.3 (0.5)	8.8 (0.5)
widowed	6.7 (0.4)	8.5 (0.4)	10.4 (0.5)	11.2 (0.6)
spouse not in Germany	1.0 (0.1)	0.5 (0.1)		
education years	10.5 (2.3)	10.8 (2.4)	11.1 (2.5)	11.2 (2.5)
<high school	43.7 (0.5)	36.6 (0.6)	30.6 (0.8)	29.4 (0.8)
high school	46.2 (0.5)	49.9 (0.7)	52.5 (0.9)	53.5 (0.9)
>high school	10.1 (0.3)	13.5 (0.4)	16.9 (0.7)	17.0 (0.7)
doctor visits	8.8 (16.2)		13.5 (19.8)	13.2 (19.5)
chronically ill	30.8 (0.5)			
not chronically ill	69.2 (0.5)			
disabled	9.2 (0.3)	12.9 (0.4)	19.6 (0.7)	20.6 (0.8)
not disabled	90.8 (0.3)	87.1 (0.4)	80.4 (0.7)	79.4 (0.8)
observations	11061	5817	3273	2911

Notes: This table shows the summary statistics of variables for respondents who were surveyed in the GSOEP in 1984 and were also surveyed later in 1993, 2003, and 2005. Means are reported for the continuous variables and proportions (for instance, 43.7 equals to the number of people with less than high school degree divided by the sum of people with less than high school, high school, and higher than high school degree) are reported for categorical variables.

Table 11: 1992 Panel: Independent variables' means, proportions, and stan- dard deviations (in parentheses)

Variable	1992	2003	2005
happiness	6.9 (1.8)	6.6 (1.8)	6.6 (1.9)
age	43.1 (16.8)	52.6 (14.7)	54.1 (14.3)
age-squared	2137.1 (1607.9)	2982.9 (1636.4)	3125.7 (1619.1)
log income	7.5 (0.5)	7.8 (0.5)	7.8 (0.5)
household size	3.1 (1.4)	2.7 (1.2)	2.6 (1.2)
children	0.7 (1.0)	0.5 (0.9)	0.5 (0.9)
male	48.6 (0.5)	47.5 (0.6)	47.1 (0.7)
female	51.4 (0.5)	52.5 (0.6)	52.9 (0.7)
working full-time	49.1 (0.5)	40.7 (0.6)	38.9 (0.6)
working part-time	7.0 (0.2)	9.9 (0.4)	9.9 (0.4)
vocational training	3.6 (0.2)	0.1 (0.1)	0.1 (0.1)
irregular part-time	1.4 (0.1)	3.1 (1.2)	3.8 (0.3)
not working	38.9 (0.4)	46.1 (0.6)	47.4 (0.7)
married	65.0 (0.4)	71.5 (0.6)	73.2 (0.8)
separated	1.0 (0.1)	1.6 (0.2)	1.8 (0.2)
never married	21.7 (0.4)	10.4 (0.4)	9.4 (0.4)
divorced	5.7 (0.2)	8.2 (0.3)	8.9 (0.4)
widowed	6.3 (0.2)	8.3 (0.3)	8.9 (0.4)
spouse not in Germany	0.3 (0.1)		
education years	11.1 (2.4)	11.6 (2.6)	11.7 (2.6)
<high school	31.5 (0.4)	20.5 (0.5)	19.7 (0.5)
high school	57.4 (0.5)	58.3 (0.6)	58.4 (0.6)
>high school	11.1 (0.3)	21.2 (0.5)	21.9 (0.5)
self-reported health			
doctor visits	11.1 (19.7)	11.9 (17.3)	11.4 (17.0)
disabled	9.1 (0.3)	14.9 (0.4)	15.8 (0.5)
not disabled	90.9 (0.3)	85.1 (0.4)	84.2 (0.5)
observations	12121	6447	5769

Notes: This table show the summary statistics of variables for respondents who were surveyed in the GSOEP in 1992 and also surveyed later in 2003 and 2005. Means are reported for the continuous variables and proportions (for instance, 31.5 equals to the number of people with less than high school degree divided by the sum of people with less than high school, high school and higher than high school degree) are reported for categorical variables.

Table 12: **The correlation between social capital and happiness: Fixed Effects**

Independent variable	Self-reported happiness	
	Ordered Probit	OLS FE
Dependent variable:		
1) volunteer work	0.04 (26.8)	0.03 (2.9)
2) attend community events	0.11 (34.8)	0.25 (16.1)
3) attend cultural events	0.16 (47.2	0.16 (17.4)
4) social involvement	0.21 (53.4)	0.33 (22.9)
5) attend religious events	0.12(49.8)	0.11 (9.4)
6) attachment to neighborhood	0.28 (35.0)	0.32 (16.7)

Notes: The regression of social capital measures on happiness and individual characteristics in 1984-2007. Happiness takes values 0-10, where 0 is totally unhappy and 10 is totally happy. Social capital variables take values 1-4. Marginal probabilities are reported which is the effect of a one unit increase in happiness on the predicted probability of the outcome (calculated at the second outcome) and multiplied by 10. Control variables: age, age-square, labor force status, years of schooling, annual doctor visits, number of children, real household income, household size, gender, marital status, and year fixed effects. t-statistics are in parentheses.

Table 13: **Can optimism explain within differences in happiness?**

Dependent Variable	Self-reported happiness			
	Ordered Probit			
	Between Effects		Fixed Effects	
	Coefficient	t	Coefficient	t
optimism	0.69	51.4	0.39	18.2
age	−0.02	5.9	−0.05	4.4
age-squared	0.04	10.7	0.02	2.2
education years	0.74	1.8	0.11	0.8
household size	−0.21	14.6	−0.12	3.9
log income	0.65	28.2	0.37	6.6
children	0.14	7.9	0.08	2.3
female	0.12	5.8		
working part-time	−0.06	1.6	−0.12	1.8
vocational training	0.18	2.8	0.03	0.2
irregular part-time	−0.09	1.7	−0.29	3.2
not working	−0.10	3.5	−0.22	4.4
married	0.43	10.9	0.02	0.4
self-reported health	0.70	58.3	0.50	23.2
R-squared	0.35		0.15	
Number of observations	30318		30318	

Notes: Happiness takes values 0-10 (0 totally unhappy, 10 totally happy). Optimism takes values 1-4 (4=totally optimistic, 1=totally pessimistic) and is only available in 1999 and 2005. Self-reported health takes values 1-5 (1=bad, 5=very good). Log income is the log of real monthly household income. Full-time working, divorced, and male are omitted categories. Coefficients on age-square and education are multiplied by 100. t denotes t-statistics. Year fixed effects are included in both regressions.

Table 14: **The impact of happiness on trust: Positive and negative residuals**

Dependent Variable: Measures of trust				
Independent Variable:	Residual happiness dummy 1984		Residual happiness dummy 1992	
	Marginal Prob.	t	Marginal Prob.	t
1) On the whole trust people	0.30	2.8	0.61	6.8
2) Nowadays can't trust anyone	-0.31	3.2	-0.51	6.9
3) Caution when dealing with strangers	-0.31	3.6	-0.12	1.9
4) Most people are fair or exploitive	0.70	3.9	1.18	8.7
5) Most people are helpful or act in own interest	0.68	3.8	0.72	5.7
Number of observations	3178		6429	

Notes: Each row reports the estimates for various outcomes. The independent variable is a dummy variable taking the value 1 if residual happiness 1984 (1992) is positive, 0 otherwise. Residual happiness is the residuals after basic happiness regression in 1984 (1992) in Table 1. All other independent variables are from 2003. Negative residual happiness is the omitted category. The dependent variables are the categorical variables: 1-3) 1=totally disagree, 2=disagree slightly, 3=agree slightly, 4=totally agree. 4) 0 or 1 5) 0 or 1. Marginal Prob. is the effect of a one unit increase in happiness on the predicted probability of the outcome (calculated at the second outcome for the regressions 1-3) and multiplied by 10. Control variables: age, age-square, labor force status, years of schooling, annual doctor visits, number of children, real household income, household size, gender, and marital status. t denotes t-statistics.

Table 15: **The impact of happiness on social capital (1992 Panel): Positive and negative residuals**

Independent Variable:	Residual happiness dummy 1992			
	1999		2007	
	Marginal Prob.	t	Marginal Prob.	t
Dependent variable:				
1) volunteer work	0.15	5.3	0.17	4.5
2) attend community events	0.17	3.4	0.13	2.2
3) attend cultural events	0.33	6.4	0.21	3.7
4) social involvement	0.51	7.1	0.45	5.3
5) attend religious events	0.26	6.7	0.21	4.5
6) neighborhood attachment	0.07	5.6		
Number of observations	8045		5041	

Notes: Each row reports the estimates for various outcomes. The independent variable is a dummy variable taking the value 1 if residual happiness in 1992 is positive, 0 otherwise. Negative residual happiness is the omitted category. The residual happiness 1984 is the residuals after basic happiness regression in 1984. The estimates are the marginal probabilities. The dependent variables are the categorical variables taking values 1-4. Marginal Prob. is the effect of a one unit increase in the residual happiness dummy on the predicted probability of the outcome (calculated at the second outcome) and multiplied by 10. Control variables: age, age-square, labor force status, years of schooling, annual number of doctor visits, number of children, real household income, household size, gender, and marital status. t denotes t-statistics.

Table 16: **The impact of happiness on trust: Absolute value of residuals**

Dependent Variable: Measures of trust				
Independent Variable:	Residual happiness absolute value 1984		Residual happiness absolute value 1992	
	Marginal Prob.	t	Marginal Prob.	t
1) On the whole trust people	-0.18	3.9	-0.14	3.6
2) Nowadays can't trust anyone	0.16	4.1	0.15	4.5
3) Caution when dealing with strangers	0.06	2.4	0.04	1.9
4) Most people are fair or exploitive	-0.28	3.6	-0.15	2.5
5) Most people are helpful or act in own interest	-0.19	2.5	-0.14	2.3
Number of observations	3178		6429	

Notes: Each row reports the estimates for various outcomes. The independent variable is the absolute value of the residual happiness. Residual happiness is the residuals after basic happiness regression in 1984 (1992) in Table 1. All other independent variables are from 2003. Negative residual happiness is the omitted category. The dependent variables are the categorical variables: 1-3) 1=totally disagree, 2=disagree slightly, 3=agree slightly, 4=totally agree. 4) 0 or 1 5) 0 or 1. Marginal Prob. is the effect of a one unit increase in happiness on the predicted probability of the outcome (calculated at the second outcome for the regressions 1-3) and multiplied by 10. Control variables: age, age-square, labor force status, years of schooling, annual doctor visits, number of children, real household income, household size, gender, and marital status. t denotes t-statistics.

Table 17: **The impact of happiness on social capital: Absolute value of residuals (1984 Panel)**

Independent Variable:	Residual happiness 1984					
	1992		1999		2007	
	Marginal Prob.	t	Marginal Prob.	t	Marginal Prob.	t
Dependent variable:						
1) volunteer work	-0.05	3.8	-0.05	3.2	-0.07	3.0
2) attend community events	-0.02	1.9	-0.03	1.7	-0.07	2.9
3) attend cultural events	-0.10	4.0	-0.09	2.9	-0.10	3.3
4) social involvement	0.00	0.2	-0.08	2.2	-0.08	1.9
5) attend religious events	-0.03	3.1	-0.03	3.6	-0.04	3.3
6) neighborhood attachment	0.00	0.4	0.00	0.6		
Number of observations	5859		4073		2401	

Notes: Each row reports the estimates for various outcomes. The independent variable is the absolute value of the residual happiness in 1984. The residual happiness 1984 is the residuals after basic happiness regression in 1984. The estimates are the marginal probabilities of residual happiness and the second rows show the estimates controlling for the initial values of social capital. The dependent variables are the categorical variables taking values 1-4. Marginal Prob. is the effect of a one unit increase in happiness on the predicted probability of the outcome (calculated at the second outcome) and multiplied by 10. Control variables: age, age-square, labor force status, years of schooling, annual number of doctor visits, number of children, real household income, household size, gender, and marital status. t denotes t-statistics.

Table 18: **Happiness and trust: Controlling for risk-taking behavior**

Dependent Variable	Measures of trust in 2003			
Independent variable: Personal willingness to take risk 2004	trusting others	financial matters	lottery question	general
1) On the whole trust people				
risk measure	0.23 (22.3)	0.05 (4.4)	0.22 (10.2)	0.02 (2.1)
happiness	0.31 (19.7)	0.31 (20.4)	0.31 (20.7)	0.31 (20.5)
log income	0.12 (2.2)	0.17 (3.0)	0.18 (3.2)	0.20 (3.7)
years of education	0.07 (7.2)	0.09 (9.7)	0.09 (9.4)	0.09 (9.6)
self-reported health	0.35 (11.7)	0.36 (12.1)	0.35 (11.7)	0.36 (12.1)
2) Nowadays can't trust anyone				
risk measure	−0.16 (17.3)	−0.02 (1.8)	−0.09 (4.3)	−0.01 (0.1)
happiness	−0.23 (16.8)	−0.24 (17.4)	−0.24 (17.6)	−0.24 (17.5)
log income	−0.19 (3.8)	−0.23 (4.6)	−0.24 (4.8)	−0.25 (5.0)
years of education	−0.14 (16.1)	−0.16 (18.0)	−0.16 (17.9)	−0.16 (18.0)
self-reported health	−0.23 (8.6)	−0.23 (8.8)	−0.23 (8.6)	−0.23 (8.8)
3) Caution when dealing with strangers				
risk measure	−0.17 (21.9)	−0.09 (10.5)	−0.03 (9.2)	−0.05 (5.7)
happiness	−0.03 (2.9)	−0.04 (3.8)	−0.04 (3.7)	−0.04 (3.8)
log income	−0.16 (3.7)	−0.016 (3.8)	−0.20 (4.8)	−0.20 (4.8)
years of education	−0.10 (12.6)	−0.11 (14.5)	−0.11 (14.9)	−0.11 (14.8)
self-reported health	−0.15 (6.3)	−0.14 (6.4)	−0.14 (6.4)	−0.15 (6.5)
4) Most people are fair				
risk measure	0.29 (17.1)	0.07 (4.0)	0.26 (7.0)	0.01 (0.3)
happiness	0.51 (19.2)	0.51 (19.7)	0.51 (19.9)	0.51 (3.6)
log income	0.13 (1.4)	0.19 (2.1)	0.20 (2.2)	0.25 (3.6)
years of education	0.13 (8.1)	0.16 (9.8)	0.16 (10.0)	0.17 (3.6)
self-reported health	0.42 (8.4)	0.43 (8.7)	0.42 (8.4)	0.43 (3.6)
5) Most people are helpful				
risk measure	0.21 (13.1)	0.04 (2.3)	0.20 (5.9)	0.06 (3.7)
happiness	0.43 (17.2)	0.48 (17.7)	0.45 (17.9)	0.45 (17.8)
log income	0.11 (1.3)	0.01 (0.1)	0.06 (0.7)	0.06 (0.1)
years of education	0.01 (0.6)	0.04 (2.5)	0.03 (2.1)	0.04 (2.6)
self-reported health	0.33 (6.8)	0.35 (7.2)	0.32 (6.7)	0.35 (7.2)
Number of observations	17982	17879	17961	17972

Notes: The individual regressions of trust measures in 2003 on happiness in 2003 and different aspects of willingness to take risks in 2004 and other control variables in 2003. Estimated with ordered probit and marginal probabilities are reported with t-statistics in parentheses. Marginal probability is the effect of a one unit increase in willingness to take risk on the predicted probability of the outcome (calculated at the second outcome) and multiplied by 10. Control variables: age, age-square, labor force status, number of children, household size, gender, and marital status.

Table 19: **Transition matrices of happiness and optimism**

happiness in 2005:		low	middle	high	very high
happiness	low	30	46	20	4
in	middle	12	51	34	3
1999	high	4	24	61	10
	very high	2	13	54	31
	Total	7	30	51	11
optimism in 2005:		low	middle	high	very high
optimism	low	34	42	15	9
in	middle	13	50	31	6
1999	high	4	28	54	13
	very high	4	15	47	34
	Total	7	29	46	18

Notes: This table shows probabilities of happiness and optimism in 2005 conditional on their values in 1999. The original happiness variable is a categorical variable taking values from 0 to 10. Happiness is recoded here as follows: (0-1-2-3) low, (4-5-6) middle, (7-8) high, and (9-10) very high. Optimism takes values 1-4 (4=totally optimistic, 1=totally pessimistic). 46 indicates that the probability of having middle happiness conditional on having low happiness in the previous period is 46 percent or 42 indicates that the probability of having middle optimism conditional on having low optimism in the previous period is 42 percent. All numbers are rounded to nearest integer in percentages.

Table 20: **Transition matrices of happiness and social capital**

current happiness :		low	middle	high	very high	current volunteer : work		low	middle	high	very high
happiness	low	35	45	17	4	volunteer	low	89	7	2	2
previous	middle	8	53	35	4	work	middle	49	36	11	5
year	high	2	20	66	13	previous	high	22	19	41	18
	very high	1	8	43	48	year	very high	16	8	16	60
	Total	5	28	51	16		Total	76	11	6	7
current political : participation		low	middle	high	very high	current social: gatherings		low	middle	high	very high
political	low	95	5	0	0	social	low	30	30	22	20
participation	middle	59	35	5	1	gatherings	middle	6	48	31	15
previous	high	26	26	39	10	previous	high	2	18	53	28
year	very high	16	10	19	56	year	very high	1	7	23	69
	Total	90	7	2	1		Total	3	19	34	44
current community : events		low	middle	high	very high	current religious : events		low	middle	high	very high
community	low	54	32	10	4	religious	low	85	13	2	1
events	middle	12	63	19	5	events	middle	24	65	9	2
previous	high	7	38	44	12	previous	high	9	29	47	15
year	very high	7	24	35	34	year	very high	5	7	15	73
	Total	16	47	27	10		Total	52	28	9	10

Notes: This table shows probabilities of current happiness and measures of social capital conditional on their values in the previous year during the period 1984-2007. The original happiness variable is a categorical variable taking values from 0 to 10. Happiness is recoded here as follows: (0-1-2-3) low, (4-5-6) middle, (7-8) high, and (9-10) very high. Social capital variables take values 1-4 (4=every week, 3=every month, 2=less frequently, 1=never). 45 indicates that the probability of having middle happiness conditional on having low happiness in the previous period is 45 percent. All numbers are rounded to nearest integer in percentages.