The Pattern of Regional Trust

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Abstract: Social trust is increasingly seen as an important determinant of economic growth and social prosperity in regions and nations. Even in a comparatively homogeneous area such as Europe, there are stark sub-national differences in levels of generalized trust. It is thus of crucial importance to identify the driving forces of regional trust and analyze the dynamics of its formation. The present paper considers these issues based on three waves of the European Values Study. Evidence is provided to demonstrate that values of regional trust remain substantially stable over an approx. 20-year period and are modified only through spatially correlated random noise processes. This finding is consistent with additional analyses identifying slow-moving factors that are responsible for the spatial distribution of trust scores and are buried deep in the cultural background of a society. Hence, in spite of its economic significance, social trust does not appear to be amenable to political intervention in the short to medium term.

Keywords: social capital, European regions, spatial econometrics

JEL classification: C21, R10, Z13

1) Introduction

In contemporary research trust has been framed as the "chicken soup of social life" that reputedly brings together many desirable outcomes in social cooperation and well-being (Uslaner 2000). Trust matters because it connects people and turns a group of strangers into a community. Furthermore, its importance is not restricted to the social sphere but stretches deep into the realm of economic activity. A trusting attitude widens the scope for productive exchanges and greases the wheels of value creation. The most succinct explanation of the importance of trust for economic analysis is provided by Kenneth Arrow: "Virtually every commercial transaction has within itself an element of trust, certainly any transaction conducted over a period of time. It can be plausibly argued that much of the economic backwardness in the world can be explained by the lack of mutual confidence" (Arrow 1972, p. 357).

Indeed, there is now a robust body of empirical evidence for the interplay between trust and economic growth (Knack and Keefer 1997, Whiteley 2000, Zak and Knack 2001, Beugelsdijk and Van Schaik 2004, Algan and Cahuc 2010, Dincer and Uslaner 2010, Bjornskov 2012). This evidence is mostly presented in the form of growth regressions of national trust scores and a number of control variables. These trust scores are primarily derived from one or several waves of the World Values Survey and construed as the percentage of respondents that answer yes to the question "Generally speaking, most people can be trusted"[1]. Given that social trust is not restricted to specific persons ("particularistic trust"), but is extended to people in general, it is termed "generalized trust". Even though this measure has been criticized for methodological shortcomings and ambiguous phrasing, its association with several indicators of economic performance and social behavior (such as corruption in La Porta et al. 1997 or returning dropped wallets in Knack and Keefer 1997) is well established[2].

A look at the regions of Europe shows considerable differences in per capita income with an extremely slow or even non-existent rate of convergence (Battisti and Di Vaio 2008, Geppert and Stephan 2008). Naturally, this observation raises questions about possible determinants of persistent regional inequalities in an area with free movement of goods and people. A prime explanation for such a phenomenon is, of course, ingrained cultural attitudes. Putnam (1993) provides conclusive evidence for the sustained effects of cultural differences on local development processes. He documents how discrepancies in civic community lead to stark differences in governmental efficiency and economic performance between regions of the same country (i.e. Northern and Southern Italy). Putnam (1993) suggests that the observed differences in social structure are due to the legacy of historical institutions such as free city states or authoritarian regimes and are thus essentially stable over long periods of time. Such analyses characterize an increasing focus on the importance of social relationships for economic activity (or "relational turn" as proposed by Boggs and Rantisi 2003) where social interaction is of crucial relevance for the diffusion of knowledge (Gertler 2003) and regional innovation (Morgan 2004).

In this context it seems plausible to suggest that generalized trust constitutes a transmission mechanism responsible for transforming cultural differences into economic discrepancies with regard

[1] As opposed to the alternative „you can't be too careful when dealing with people."

[2] For a detailed exposition on the main findings derived from research on social trust in economic analysis one can consult either Nannestad (2008) or Chapter 7 in Beugelsdijk and Maseland (2011).

to incomes and growth rates. If this hypothesis is correct in holding trust responsible for the lacking convergence in European regions, the following two assertions apply:

(1) The differences in endowment with social trust on a regional level change very slowly or are basically stable.

(2) The spatial distribution of social trust is determined by factors that also display a high degree of temporal stability and are strongly linked to cultural norms.

In order to investigate these two propositions we combine information from the three waves of the European Values Study (EVS 1990, 1999, 2008) in order to compile regional indicators. The rest of this paper unfolds as follows: Section 2 provides a literature review of regional trust scores in Europe and theoretical considerations of potential determinants. The third section follows with a description of the data set, an exposition of the selected indicators as potential determinants for social trust and an illustration of the employed methods. Section 4 investigates rates of change of regional trust between the three waves and presents the results of the estimation of driving forces. Section 5 concludes the paper.

2) Literature Review

The first examination of the regional distribution of generalized trust in Europe is provided by Van Schaik (2002). He investigates trust along with complimentary indicators of social capital in a sample of 54 NUTS 1 regions of Western Europe using data from the second wave of the EVS 1990. The results point to stark regional differences that often transcend the national level. Italy, in particular, exhibits a clear north-south profile corresponding to the analyses provided by Putnam (1993). In a follow-up paper Beugelsdijk and Van Schaik (2005) use the regional sample and the indicators of social capital to test their impact on economic growth. Whereas a positive and highly significant impact can be diagnosed for active group involvement, generalized trust does not exhibit a clear effect on growth. The association between regional trust and growth in Europe is reconsidered in Akczomak and ter Weel (2009) with an extended database and a refined model. Using data from the European Social Survey the authors illustrate a robust impact of generalized trust on patent applications, which in turn positively affect economic growth. Hence, social trust appears to play an important role in economic growth and social prosperity in European regions.

Where do the differences in endowment with regional trust come from? The most salient characteristic of the national distribution of social capital in Europe is the concentration of extreme trust scores in the Nordic states as well as the post-communist countries. In particular, the Nordic countries exhibit the highest scores for social trust, not only on a European but also on a global scale (Paldam 2009, Bjornskov 2007). In contrast, countries with a communist legacy tend to exhibit scores for generalized trust that range about 17 - 19 percentage points below the average for other European states (Fidrmuc and Gherxani 2008). This stylized fact evokes two possible explanations: Social trust is either influenced by the institutional framework or formed by the cultural background common to different territories. From a theoretical point of view, both hypotheses seem plausible (and not mutually exclusive). A well functioning institutional environment increases the efficiency of public

services such as law enforcement and thereby decreases the risk associated with trusting other people. Hence, it becomes rational to trust. Scandinavia's large public sector and its universal welfare institutions ensure that people are treated equally, which strengthens overall levels of trust (Rothstein 2001, Rothstein and Stolle 2003). In contrast, countries with a communist legacy were forced to go through a period of institutional restructuring that entailed painful reforms and engendered high levels of corruption following the collapse of communism. Indeed, such countries exhibit uniformly low levels of institutional quality as measured by both Transparency International indicators (Treismann 2003) and World Bank quality of governance indices (Charron et al. 2013).

Rather than being a reaction to external conditions (such as institutions), trust may be induced very early in life through the socialization process. The main proponent of this perspective is Uslaner (2000, 2002), who considers social norms to be the ultimate foundation of trust. These norms relate to a general outlook on life that is deeply entrenched in optimism, egalitarianism and religious values. People acquire these values from their parents at an early age and basically adhere to them for their entire life. Thus, in this perspective a trusting attitude remains a stable characteristic. The relationship between generalized trust and social norms in European regions was further explored by Tabellini (2010). He develops indicators of cultural traits based on selected questions from the World Values Surveys on trust, respect for others and confidence in individual self-determination. All the questions exhibit the theoretically presumed associations on the individual level (such as a positive correlation of generalized trust with the impression that one has control over one's life), which is in line with the moralistic conception of trust proposed by Uslaner. In addition, Tabellini (2010) also provides evidence to show that regional culture is formed by path-dependent processes rooted in different historical institutions and literacy rates.

The concept of trust as part of a wider cultural normative framework used by Tabellini (2010) is similar to the one proposed by Inglehart and Baker (2000). Using nationally aggregated data from the World Values Survey they measure different value systems on a global scale based on a principal component analysis. Inglehart and Baker (2010) distinguish between two types of cultural framework: Traditional vs. secular-rational value orientations and survival vs. self-expression values. In highly traditional societies people emphasize religion as well as parent-child ties and have a high opinion of authority. Secular societies take the opposite stance and exhibit a high tolerance for abortion and divorce. Whereas this value dimension is linked with the transition from an agricultural to an industrialized society, the second value orientation, namely survival vs. self-expression values, characterizes the path towards a post-industrialized knowledge economy. In this type of economy people tend to take their survival for granted and are thus able to focus more on subjective well-being, self-expression and quality of life. Social trust is seen as emanating from the second cultural dimension illustrated by a high loading of the generalized trust questions on this component.

The third major candidate as a determinant of trust is the social structure of a society. In particular, social heterogeneity is assumed to diminish trust, given that it increases the social distance between people. Heterogeneity may come in different shapes and forms, and two individual qualities are seen as especially relevant for producing social frictions: income and ethnicity. Several studies of national cross-section samples of generalized trust provide evidence for the detrimental effects of both types of social division on trust (Knack and Keefer 1997, Zak and Knack 2001, Delhay and Newton 2006, Berggren and Jordahl 2006). Whereas the empirical evidence concerning income inequality is almost unanimous, some studies fail to identify a significant effect of ethnic diversity (such as Bjornskov 2007 or Paxton 2002). The latter finding along with mixed evidence from neighborhood studies (such as

Marschall and Stolle 2004 or Leigh 2006) points to a more complex association between the two dimensions. Additional social characteristics that are potential driving forces of trust are education and age. The level of personal education is often seen as one of the prime determinants of personal attitudes in general and of social capital in particular: "Education is by far the strongest correlate of civic engagement in all its forms that I have ever discovered, including social trust and membership in many different types of groups" (Putnam 1995, p. 667). In addition, the demographic make-up of a society may affect levels of trust if these are subject to life-cycle fluctuations (Glaeser et al 2000, Glaeser et al 2002).

3) Data and Methods

3.a) Data on Regional Trust Scores

Using the regional information provided by the second (1990), third (1999) and fourth (2008) waves of the EVS it is possible to investigate the dynamics of regional trust. The spatial resolution varies across the individual nations, given that sample sizes are primarily designed to provide an accurate reflection of national attitudes. As the most appropriate regional level for comparison of individual territories the NUTS 1 level was chosen[3]. A close inspection of the data with harmonization of the regional codes between the three waves permits construction of a sample comprising 82 NUTS 1 regions from 23 countries with data for all three time points. [4]

For construction of the three data sets we use only those regions that provide comparable data for all three waves. Hence, we have to drop countries because they were not surveyed in wave 2 (1990) of the EVS (Greece, Luxembourg, Cyprus) or do not exhibit regional information for this wave (Hungary). In addition, regions like Hamburg and Bremen were eliminated because their small sample size severely affected data reliability. Of the remaining 82 observations five regions (Rhineland-Palatinate, Schleswig-Holstein, Saarland, Eastern England, Canaries) exhibit sample sizes of less than 50 respondents in one of the waves. These were retained in the sample in order to preserve the spatial structure of the data; their removal would not substantially alter the main results with respect to dynamics[5].

A preliminary analysis of differences in regional rankings for generalized trust (based on the Wilcoxon test) between the three series points to significant modifications during the two ten-year periods (1990-1999 and 1999-2008), but finds no deviations for the approx. twenty-year period (1990-2008). Hence, the movement observed over the ten-year time spans disappears on taking the longer view from 1990 to 2008. Trust scores seem to fluctuate around a stable mean, which suggests the possibility of a reversion to mean phenomenon. This long-run stability observed in regional trust is

[3] The Nuts 1 level is the highest regional level denoting major socio-economic regions with an approximate population of 3 – 7 million. The smaller European countries with population numbers below this threshold such as Luxembourg or the Baltic states form a single Nuts 1 region.

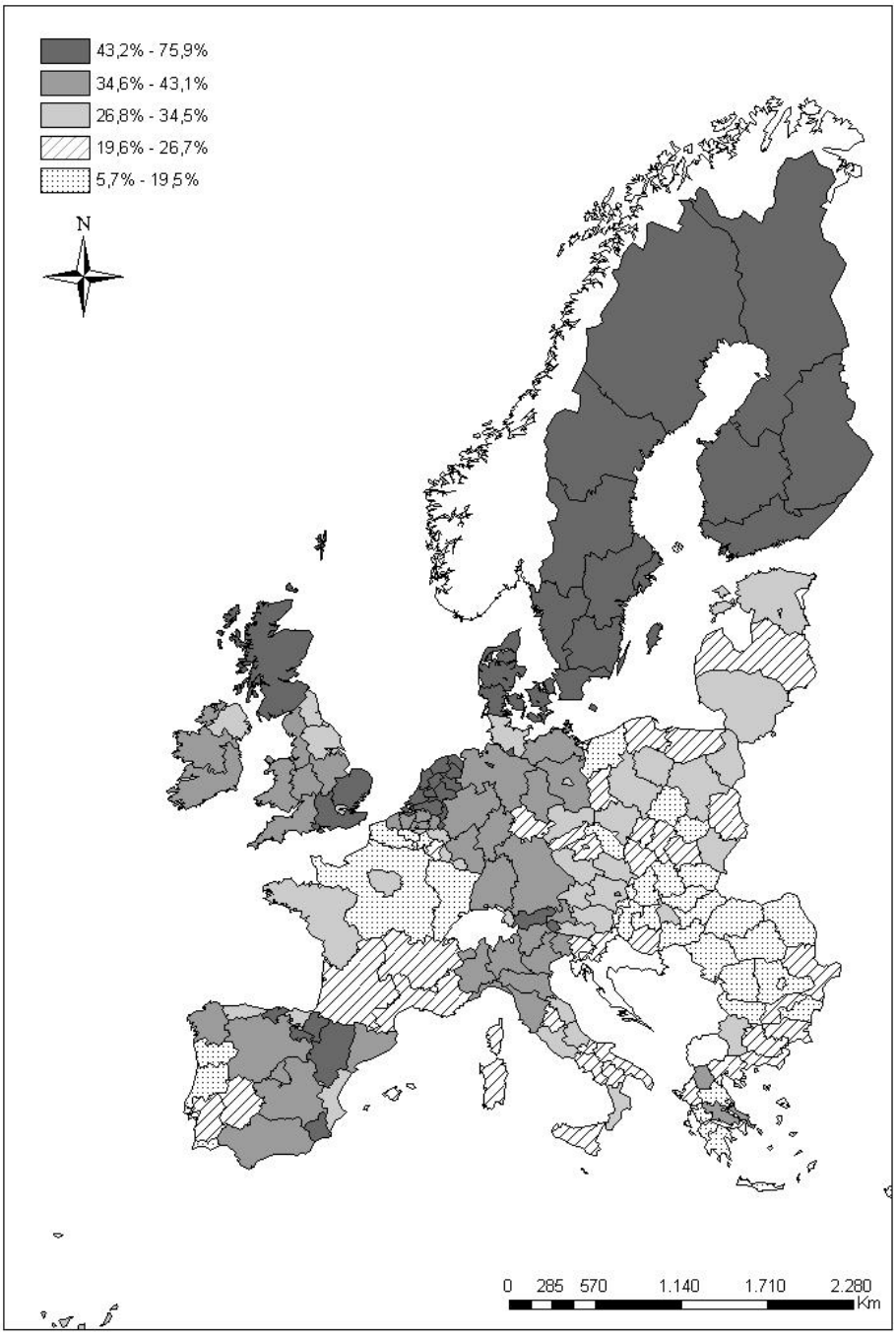
[4] Austria (3), Belgium (3), Bulgaria (2), Czech Republic (1), Germany (14), Denmark (1), Estonia (1), Spain (7), Finland (1), France (8), Ireland (1), Italy (5), Lithuania (1), Latvia (1), Malta (1), Netherlands (4), Poland (6), Portugal (1), Romania (4), Sweden (3), Slovenia (1), Slovakia (1), Great Britain (12).

[5] The results of the 77-region sample are not reported in the paper, but are available on request.

employed for the creation of a fourth dataset. In order to provide a comprehensive overview of regional trust at a fine-grained spatial resolution for the whole EU27 we pool the respondents for each region over all three waves. Thus, we are able to compile a fourth regional dataset that consists of 200 regions[6] (36 NUTS 1 regions, 164 NUTS 2 regions). The latter sample is used to illustrate the distribution of regional trust values at the highest possible spatial resolution in Figure 1.

[6] Austria (9), Belgium (11), Bulgaria (6), Czech Republic (6), Germany (16), Denmark (5), Estonia (1), Spain (17), Finland (4), France (8), Ireland (2), Italy (20), Lithuania (1), Latvia (1), Malta (1), Netherlands (12), Poland (16), Portugal (7), Romania (8), Sweden (8), Slovenia (2), Slovakia (4), Great Britain (12), Greece (13), Hungary (7), Cyprus (1), Luxembourg (1).

Figure 1: Distribution of generalized trust in European regions based on aggregated results from waves 2, 3 and 4 of the European Values Study



3.b) Proxies for Potential Determinants of Generalized Trust

Revisiting the main candidates as determinants for social trust in European regions, three types of factors are seen to be most noteworthy. First, there is the role of cultural norms and values as important mechanisms for shaping social attitudes and interaction. Second, contemporary institutions may provide incentives for cooperation and thereby engender a sense of trust toward fellow human beings. Third, social structure along with other region-specific characteristics may constitute a catalyst for social contact or alternatively obstruct interpersonal exchange. In order to test their impact on generalized trust, we select indicators for each of these three categories that are discussed in the subsequent paragraphs.

Culture: As a proxy for culture we adopt the conceptual framework and indicators elaborated by Inglehart and Baker (2000). They use ten questions from the World Values Survey as proxy measures and develop two indicators to measure various degrees of the traditional-secular and survival-self-expression divide[7]. Given that generalized trust is one of these indicators, we replicate the analysis based on regional aggregates of nine variables. The resulting factor structure is very similar to the one produced with national data by Inglehart and Baker (2000). The only (substantial) difference is that the principal component analysis (PCA) of regional data computes three factors with eigenvalues > 1[8]: Whereas the first factor represents traditional vs. secular value orientations and the second survival vs. self-expression value orientations, the third factor subsumes the influence exerted by one variable (respect for authority). The following analyses integrate all three factors. Further details regarding question phrasing and factor composition are given in the appendix (Tables A1 and A2).

Institutions: In order to measure regional differences in performance of institutions Charron, Dijkstra and Lapuente (2013) develop the European Quality of Governance Index (EQI). They combine data from the World Bank's "World Governance Indicators" (WGI) and data from a specifically designed survey on quality of governance in European regions. In this survey respondents were asked to rate three core public services (education, health care, law enforcement) with regard to quality, impartiality and level of corruption. The final indicator derives from the country averages of the WGI with sub-national variation provided by the regional survey and standardized with a mean of 0 and a standard deviation of 1. The EQI indicator is adopted to test for the impact of institutional performance on social trust[9].

Social structure: A range of variables from the Eurostat Regio Database is selected as indicators of the structural characteristics of a region. Education is proxied based on the share of people with tertiary education; the share of inhabitants aged 65 and older measures the impact of demographic conditions. Social heterogeneity is notoriously difficult to measure on a regional level due to constrained data availability. As proxy measure for ethnic fragmentation we use the share of foreign residents as indicated by census data from 2001. While this is not a concise indicator of fragmentation, a large percentage of foreign residents increases the likelihood of fragmentation and is a potential source of ethnic conflict. Given that the regional measures for income inequality are available only for subsets of European regions and are not yet consolidated for different time periods[10], we employ the averages of the national Gini coefficients as provided by Eurostat. Intra-national income inequality may still be sizable due to agglomeration economies. Therefore, we integrate dummies representing urban and rural regions[11]. Finally, we also test the impact of different income levels based on GDP per capita

[7] Detailed information on selection, aggregation and condensation of the variables by Inglehart and Baker (2000) can be retrieved from the internet appendix of a subsequent publication: http://www.worldvaluessurvey.org/publications/humandevelopment.html

[8] The explained variance of the three components amounts to 78% of the variance of the underlying questions. In addition, the KMO criterion exhibits a value of 0.727, which denotes good suitability of the selected questions for the purposes of a principal component analysis.

[9] For two countries, the regional aggregation of the EQI indicator is not in line with the territorial classification of the pooled trust sample: Sweden exhibits only NUTS 1 data, which were assigned to the corresponding NUTS 2 regions in the trust sample. For France the institutional index is given only at the NUTS 2 level. These were averaged at the Nuts level in order to be compared with regional trust values.

[10] For examples of such data sets, consult either Ezcurra 2007 or Hoffmeister 2009.

[11] The dummies are constructed based on the urban-rural typology indicated in Eurostat (2010). On the basis of several criteria Eurostat classifies a NUTS 3 region as urban, rural or intermediate. We aggregated the classification to a higher regional level by identifying a region as rural (urban) if 70% or more of the inhabitants

data. Due to unclear causality (from trust to GDP or vice versa), the inclusion of the latter variable is intended to investigate the robustness of the results to a different specification rather than to establish the impact of the indicator. All structural variables are computed based on the averages from available data for the period 1990 - 2008 in order to provide the most representative information for this period. Table 1 gives an overview of the indicators adopted in the regression analyses.

live in a rural (urban) type NUTS 3 region. The remaining regions are automatically classified as intermediate. Different thresholds such as 60% and 80% were also computed. Adoption of such a specification does not alter the results of the subsequent analyses in any substantial manner.

Table 1: Description of indicators included in regression analyses

Name	Indicator	Data
GenTrust	Generalized Trust score	Regional percentage of respondents trusting other people in general
EQI	Quality of governance in European regions	Composite index of country averages from the WGI data for four indicators: „control of corruption", „government effectiveness", „rule of law" and „voice and accountability" and modification of regional values based on quality of governance survey (2009)
Traditional	Emphasis on traditional values (as opposed to secular-rational values)	First component of PCA of regional aggregates of nine questions from aggregated three waves of the EVS on individual attitudes and norms based on Inglehart and Baker (2000)
Survival	Emphasis on survival values (as opposed to self-expression values)	Second component of PCA of regional aggregates of nine questions from the aggregated three waves of the EVS on individual attitudes and norms based on Inglehart and Baker (2000)
Authority	Emphasis on respect for authority	Third component of PCA of regional aggregates of nine questions from aggregated three waves of the EVS on individual attitudes and norms based on Inglehart and Baker (2000)
Gini	Inequality of income distribution	National Gini index by Eurostat averaged over 2005 - 2008
ShareFor	Social heterogeneity	Percentage of foreign residents indicated by 2001 census data (Eurostat Regio Database)
Educ	Degree of education	Share of persons with tertiary education averaged over 2000 - 2008 (Eurostat Regio Database)
AgeQuota	Demographical structure	Share of persons aged 65 or older in total population averaged over 1991 - 2008 (Eurostat Regio Database)
Rural	Rural region	More than 70% of inhabitants in territory live in a NUTS 3 region classified by Eurostat as "rural"
Urban	Urban region	More than 70% of inhabitants in territory live in a NUTS 3 region classified by Eurostat as "urban"
Intermed	Intermediate region	The region is classified neither as urban nor as rural based on Eurostat criteria

GDPpc	Gross domestic product per capita	GDP per capita in PPP averaged over 1995 - 2008

3.c) Methods

In order to test our hypothesis we employ the following model:

$$\mathrm{Trust}_{it} = \mu_i + u_{it},$$

$$u_{it} = \lambda \sum_{i \neq j} w_j u_{jt} + \varepsilon_{it},$$

$$\varepsilon_{it} \sim \mathrm{iid}(0, \sigma_\varepsilon^2)$$

where t = 1990, 1999, and 2008, I = 1,..., 82, and w_j is the elements of a spatial weighting matrix. The spatial weighting matrix W is based on a first-order contiguity structure and row-standardized spatial weights (Anselin 1988; Anselin and Bera, 1998).

To analyze the stability of distribution (i.e. μ_i) the regional trust scores are first investigated separately for each year and their dynamics analyzed subsequently. For this purpose the mean of the changes in trust between two consecutive waves (Δ Trust 1990 – 1999 and Δ Trust 1999 – 2008) as well as the overall changes (Δ Trust 1990 – 2008) are computed. In addition, we compute the mean of the absolute values of changes and of the percentage of changes larger than 10% in absolute value in order to determine any clear patterns underlying the movement of the trust values. Large absolute values in the short-run that cancel out in the long term are potentially explained by a regression to mean process. A possible interpretation of this phenomenon posits a component of substance (in our case social trust) inherent in the indicator that changes very slowly (if at all), but can be measured only with imprecision. Hence, the expected value of each measurement corresponds to the true component, but is obfuscated by stochastic movements. When measurements are taken at different points in time, an overshooting of the "true" trust level is normally followed by a decrease in the next measurement (and vice versa). For the present case, this implies that the rates of change between waves 2 and 3 and waves 3 and 4 should be inversely related.

In order to ascertain that the observed is compatible with a regression to mean process we perform a Monte Carlo simulation calibrated with the parameters of the regional dataset. First, we randomly draw 82 observations from the independent random variables simulated from the distributions of our three trust variables: i.e. : $X_1 \sim \mathcal{N}\left(\bar{x}_{\mathrm{Trust\ 1990}}, s^2_{\mathrm{Trust\ 1990}}\right)$, $X_2 \sim \mathcal{N}\left(\bar{x}_{\mathrm{Trust\ 1999}}, s^2_{\mathrm{Trust\ 1999}}\right)$ and $X_3 \sim \mathcal{N}\left(\bar{x}_{\mathrm{Trust\ 2008}}, s^2_{\mathrm{Trust\ 2008}}\right)$. Subsequently, this procedure is repeated 10,000 times. For each of these draws the Pearson correlation of the differences is computed, i.e. $\mathrm{Corr}\left((X_2 - X_1), (X_3 - X_2)\right)$. Using the distribution of the correlations an appropriate confidence interval is calculated. This interval allows the range of correlation coefficients produced by a typical regression to mean process to be evaluated.

The randomness of the distribution is analyzed using Moran's I statistic applied on the Δ Trust scores. Thus, all regions with no neighbors (i.e. islands) are eliminated from the sample so that all regions exhibit at least one neighbor, which is a requirement for unbiased spatial diagnostics.

Finally, we specify μ_i using the data from the pooled sample indicated in Section 3.a with the indicators illustrated in Section 3.b. Again, of the 200 regions 12 observations are dropped on the grounds of their spatial characteristics (i.e. no neighbors). The final sample size amounts to 188 regions constituting the data set for implementation of the spatial analysis that takes the form of a so-called "Spatial Error Model" (SEM):

$$\mathrm{Trust}_i = \kappa + X_i\alpha + y_i\beta + Z_i\gamma + u_i$$

$u_i = \lambda \sum_{i \neq j} w_j u_j + \varepsilon_i,$

X_i = Cultural characteristics of region i

y_i = Institutional proxy of region i

Z_i = Structural variables of region i

$$\varepsilon_i \sim \mathrm{iid}(0, \sigma_\varepsilon^2)$$

where I = 1,..., 188. The parameter vectors *α*, *β* and *γ* as well as the constant *κ* are estimated via maximum likelihood. The (pseudo) R^2 in our application denotes the correlation between Trust and the estimated values of Trust squared.

4) Results

4.a) Stability of Distribution of Regional Trust Scores

The average regional trust levels (i.e. the percentage of respondents trusting other people) in the three individual waves, as indicated in Table 2, are similar: around 35% in the 1990 and the 2008 wave, a little lower in the 1999 wave, namely 32%. The regional variation around these averages is substantial: Whereas the highest trust scores can exceed a share of 70% of high-trust respondents (mainly in Northern Europe), low trust regions are characterized by trust scores around 10% (primarily in the southern and eastern parts of the continent). This spatial pattern exhibits a remarkable degree of stability, as indicated by the highly significant correlations of trust scores between the three waves. These hover between 0.7 and 0.8. Interestingly, the regional trust values with a twenty-year time difference exhibit the highest correlation.

Table 2: Descriptive statistics on distribution and changes in generalized trust values in European regions from three waves of the EVS

Descriptive Statistics[1]	**Trust 1990**	**Trust 1999**	**Trust 2008**
Observations	82	82	82
Minimum	12.59%	7.10%	12.58%
Maximum	70.32%	72.50%	76.04%
Average	34.65%	31.84%	35.14%
Std. Dev.	12.95%	15.22%	14.27%
Correlations[2]			
Trust 1990	1		
Trust 1999	0.709	1	
Trust 2008	0.790	0.738	1
Dynamics	**90-99**	**99-08**	**90-08**
Mean Δ Trust	-2.81%	3.30%	0.49%
Mean |Δ Trust|	8.39%	8.61%	7.10%
Fraction of |Δ Trust| > 10%	30.50%	31.70%	25.60%
Moran's I Δ Trust[3]	0.3763	0.2063	0.1152
p Value Moran's I	0.000	0.013	0.150

[1] Std. Dev. = Standard Deviation, Δ Trust = Change in percentage points in regional trust scores between waves, |Δ Trust| = absolute value of trust change

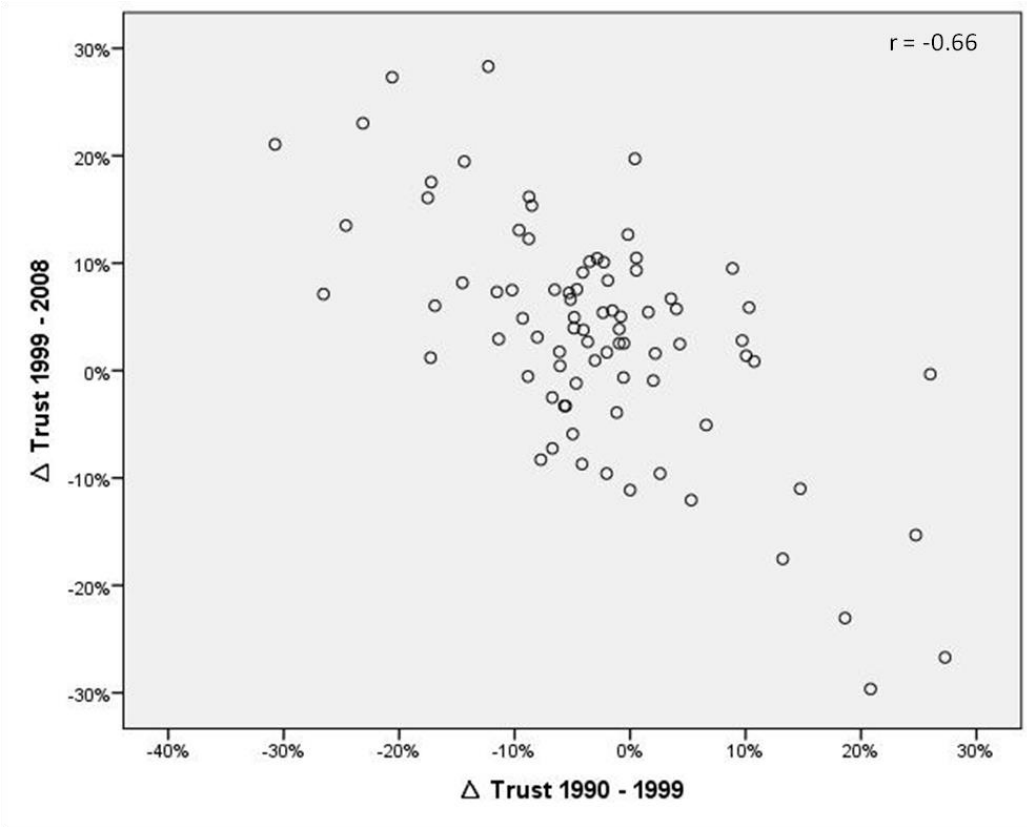
[2] All correlations are highly significant at a 1% confidence level

[3] Moran's I computed based on row-standardized queen matrix and 79 observations that exhibit at least one neighbor

Taking into consideration the absolute levels of change between the three waves, a somewhat different picture is sent to emerge. The average absolute change in trust scores amounts to around 8 percent, with a sizable fraction of regions registering absolute changes of more than 10%. However, the absolute changes tend to be larger in the short term than in the long term. The Wilcoxon rank sign test confirms this hypothesis, given that there are significant changes in the regional trust rankings on a ten-year base but not on a twenty-year base.

Hence, the distributions over the longer time frame seem to be more similar than are the samples from subsequent waves. This finding suggests that the changes registered between the waves are stochastic in nature and tend to cancel out in the long run. This relationship is graphically illustrated in Figure 2 with a scatter plot of the numerical changes (in terms of percentage points) observed for 1990-99 and 1999-08. A clear negative and linear association is seen between the changes in the two periods that can be interpreted as wide fluctuations around a stable mean in the individual regions. And yet, even though these fluctuations eventually cancel out, they show a peculiar feature: When tested for spatial correlation using the Moran's I test statistic (with a queen-type contiguity matrix that indicates neighboring regions in a binary 1–0 fashion) a significant spatial dependence can be detected for the two ten-year periods. The spatial autocorrelation ultimately disappears over the twenty-year period (see the last two rows in Table 3). The changes seem to be driven by certain factors common to neighboring areas.

Figure 2: Scatter plot of changes in generalized trust in percentage points between waves 2 and 3 (1990 – 1999) and waves 3 and 4 (1999 – 2008)



From the Monte Carlo simulations we obtain an average correlation of -0.55 with a 95% confidence interval (-0.69, -0.39). The empirical correlation between the two ten-year change series in

regional trust scores, namely -0.66, is inside this interval. Consequently, the observed correlation value does not significantly differ from a regression to mean process. However, the stochastic fluctuations in trust scores do not seem to be completely random, given that they exhibit a significant degree of spatial autocorrelation. The spatial properties of the changes can be interpreted as stochastic shocks with a range over several regions. Overall, we are not able to identify systematic changes in regional endowment with social trust. Hence, we limit the analyses of determinants to the pooled sample, given that it offers the most condensed information and provides a greater degree of spatial resolution.

4.b) Determinants of the Distribution of Regional Trust Scores

The baseline model to be estimated starts from the central characteristic of the spatial distribution of generalized trust in Europe: high levels in the Northern states, low levels in the post-communist countries. We subsequently add the indicators for cultural, institutional and structural characteristics in order to test their impact on social trust. In the final step we also add the data on GDP per capita in order to control for the beneficial effect exerted by higher income levels on social interaction and attitudes. This model is estimated separately to investigate the robustness of the estimation results and analyze potential interaction effects with other independent variables in the model.

Table 3: Estimation results from SEM implementation of Models 1 - 3

	Model 1			Model 2			Model 3		
	Coeff	**p Val**	**Sig**	**Coeff**	**p Val**	**Sig**	**Coeff**	**p Val**	**Sig**
(Intercept)	0.336	0.000	***	0.145	0.213		0.108	0.350	
Nordic	0.329	0.000	***	0.252	0.000	***	0.254	0.000	***
Postcom	-0.059	0.029	*	0.026	0.387		0.041	0.171	
EQI				0.018	0.117		0.020	0.079	.
Traditional				-0.009	0.449		-0.002	0.880	
Survival				-0.072	0.000	***	-0.058	0.000	***
Authority				-0.006	0.498		-0.003	0.723	
TerEdu				0.003	0.022	*	0.002	0.077	.
ForTot				-0.170	0.169		-0.358	0.008	**
OldAge				0.284	0.359		0.213	0.481	
Gini				0.002	0.527		0.002	0.582	
Intermed				0.009	0.602		0.001	0.940	
Urban				0.008	0.717		-0.012	0.616	
GDPpc							0.000	0.002	**
λ	0.69	0.000	***	0.46	0.000	***	0.47	0.000	***
Log Likelihood	195.1			220.5			225		
(Pseudo) R^2	0.757			0.792			0.802		

. p.val. < 0.1; * p.val. < 0.05; ** p.val. < 0.01; *** p.val. < 0.001

The results of the estimations are provided in Table 3. All estimated models exhibit highly significant degrees of spatial autocorrelation, as can be gleaned from the p values of the lambda coefficients. For

Model 1 the special Nordic / post-communist characteristics of social trust are clearly visible with a highly significant positive coefficient for the Nordic states; the post-communist regions, on the other hand, exhibit significantly lower scores for generalized trust than does the average European region. The Pseudo R^2 from Model 1 corresponds to 75.7%, which points to the importance of the stark differences in social trust in both areas.

More light is shed on those differences when the institutional, cultural and structural variables are integrated in Model 2. Once these variables are controlled for, the dummy for post-communist regions becomes insignificant, whereas the dummy for Nordic regions is still highly significant with only a slightly smaller coefficient. Accordingly, the low level of social trust observed in post-communist areas is adequately explained by the control variables in the model. The extremely strong inclination to trust other people in the Nordic states, on the other hand, goes far beyond any institutional, cultural or structural characteristics considered in the analyses. Institutional quality (even though strongly correlated with generalized trust) does not exhibit a significant influence in the model, as is the case for two of the three cultural proxies (Traditional vs. Secular Value Orientations and Respect for Authority). A highly significant coefficient is obtained for Survival Values: its negative sign indicates the detrimental influence on social trust exerted by a strong emphasis on survival values instead of self-expression values. The further inclusion of the structural variables suggests a beneficial effect of tertiary education (significant at the 5% level), whereas the coefficient for share of foreign residents is not significantly different from 0. In addition, neither the Gini coefficient nor the dummies for urban and intermediate regions display any significant coefficients.

The latter observation also applies to the type of region dummies and income inequality when GDP per capita is integrated in Model 3. Not unexpectedly, the coefficient for this variable is positive and highly significant (which underscores the association between GDP and trust). In the context of the estimated model, this finding may be interpreted as the requirement of a material basis for social trust (i.e. trust has to be earned in a literal fashion). The sign and significance of institutional and cultural characteristics remain basically unchanged by the inclusion of GDP per capita. The strongest interaction effect in Model 3 can be observed for share of foreigners: In comparison with Model 2, the coefficient of this variable almost doubles and is now highly significant at a 1% level. Even though the variables generalized trust and share of foreign residents are uncorrelated, the latter exerts a highly significant negative impact on the former once GDP per capita is controlled for. Given that immigrants are primarily attracted to economically high-performing regions, a simple correlation analysis of share of foreign residents and generalized trust may fall prey to the ecological fallacy phenomenon[12]. A somewhat more muted interaction effect can be diagnosed for tertiary education that exhibits a reduced coefficient significant only at the 10% level after controlling for GDP per capita.

Given that regional development is a syndrome affecting the social, institutional and structural facets of a society, there is a fair amount of co-variation in the data. Consequently, when estimating models of types 2 and 3, multicollinearity represents a potential problem for interpretation of the regression results. Computation of the Variance Inflation Factors indicates a maximum value of 5.8 for

[12] The ecological fallacy phenomenon is defined as erroneously inferring an individual-level behavioral relationship from an investigation of aggregate-level data. The concept was introduced by Robinson (1950), who found a positive correlation between rates of foreign born residents and literacy levels in US states, even though on an individual level this correlation was negative. He explained this observation by noting that immigrants are primarily attracted to places with high literacy.

Survival Values (all other variables display VIFs below 5), which is well below the critical threshold of 10 normally indicated in the literature (O'Brian 2007).

Conclusion

The roots of social trust are buried deep in regional culture. This conclusion is suggested by both analyses of the dynamics and determinants of generalized trust. The trust scores exhibit a high regional variation and are essentially stable between 1990 and 2008. Given that this period was characterized by both institutional change (collapse of communism and European unification) and modifications in social structure (an ageing population and increases in economic inequality), the stability in regional trust suggests a deeper grounding in social norms and values. The changes observed between the three waves appear to be stochastic and exhibit clear properties of a mean reversion process. Nonetheless, the ten-year changes (between waves 2 and 3 and waves 3 and 4) display spatial interdependence. Regional trust thus appears to be an essentially slow-moving phenomenon that remains stable over two decades.

The most incisive driving force behind regional trust is cultural norms in the form of an emphasis on self-expression values (as opposed to survival values). This type of value orientation shapes an open society with tolerant and respectful members that ultimately constitute the foundation for trustful interaction. Once the cultural proxies are controlled for in the model, institutional quality does not appear to be a primary determinant of social trust. The same conclusion also applies to the coefficient for post-communist regions: Once institutional, cultural and structural variables are integrated, levels of generalized trust in this area are similar to the European average. The Nordic regions, by contrast, still exhibit significantly higher levels of trust, even when GDP per capita is integrated in the model. This finding suggests that, rather than Nordic culture or quality of institutions, it is the type of institutions that exerts an impact on social capital in Scandinavia. In particular, the universal welfare institutions in this geographic area may exert an important role in forming social trust (as suggested by Kumlin and Rothstein 2001).

There do not seem to be any ready-made tools with which policymaking can increase trust: Whereas income inequality exhibits no significant effect, the impact of education turns out to be rather weak. In contrast, a large share of immigrants is clearly detrimental for regional trust. A corroboration of this finding on the basis of more detailed indicators of ethnic fragmentation provides ample scope for further research; the successful integration of foreign born residents is clearly a major objective for political initiatives with considerable ramifications for the overall social capital of a territory.

On a more general level, research should more closely specify the interplay between cultural frameworks and social, institutional and economic outcomes. The provision of more concrete policy advice necessitates detailed knowledge on the transmission channels from cultural norms to economic production (and the role played by institutions in this causal chain). The results obtained in the analyses with regard to importance of norms for social attitudes and interaction are informative but far from exhaustive. The persistent spatial autocorrelation in the estimations (i.e. the highly significant values for lambda) indicates that there is still some unexplored component (cultural or otherwise) underlying

social trust in neighboring regions. At this stage of research we can confidently say that promoting trust defies short-term manipulation and requires a long time horizon with sustained investments in social interaction and community cohesion.

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APPENDIX

Table A1: Selection and description of variables from the European Values Study elaborated by Inglehart and Baker 2000 for the measurement of cultural frameworks

Variable	Maximum score	Regional aggregates	Min	Max	Mean	Std. Dev.
Importance of God	God is very important in my life	arithmetic mean (between 1 and 10)	2.83	9.20	6.02	1.60
Children Obedience Faith	Teach children obedience and faith rather than independence and determination	arithmetic mean (between -2 and 2)	-1.15	0.86	-0.28	0.40
Disapproval of Abortion	Abortion can never be justified	arithmetic mean (between 1 and 10)	3.18	9.59	6.45	1.05
National Pride	I am very proud to be X	arithmetic mean (between 1 and 4)	2.45	3.84	3.28	0.27
Respect for Authority	Greater respect for authority is a good thing	percentage of people who agreed	0.09	0.94	0.57	0.17
Economic Physical Security	"Maintaining order in nation" and "fighting rising prices" have priority over "giving people more say in government decisions" and "freedom of the press"	percentage of people with first priority on either "maintaining order in the nation" or "fighting rising prices"	0.33	0.87	0.58	0.12
Feeling of Unhappiness	Respondent feels very unhappy	arithmetic mean (between 1 and 4)	1.45	2.63	1.95	0.24
Disapproval of Homosexuality	Homosexuality can never be justified	arithmetic mean (between 1 and 10)	2.60	9.42	6.66	1.50
Never Sign Petition	Respondent would never sign a petition	percentage of people who agreed	0.02	0.86	0.26	0.17

Table A2: Factor profile of regional aggregates of selected measures of cultural frameworks

	Components		
	1 (Traditional)	2 (Survival)	3 (Authority)
Importance of God	0.88	0.30	-0.08
Children Obedience Faith	0.80	0.12	0.38
Disapproval of Abortion	0.77	0.27	0.17
National Pride	0.75	0.06	-0.06
Respect for Authority	0.07	0.08	0.97
Economic Physical Security	0.12	0.81	0.25
Feeling of Unhappiness	0.01	0.90	-0.10
Disapproval of Homosexuality	0.48	0.79	0.05
Never Sign Petition	0.35	0.77	0.06

Factor profile computed based on Varimax rotation. Shaded areas denote the loadings of the variables in the factor profile provided by Inglehart and Baker (2000) based on national aggregates of variables. The only question that does not fit into cultural framework based on regional aggregates is "Respect for Authority," which exhibits a separate loading on the third component.