"Whose Realm, His Trust"

REGIONAL DISPARITIES OF GENERALIZED TRUST IN EUROPE

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ABSTRACT

Trust explains the functioning of markets, institutions or society as a whole. It is a key element in almost every commercial transaction over time and might be one of the main explanations of economic success and development. In Europe, the determinants of (generalized) trust have been investigated in the past. Most scholars have focused on aggregate (national) levels of trust. However, it can be assumed that driving forces, which foster or diminish trust, act at a sub-national level. Regional clusters remain undetected. With the use of the European Social Survey 6 (2012) and modern spatial diagnostics, this work examines the individual and regional determinants of trust in 88 European NUTS₁ regions in 26 countries. There are two main findings. First, wealth, linguistic fragmentation, and religious ideologies shape trust on a regional level, education, income, and membership in associations foster trust on an individual level. Secondly, the study unravels regional dispersions in different types of "trust regimes" in Europe. Regional clusters of generalized trust are confirmed by spatial diagnostics. The "regionality" of trust could be of importance for future targeted policy making.

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* As once the slogan *cuius regio, eius religio* (whose realm, his religion), meaning that the religion of the ruler was to dictate the religion of those ruled, was applied to the shattered principalities of the Holy Roman Empire, today's Europe is dispersed in 'regimes' of generalized trust.

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1 Introduction

"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."

This quote by Nobel-prize laureate Kenneth Arrow [1972, 357] explains why not only since 1972, economics is concerned about trust¹. Over the last decades, economists, sociologists, and political scientists have started to perceive trust as an indicator for the social wellbeing of a society and have examined its characteristics, roots, and consequences. Scholars have emphasized how trust fosters economic growth and development, how it creates better working bureaucracies and strengthens civil society. In the face of beneficial spill-overs, scholars have striven to discover the requisites and drivers of trust. Much of the investigation has treated trust as a closed entity on a national level. Comparisons of trust across countries constitute the majority of empirical analyses in the past. However, patterns and determinants of trust on a regional and individual level are neglected in this case. Indeed, in the case of Europe, trust evolves in regional patterns rather than sticking to national borders just like its determinants, such as Protestantism or linguistic fragmentation are region specific. The present study aims at investigating these regional dimensions of generalized trust. With the use of the ESS 6 survey, responses and multi-level as well as spatial model environments, levels of trust can be explained on the basis of religious background, wealth, and linguistic fragmentation. The regional perspective on trust reveals a huge degree of within country variance. Levels of trust are clustered in "regimes". In the following, previous discussions about the roots and consequences of trust are summarized and concerns about mutual dependencies of trust are addressed. The third section explains the method of this study, while the fourth section depicts its results. Lastly, section five concludes.

2 Discussions about Trust

The Problem of Mutual Dependence

When discussing beneficial spillovers and plausible determinants of trust, the question about mutual effects becomes apparent. In some cases, the direction of cause and effect is debatable. Many scholars argue that civic engagement or economic growth is fostered by generalized trust, though one could easily argue that a working civil society and economic prosperity lay the ground for people trusting each other. In fact, for the case of civic participation and generalized trust, an ongoing reciprocative relation has become the consensus in the literature [van Ingen and Bekkers, 2015]. For other features, however, it is much more plausible to argue for a one-sided direction of influence. For the example of religious opinions, it might be true that our denomination has an impact on how much we trust each other, while it is hard to imagine an effect in the opposite direction. Still, future investigations shall be encouraged to include temporal components so as to allow more determined statements about the cause and effect of generalized trust.

¹In this work, the terminology *trust* stands for generalized trust

The Benefits of Trust

Among several other empirical results, it has been shown that trust can be associated with higher rates of economic growth [Knack and Keefer, 1997] and better financial [Guiso et al., 2000] and educational [Stephany, 2019] development. It has been shown that bureaucracies [Porta et al., 1996] and education systems [Alesina et al., 1997] work better in a high trust environment. In addition to possible associations with desirable economic outcomes, trust appears to be a good proxy for social capital, as described by Putnam [Putnam, 1995], [Putnam et al., 1994]. With his work "Making democracy work: Civic traditions in modern Italy" [Putnam et al., 1994] and "Bowling alone." [Putnam, 1995] he revolutionized the way social sciences think about the importance of social capital for civic or political participation and its role in the overall functioning of a society. He [Putnam et al., 1994, 170-171] convincingly summarizes that "...trust is a sentiment linking us to other people, to work cooperatively with them on common projects."

From a regional perspective, trust in Europe has been found to foster economic growth [Beugelsdijk and van Schaik, 2005] and innovation [Stephany et al., 2019, ?]

Determinants of Trust

Possible influences on how much people trust each other have been discussed widely in the socio-economic literature in the last 15 years. An overview of the determinants tested in seven of the most cited empirical papers is given in table 1. Some features have been used more frequently than others and studies differ in their regional focus and applied metric.

Alesina and La Ferrara [2002], for example, examine individual data from US localities and develop an understanding that generalized trust is mainly influenced by four factors. First, a personal history of traumatic experiences reduces an individual's level of trust. Second, belonging to a minority with a history of discrimination and third, having little economic success in terms of education and income drives levels of trust down, too. Lastly, living in racially and economically (inequality of income) mixed communities weakens mutual confidence. The effect of racial fragmentation is even amplified for individuals, who are against racial integration. The authors do not find any evidence that the religious background of either the individual itself or the community the person lives in plays any role in how much a person trusts others.

The work by Bjørnskov [2007], on the other hand, points towards potential influences of religion on trust. The paper explores determinants of trust in 76 countries around the world and employs only nationally aggregated data. While countries with a history of Protestantism and monarchical systems exhibit significantly higher levels of trust, Muslim and post-communist societies appear to be less trusting. Social polarization, such as fragmentation by income and race, are confirmed to be threats to generalized trust, as well.

Only a few influential studies on the causes of generalized trust cast an eye on Europe. The paper by Hooghe et al. [2009] criticizes the common focus on North America, which, according to the authors is the main explanation for the commonly discovered negative relationship between ethnic diversity and trust. Hence, the study examines 20 European countries and employs refined measurements of ethnic diversity with the use of OECD migration data. While most of the frequently stated individual determinants, such as education and income, are confirmed. The country level indicators for migration and diversity fail to show any relation to generalized

trust. The warn transferring the US-stemming connection between ethnic fragmentation and trust across the Atlantic.

An institutional perspective is taken by Rothstein and Stolle [2008], who argue that social capital, approximated by levels of generalized trust, is embedded in political and legal institutions. In their cross-national study of 71 countries around the world, they find that "... impartiality, efficiency and fairness of street-level political institutions..." [Rothstein and Stolle, 2008, 8] increase institutional and lastly generalized trust.

Regional Perspective

A 'grand challenge' for scholars dealing with generalized trust is to distinguish between external and cultural determinants of trust. Surely, moral values and deeply-rooted cultural beliefs are strong predictors of generalized trust. But it might be questioned that the different levels of trust are only due to differences in culture. Even controlling for ethnic or cultural characteristics [Uslaner and Brown, 2005], [Leigh, 2006], past research has not been able to completely overcome this critique, since the focus of the analysis has remained on an aggregated country level, with some exceptions [Stephany et al., 2017, Stephany and Braesemann, 2017]. Even though it can plausibly be argued that ethnic and linguistic diversity or religious heritage are, for one, rather determined on a regional than on a national level, and furthermore, do not necessarily retain from crossing today's national borders.

Some scholars, like Alesina and La Ferrara [2002], have undertaken the effort to look at a sub-national level. In their examination of US localities they seek to find prerequisites of trust. While both inequality and ethnic fragmentation play an important role, they conclude that ethnic stratification appears to be more influential for trust than inequality. The inequality-trust-linkage on a regional level is questioned by Leigh [2006], who examines local authorities in Australia. In his work, ethnic and linguistic fragmentation hinder trust, while he finds no evidence that inequality might do so. Leigh [2006] points to the fact that, on a regional level, the ability to communicate effectively might be more important than economic imbalances. On the level of US neighbourhoods, Marschall and Stolle [2004] argue in a similar fashion. While they find support for the theory that ethnic fragmentation weakens trust, they contrastingly point out that interracial contacts and diversity of interaction are important prerequisites for the development of generalized trust.

Shifting the focus on Europe, hardly any notable work commenting on regional level determinants of trust can be found. Albanese and Blasio [2013], for example, examine the EU 15 on a NUTS1 level in order to document the individual determinants of trust. Schooling, family background, labor market status are confirmed as influential factors. Aspects of aggregated regional specificities or spatial components are still neglected. Only recently, a more comprehensive analysis on ethnic diversity and social capital has been performed on a regional level by Ziller [2014]. The author reflects on the discovered negative relationship between immigration-related ethnic diversity and social capital. Even though researchers have begun to use sub-national level of trust in Europe in order to explain economic growth [Beugelsdijk and van Schaik, 2005], innovation [Schild, 2013] or the relation to income structure [Stephany, 2017], endeavours about the regional determinants of generalized trust in Europe still remain to be undertaken.

Asking About Generalized Trust

In order to grasp the concept of social or interpersonal confidence, the generalized trust question - as applied in this study - has become the most commonly used approximation in empirical analyses. The use of one single survey question for picturing trust has been criticized and even Putnam [1995], strongly convinced of the importance of trust for social capital, has expressed his displeasure about the problem: "since trust is so central to the theory of social capital, it would be desirable to have strong behavioral indicators of trends in social trust or misanthropy. I have discovered no such behavioral measures."

Responding to the critique that social capital without a measurement would be nothing but a "buzzword" [Fukuyama, 1995], Putnam addresses the difficulty of measuring social capital and refers to generalized trust (*How much you tend to trust other people in general*) as a possible approximation. [Putnam, 1995] distinguishes *bridging* social capital (*generalized trust*) from *bonding* social capital (*particularized trust*). Though the later analyses focus on generalized trust, the distinction is worth noticing and should be kept in mind, when speaking about the associations of trust and group participation. Racists and fundamentalists, for example, are extreme examples of *particularized trusters*. They only rely on individuals of their own kind rather than on people in general.

The most common criticism to the generalized trust question, which asks for the trust in *most people* addresses its vague, abstract, and subjective character. It is argued that the term *most people* might be interpreted quite differently from individual to individual. The idea to whom or which group of people one refers when asked about generalized trust is known in the literature as *the radius problem*. What is the radius of social interactions to which those *most people* belong to? Surely, as interpersonal trust, like human intelligence for example, is a non-tangible concept, approaches to make it measurable will always have to face some shortcomings. The following considerations should underline why the generalized trust question is a valid choice when it comes to catch hold of interpersonal trust.

Delhey et al. [2011] have shown that people distinguish at least in two different sets of social interactions and therefore two distinct groups of trust, in-group and out-group trust. In their cross country analysis, they state that *most people* in standard questions most commonly refer to out-groups. They acknowledge the subjectivity of the radius of *most people*, but point out that the variation is driven by cultural differences rather than by individual perception. The radius is quite narrow in Confucian countries, wider in wealthy countries, and - in this particular case - relatively comparable across European societies.

In addition, Knack and Keefer [1997], argue that the actual strength of the generalized trust question lies in its ambiguity. Since it potentially includes a large radius of individuals - not only friends and family members - the generalized trust question mixes two different concepts. On the one hand, how much one trusts in people who are not friends and relatives, and, on the other hand, how often an individual encounters with such persons. In low-trust environments, transaction with close friends and family members is much more common than in high-trust environments. If the respondents to the *most people* question consider the individuals they interact with, the variation of the trust measure should be reduced, which makes it a more reliable measure in explaining potential outcomes like growth or civic participation. In their empirical analysis, the centered pattern of generalized trust is confirmed.

Lastly, a study by Glaeser et al. [2000] with the promising title "Measuring Trust" defends the validity of the generalized trust measure by comparing it with trust and trustworthiness items

from two experiments. Generalized trust - stemming from the controversial question - is shown to be a very good predictor for trusting behaviour in the experiments. Furthermore, the authors point out that in their experiments the reported level of generalized trust should actually be interpreted as a signal for the own level of trustworthiness rather than as a representation of mutual confidence in others.

In conclusion to the review of the generalized trust questions, the answers to the query about "most people" can be justified as the unit of observation in this study, in awareness of its possible limitations.

Table 1: *Variable Selection - Generalized Trust*

	Alesina and LaFerrara (2002)	Björnskov (2007)	Hooghe (2009)	Leigh (2006a)	Leigh (2006b)	Marschall (2004)	Rothstein and Stolk (2008)	ESS6 (2012)	AIC/BIC -based selection
Individual Variables									
Age	✓		✓	✓	✓	✓	✓	✓	✓
Gender	✓		✓	✓	✓	✓	✓	✓	✓
Education	✓		✓	✓	✓	✓	✓	✓	✓
Employment Status	✓		✓	✓			✓	✓	
Marital Status	✓				✓		✓	✓	
Children	✓					✓		✓	
Income	✓							✓	✓
Religion	✓							✓	✓
Life Satisfaction							✓	✓	✓
Race	✓							na	
Migrant Background			✓	✓				✓	
Church Attendance			✓					✓	
Commuting				✓				na	
Length of residence				✓		✓		✓	
Type of residence								✓	✓
Interracial Contact						✓		na	
Trauma in Past	✓							na	
Association Membership								✓	✓
Rating of Police							✓	✓	✓
Rating of Justice System							✓	✓	✓
Rating of Political System			✓					✓	✓
Neighbourhood Problems						✓		na	
Regional Variables									
GDP per Capita		✓	✓		✓		✓	✓	✓
Population Size		✓						✓	
Population Density								✓	✓
Age Distribution		✓			✓			✓	
Median Household Income								✓	
Income Inequality		✓	✓	✓	✓			✓	
Ethnic Fragmentation	✓	✓		✓	✓		✓	✓	
Linguistic Fragmentation				✓				✓	✓
Racial Fragmentation	✓					✓		✓	
Religious Ideologies		✓					✓	✓	✓
Political Ideologies		✓						✓	
Association Membership Rate						✓	✓	✓	
School Attainment						✓	✓	✓	
Crime Rate								na	
Model Specification									
Region	USA	World	Europe	Australia	World	USA	World	-	Europe
Level of	Federal	Countries	Countries	Neighbour-	Countries	Neighbour-	Countries	-	NUTS ₁
Aggregation	States			hoods		hoods		-	
Number of Groups	51	76	20	692	59	15	71	-	88
Number of Observations	7325	na	36,697	6500	82,778	902	84,006	-	42,350
Micro-level Model	yes	no	no	no	yes	no	yes	-	yes
Macro-level Model	yes	yes	no	no	yes	no	yes	-	yes
Mixed Model	no	no	yes	yes	no	yes	yes	-	yes

Note: a) Unlike in Alesina et LaFerrara (2000), the index of racial fragmentation is calculated with the use of citizenship data,

b) if diverging numbers of observations occur, the largest model is selected,

c) though both macro and micro characteristics are applied, Leigh (2006a) does not use a mixed-effects approach.

3 Data and Method

The empirical analysis is conducted in three steps. First, seven of the most influential recent empirical papers examining the roots of generalized trust are summarized with regard to their explanatory variables. They build the selection of possible macro- and micro-level determinants of trust, which are then, in a second step selected by a step-wise procedure based on the Akaike (AIC) and Bayesian Information Criterion (BIC). Future interpretations are based on the variable selection with the best model fit. In a third step, the selected macro-level variables are included in the spatial diagnostics with which spatial errors and lags are detected.

Data

The study employs the European Social Survey dataset 6 (ESS6) of 2012². Geographically, 26 countries with 88 NUTS1 regions are covered³. Here, a measure of trust emerges from the survey question phrased *"Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?"*, with a response scale from 0 (*"You can't be too careful"*) to 10 (*"Most people can be trusted"*). In addition to the trust variable, several other individual characteristics have been modeled by survey questions. Regional measures, like wealth, population size or school attainment are embedded in the ESS6, other variables, such as measures of fragmentation or income distribution have been calculated. A detailed description of the selected controls and their computation can be found in the appendix.

Method

Figure 1 displays responses to the generalized trust question in histograms per country. The distribution of the trust outcome in general appears to be well captured with a logit distribution. For most countries patterns of trust are almost symmetrically distributed, but with thick tails. Therefore the applied model with an ordinal outcome assumes a logit distribution. Furthermore, it can be noticed that the shape of the distribution varies significantly across countries. We can observe a left shift of the distribution in low trust countries like Bulgaria and Portugal, a symmetric distribution in countries like Germany and Italy, and a right-skewed pattern in high trust countries like Norway and Denmark. In the model, regional fixed effects are considered in order to ensure a more precise estimation. The final multi-level ordinal logit model (MLOL) with regional fixed effects can be described as following:

$$P(Trust_i = t_i | x) = f_{e_{nuts1}} + \beta_{nuts1} \cdot Macro_{nuts1} + \gamma_i \cdot Individuals_i + \epsilon_{nuts1} \quad (1)$$

Table 1 shows how generalized trust has been modeled in previous works and summarizes the selection of variables applied. Based on a cumulative sample of all the variables applied in the

²The observations from Croatia and Greece stem from the ESS5.

³The regions and their levels of trust are listed in table 6 in the appendix.

past, controls are added stepwise to an ordinal logit model. After each addition of a further control, the model line with the best AIC/BIC model score is selected. The final selection of individual characteristics, based on the AIC/BIC criterion, includes *age, gender, years of full-time education, household income, religious denomination, life satisfaction, type of residence and trust in the police, politicians and the justice system*.

On the basis of the selected micro-level determinants, a MLOL model is used to select regional characteristics in the step-wise fashion described above. Table 2 shows intermediate steps of the selection procedure. The regional controls at the end of the selection are *2012 GDP per capita in current USD prices (log)*, the *percentage of Protestants and Muslims* among the respondents in each region, and the *Herfindahl Index of Linguistic Fragmentation*⁴, based on the first language spoken in the household of the respondent. Figures 6 to 9 in the appendix show the regional distribution of the four measures.

Simple Spatial Modeling

There are good reasons to believe that a spatial perspective needs to be considered when evaluating the origins of trust in Europe. For one, historically, possible determinants of trust have a distinct spatial distribution, such as Protestantism, for example, which is particularly strong in Germany and Northern Europe (see figure 9). On the other hand, on a local scale, it could be possible that higher levels of trust in one region have external spillovers, such as an enhanced civic society, which facilitates trust in a neighbouring district. Both scenarios would lead to the creation of regional clusters, with similar levels of trust and would cause disturbances in any non-spatial model. Figure 2 depicts the regional levels of trust across 88 European NUTS1 regions. It suggests local clusters of similar levels of trust, within and across national borders. In order to test for the above mentioned origins of spatial disturbances, the following set of diagnostics is carried out. The starting point of the empirical analysis is the MLOL model from (1).

Here, the average (generalized) trust level $P(Trust_i = t_i|x)$ of each NUTS 1 region is explained by the set of macro-level features^l. The error term is defined by ϵ_{nuts1} . The spatial disturbance in the model might be reflected in two different cases [Anselin et al., 1996].

On the one hand, it could be possible that further determinants of trust are not respected. The disturbances are therefore spatially correlated and the assumption:

$$Cov(\epsilon) = E(\epsilon \cdot \epsilon') = \sigma^2 \cdot I \quad (2.2)$$

is violated. The simplest version of this so-called "spatial error process" is a spatially autocorrelated process of first order that is defined analogous to the Markov process in time-series analysis:

⁴The index is described accordingly in the appendix.

$$\epsilon = \lambda W\epsilon + v \quad (2.3)$$

The term λ is called the spatial autoregressive coefficient, while the matrix W represents the distance weights between the regional entities.

On the other hand, spatial dependence might be present due to spill-over effects, levels of trust in one region influence the trust measure in neighbouring areas. In the regression model, this can be accounted by entering a spatial lag to the endogenous variables:

$$P(T = t|X) = \rho Wt + \beta X + \epsilon \quad (2.4)$$

The average (generalized) trust level t of each NUTS 1 area is explained by the previously selected set of regional specifications. In addition, a spatial lag (Wt), which means in this case, regional levels of trust in neighbouring areas, are taken into consideration. The coefficient ρ is associated with a spatial lag of the dependent variable, which means that it captures the extent to which generalized trust in one region depends on the level of trust in a neighbouring entity.

In accordance with the possibility of encountering two different spatial dependencies, errors or lags, spatial diagnostics are built in three additional steps. First, with the use of the longitudinal and latitudinal coordinates of the regions' geographical centres, an inverse distance weights matrix W is created. The matrix is constructed by the weights of the geographical distance between the geographical centre of each region. Second, on the basis of the results of the MLOL model and with the use of the inverse distance weights matrix, two diagnostic tests, Moran's I test [Moran, 1950] and the Lagrange Multiplier test [Anselin, 1988], are performed⁵. With the results of the diagnostics, spatial lag and the spatial error regression models estimate the spatial error term λ and the spatial lag coefficient ρ by maximum likelihood in four different spatial model environments. Lastly, the regional fixed effects, as the regions' unexplained level of trust, are estimated and plotted on a map.

⁵Please find a detailed description of the diagnostic tests in the appendix

Source: ESS 6 (2012) and own calculations

Figure 1: Generalized Trust Distribution

Table 2: *Explaining Generalized Trust: ML Ordinal Logit Model*

VARIABLES	(1) GT	(2) GT	(3) GT	(4) GT
NUTS1 2012: GDP per Capita (cp. USD log)	0.199*** (0.0189)	0.0564*** (0.0209)	0.0381* (0.0211)	0.0156 (0.0213)
NUTS1: % of Protestants		1.453*** (0.0863)	1.472*** (0.0865)	1.506*** (0.0865)
NUTS1: % of Muslims			-2.698*** (0.360)	-3.498*** (0.376)
NUTS1: HI of Linguistic Fragmentation (0-1)				-0.576*** (0.0797)
Age (15+)	-0.00572** (0.00287)	-0.00601** (0.00287)	-0.00571** (0.00287)	-0.00534* (0.00288)
Age ² :1000	0.0817*** (0.0287)	0.0863*** (0.0287)	0.0861*** (0.0287)	0.0819*** (0.0287)
Gender: Male (ref. Female)	0.0252 (0.0185)	0.0214 (0.0185)	0.0229 (0.0185)	0.0244 (0.0185)
Years of full-time education completed	0.0510*** (0.00259)	0.0521*** (0.00259)	0.0525*** (0.00259)	0.0524*** (0.00259)
Trust in the legal system	0.114*** (0.00540)	0.107*** (0.00542)	0.105*** (0.00543)	0.105*** (0.00543)
Trust in political parties	0.137*** (0.00518)	0.131*** (0.00519)	0.135*** (0.00522)	0.134*** (0.00522)
Trust in the police	0.0685*** (0.00516)	0.0655*** (0.00516)	0.0635*** (0.00517)	0.0631*** (0.00517)
Household's total net income, all sources	0.0508*** (0.00363)	0.0513*** (0.00363)	0.0520*** (0.00363)	0.0504*** (0.00364)
Religion: Protestant (ref. no denom.)	0.242*** (0.0295)	0.0869*** (0.0308)	0.0861*** (0.0308)	0.0874*** (0.0308)
Religion: Islamic	-0.412*** (0.0700)	-0.387*** (0.0701)	-0.279*** (0.0717)	-0.274*** (0.0717)
Religion: Eastern Religion/Greek Orthodox	-0.389*** (0.0338)	-0.307*** (0.0343)	-0.248*** (0.0351)	-0.225*** (0.0353)
Religion: Catholic	-0.121*** (0.0235)	-0.0114 (0.0244)	-0.0326 (0.0246)	-0.0252 (0.0246)
Life satisfaction	0.0308*** (0.00281)	0.0294*** (0.00277)	0.0289*** (0.00276)	0.0291*** (0.00277)
Worked in organisation	0.260*** (0.0265)	0.221*** (0.0266)	0.227*** (0.0267)	0.233*** (0.0267)
Residence: Suburb (ref. Big City)	-0.0723** (0.0340)	-0.0770** (0.0340)	-0.0798** (0.0340)	-0.0758** (0.0340)
Residence: Town	-0.146*** (0.0269)	-0.147*** (0.0269)	-0.154*** (0.0269)	-0.158*** (0.0269)
Residence: Village	-0.113*** (0.0270)	-0.0891*** (0.0271)	-0.0863*** (0.0271)	-0.0946*** (0.0271)
Residence: Farm	0.0493 (0.0444)	0.0200 (0.0444)	0.0158 (0.0444)	0.0102 (0.0444)
Observations	36,949	36,949	36,949	36,949
Number of groups	88	88	88	88
AIC/Obs	4.156	4.147	4.145	4.144
BIC/Obs	4.163	4.154	4.152	4.151

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Figure 2: NUTS1 Map of Generalized Trust

4 Results

Multi-Level Ordinal Logit Model

Table 2 summarizes the results of the MLOL model with regional clusters of 88 NUTS₁ regions. Starting with a selection of eleven individual control characteristics, four regional controls are added.

On a regional level, economic outcome appears to be positively related with generalized trust. The higher a region's wealth, the more mutual confidence its inhabitants have. The relation between regional wealth and trust weakens once features of religious background and linguistic fragmentation are included. Regarding the religious background of a region, the following observations can be made. The individual level of generalized trust is influenced by the extent to which a region is populated by Protestants and Muslims. While levels of trust appear to increase the more a region inherits a Protestant population, a higher share of inhabitants with a Muslim background seems to decrease the individual level of generalized trust. This observation is strongly related to the fact that individual levels of trust are analogically related to the two religions and the results coincide well with previous findings [Bjørnskov, 2007]. Linguistic fragmentation, here measured by the Herfindahl index regarding the first language spoken at home, is negatively associated with generalized trust. The more linguistically fragmented a region is, the lower the individual level of social trust. An observation, which has been made before [Leigh, 2006].

With regard to individual features, generalized trust clearly increases with years of education, income, and life satisfaction. It is evident that generalized trust is also positively associated with trust in political parties, the legal system and the police. The influence of an individual's religious background on generalized trust is similar to the macro-level. In comparison to individuals with no reported religious denomination, Muslims and followers of eastern or Greek orthodox churches exhibit lower levels of trust, while Protestants seem to have higher confidence in others [Bjørnskov, 2007]. Having worked in civil society or charity organizations in the past increases a person's level of trust. This goes well with the assumption that generalized trust, as a measure for social capital, is increased in cooperative exchange with others [Putnam et al., 1994]. Lastly, it can be noticed that the level of trust is higher in metropolitan areas in comparison to towns and villages.

A Spatial View on Trust in Europe

In figure 2, levels of generalized trust on a subnational scale are illustrated for the first time. The levels reflect the regional average of the responses to the trust question from the ESS 6. Across European NUTS₁ regions a large spectrum in levels of generalized trust is captured.

Values range from 3.26 in Northern and Eastern Bulgaria to 6.98 in Denmark. Some regional patterns become evident. Europe is divided in regions with high levels of generalized trust, such as the Scandinavian countries, the Baltics, the UK, and the Netherlands, and regions with low levels in Poland, Bulgaria, Romania and Greece, as well as France and Portugal. In some countries, like Germany, Italy, and Belgium, a strong subnational decline is visible. Previous investigations assuming a uniform and self-contained national level of generalized trust, should be reassessed with some cautiousness.

In Italy and Germany, the complete European spectrum of levels of trust is present (see figures 3 and 4). While Italy exhibits a strong North-South divide, in Germany, a clear East-West divide is visible. For both countries, the specificities of these divisions have been described in the past (Putnam et al. [1994]; [Koopmans and Veit, 2014]). The decline on both countries leads to an additional geographical phenomenon. Together with Switzerland, the southern *Bundesländer* of Germany and the northern regions of Italy build a regional cluster of high levels of trust in the centre of Europe.

Figure 3: Generalized Trust in Germany

Figure 4: Generalized Trust in Italy

Spatial Diagnostics

In order to investigate spatial dependencies, first spatial diagnostics for potential errors or lags are applied. The model contains 88 regional entities and macro-level controls is applied. The spatial matrix W of 88x88 dimension contains values, measured in longitudinal and latitudinal units, ranging from 0.1 (min. distance between two entities) to 61.5 (max. distance)⁶.

⁶The largest minimum distance between two countries is estimated with 16.57, while the smallest maximum distance between two entities is 31.49.

Table 3: *Spatial Model: Diagnostics*

Test	Statistic
Spatial error:	
Moran's I	3.528***
Lagrange multiplier	5.257**
Spatial lag:	
Lagrange multiplier	6.574**

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4: *Various Spatial Models*

SPATIAL MODEL VARIABLES	(1) LAG Trust	(2) ERROR Trust	(3) GSM Trust	(4) DURBIN Trust
NUTS1 2012: GDP per Capita (log)	0.565*** (0.126)	0.710*** (0.140)	0.694*** (0.151)	0.730*** (0.160)
NUTS1: % of Protestants	1.322*** (0.393)	1.698*** (0.454)	1.646*** (0.486)	1.645*** (0.528)
NUTS1: % of Muslims	-4.473*** (1.526)	-4.812*** (1.502)	-4.797*** (1.513)	-4.857*** (1.545)
NUTS1: HHI Linguistic Frag. (0-1)	-1.047*** (0.398)	-1.034*** (0.401)	-1.036*** (0.402)	-0.993** (0.405)
Wx: NUTS1 2012: GDP per Capita (log)				-0.436 (0.283)
Wx: NUTS1: % of Protestants				-0.754 (0.862)
Wx: NUTS1: % of Muslims				1.116 (2.865)
Wx: NUTS1: HHI Linguistic Frag. (0-1)				-0.146 (1.308)
Rho (Spatial Lag)	0.368*** (0.135)		0.0678 (0.237)	0.512*** (0.154)
Lambda (Spatial Error)		0.523*** (0.148)	0.476** (0.228)	
Sigma	0.492*** (0.0374)	0.477*** (0.0368)	0.479*** (0.0373)	0.477*** (0.0367)
Constant	-1.700 (1.270)	-1.385 (1.494)	-1.553 (1.575)	0.438 (2.351)
Observations	88	88	88	88
AIC/Obs	1.602	1.567	1.589	1.653
BIC/Obs	1.799	1.764	1.814	1.962

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

After the spatial diagnostics, four different spatial models are tested. A spatial lag model, a spatial error model, a general spatial model, and a spatial durbin model. While the spatial lag and spatial error models, respectively, only consider potential dependent variable lags (ρ) and errors (λ), the general spatial model, takes both disturbances into account. The spatial durbin model, on the other hand, controls for a spatial lag of the dependent variables Wx and a spatial lag of the dependent variable (ρ).

Table 3 shows the main diagnostics for the detection of spatial errors and lags and table 4 compares the four spatial models. On the basis of the MLOL model and with the use of the inverse distance weights matrix, the Lagrange multiplier test for spatial errors and spatial lags, and the Moran's I test for spatial errors are performed. The test statistics indicate that the simple regression model is exposed to spatial dependence stemming from a spatial disturbance of the error term and that the estimation of generalized trust could be improved with the introduction of a spatial lag of the dependent variable.

The results of lag and error models in the first two columns of table 4 indicate confirm the diagnostics' finding. However, controlling for a spatial lag of the dependent variable and a spatial error, in column three, the spatial lag coefficient ρ does not appear to be significant, anymore. The remaining positive and significant coefficient of λ indicates that the levels of generalized trust are driven by some underlying spatially distinct determinant, which is not captured in the model. The fourth and last model includes spatial lags of the independent variables in addition to the spatial lag of generalized trust. However, the lagged dependent variables are of no significant influence to generalized trust.

Overall, the diagnostics clearly support the assumption that regional levels of trust rely on spatial dependencies. Future research in this field should consider this finding. The significant influence of the spatial error term throughout several model environments deserves further attention. The result suggests that some of the differences in regional levels of generalized trust are independent to a certain extent of the controlling contextual characteristics. Figure 5 shows a map of the regional fixed levels of generalized trust, which means the region specific levels once all explanatory variables in the MLOL are set to zero. Indeed, a clear regional pattern emerges. An interpretation of the different regional fixed levels of generalized trust could be that trust is well explained by contextual factors, like religion, linguistic fragmentation and wealth, in some regions, while depends less on those factors in other regions. The low fixed level in protestant regions, such as scandinavian countries, the UK, Belgium, Germany and Switzerland, underlines the how much Protestantism, for example, helps to interpret levels of generalized trust. This regional gap in the explanatory power of determinants of generalized trust could be an interesting starting point for future research.

Figure 5: NUTS1 Map of Fixed Levels of Generalized Trust

5 Conclusion

What are the Determinants of Trust?

How much we trust others is determined by a variety of influences. Personal features, our education, income, and satisfaction with life, but also experiences, such as civic engagement, constitute to our confidence in others. In addition, it can be shown that the environment in which we live, whether it is a small town or a big city, or if we can easily communicate in the same language with others, shapes our level of trust, too.

In the past scholars have searched in several directions for determinants of trust. They have contributed with a long list of possible factors. Some of which are confirmed as drivers of generalized trust in this study, some are not (see table 1). Some features are singular, others are commonly named. Economic inequality and fragmentation of ethnicity are reappearing determinants. Most scholars conclude that both factors diminish levels of trust. In this analysis, of levels of trust in European regions, they do not show to be of particular significance. Why is that? The reasoning behind both concepts is that excessive dispersion, of wealth, income, or ethnic background, reduces the basis for individuals to affiliate with each other, interpersonal trust, consequently, can not be established. Most of the studies, which identify ethnic and economic fragmentation as potential threats for trust, are based in the United States (Alesina and La Ferrara [2002]; Marschall and Stolle [2004]). This might explain the different outcome concerning the effects of income inequality and ethnic diversity, in contrast to the examination of Europe, for several reasons. For one, income disparities in the US are simply much larger than in Europe. The effect on trust, might be more distinct in the US, since income inequality has been on a constantly higher level than in Europe over the last decades. Second, ethnic groups in US are more segregated and less dispersed than in Europe. While ethnicities in the US are mainly divided in three very distinct groups (Blacks, Hispanics and Whites), the historical development of ethnics on the 'old continent' is complex and the numerous ethnicities are much less segregated than in the US. However, in Europe, the big rag of languages compared to the US, appears to weaken trust. Third, in the US, the two features are interlaced [Alesina and La Ferrara, 2002]. Often, income disparities are based on racial discrimination. Effects of both features might therefore be amplified.

Trust is Deep-Rooted

In response to the discussion made in the past about whether economic circumstances or cultural heritage have a larger influence on interpersonal trust, the present results give a clear answer. Considering a multitude of potential economic, demographic, and cultural features, on a regional scale, the analysis reveals mainly three factors by which levels of trust in Europe could be influenced. First, the common conclusion that wealthy environments (Rothstein and Stolle [2008]; Hooghe et al. [2009]) foster trust is confirmed on a regional level. Second, the relative size of regional religious communities, at least for Protestantism and Islam, influence levels of trust [Bjørnskov, 2007]. And, lastly, the degree to which languages are dispersed

regionally has an impact on how much people trust each other [Leigh, 2006]. With regard to the ductility of regional levels of trust, results indicate a strong relation to deeply-rooted concepts. Since linguistic dispersion and religious heritage are very persistent regional features, which might only alter over a longer timespan, trust itself most probably shares this entrenched attributes. The different regional fixed levels of generalized trust support this idea.

Spatial Dispersion of Trust

What does the new regional perspective and the application of spatial diagnostics contribute to the investigations about generalized trust in Europe? The new spatial component of regional levels of trust questions the assumption of national integrity. Regional disparities in levels of trust are vast within some countries, like in the case of Belgium, Germany or Italy. At the same time, diagnostics indicate that trust agglomerates regionally in clusters. The case of the 'high trust' cluster formed by Southern Germany, Switzerland, and Northern Italy, is one of many examples in Europe, for which the limits of previous aggregations on a national level become evident. With the application of regions as the unit of observation it can be seen, on the one hand, that regional levels of trust alter significantly within the respective countries, and, on the other hand, that regions with a common cultural heritage form regional clusters of trust. The spatial interdependence of generalized trust in European regions is strongly emphasised by the presented results.

Outlook

In some cases, the direction of cause and effect of trust and its determinants is debatable. The inclusion of spatial components is one attempt in order to erase doubts about the direction of effects. This approach should be facilitated by accessing of smaller local units, like municipalities. Still, future investigations shall be encouraged to include both spatial and temporal components so as to allow more determined statements about the cause and effect of generalized trust.

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Figures and Tables

Figure 6: NUTS1 Map of GDP per Capita in Current USD Prices (log)

Figure 7: NUTS1 Map of Linguistic Fragmentation (HHI: 0-1)

Figure 8: NUTS1 Map of Percentage of Muslims

Figure 9: NUTS1 Map of Percentage of Protestants

Table 5: *Individual Characteristics and Generalized Trust: Ordinal Logit Model*

VARIABLES	(1) GT	(2) GT	(3) GT	(4) GT	(5) GT	(6) GT
Age (15+)	0.00324 (0.00252)	0.000376 (0.00259)	-0.00391 (0.00260)	-0.00420 (0.00260)	-0.00333 (0.00261)	-0.00357 (0.00261)
Age ² :1000	-0.0498** (0.0250)	0.0210 (0.0259)	0.0744*** (0.0261)	0.0619** (0.0261)	0.0507* (0.0262)	0.0528** (0.0262)
Gender: Male (ref. Female)	0.0845*** (0.0167)	0.0468*** (0.0167)	0.0255 (0.0168)	0.0230 (0.0169)	0.0149 (0.0169)	0.0124 (0.0169)
Years of Full-time Education		0.0694*** (0.00226)	0.0591*** (0.00233)	0.0529*** (0.00235)	0.0489*** (0.00236)	0.0487*** (0.00239)
Trust in Legal System		0.124*** (0.00469)	0.121*** (0.00469)	0.112*** (0.00472)	0.108*** (0.00472)	0.108*** (0.00473)
Trust in Politicians		0.153*** (0.00453)	0.149*** (0.00453)	0.140*** (0.00455)	0.136*** (0.00456)	0.136*** (0.00456)
Trust in Police		0.0756*** (0.00438)	0.0759*** (0.00438)	0.0678*** (0.00446)	0.0633*** (0.00447)	0.0621*** (0.00448)
HH Income (net, all)			0.0560*** (0.00327)	0.0485*** (0.00329)	0.0440*** (0.00330)	0.0439*** (0.00330)
Religion: Protestant (ref. no denom.)				0.338*** (0.0279)	0.292*** (0.0281)	0.286*** (0.0282)
Religion: Muslim				-0.682*** (0.0408)	-0.663*** (0.0408)	-0.656*** (0.0410)
Religion: Eastern Orthodox				-0.301*** (0.0267)	-0.271*** (0.0268)	-0.273*** (0.0270)
Religion: Catholic				-0.146*** (0.0212)	-0.144*** (0.0212)	-0.140*** (0.0213)
Life Satisfaction					0.0255*** (0.00214)	0.0253*** (0.00213)
Worked in organisation					0.277*** (0.0250)	0.274*** (0.0250)
Residence: Suburb (ref. Big City)						0.000283 (0.0307)
Residence: Town (ref. Big City)						-0.107*** (0.0234)
Residence: Village (ref. Big City)						-0.0546** (0.0237)
Residence: Farm (ref. Big City)						0.188*** (0.0418)
Observations	43,882	43,882	43,882	43,882	43,882	43,882
AIC/Obs	4.467	4.251	4.244	4.230	4.224	4.222
BIC/Obs	4.469	4.254	4.248	4.235	4.228	4.228

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6: *Regional Levels of Generalized Trust*

NUTS 1 Code	Name	Level of GT	NUTS 1 Code	Name	Level of GT
BE1	Brussels Capital Region	5.01	FR6	South West	4.34
BE2	Flemish Region	5.50	FR7	Centre East	4.55
BE3	Walloon Region	4.38	FR8	Mediterranean	4.55
BG3	Northern and Eastern Bulgaria	3.26	HR0	Croatia	4.58
BG4	South-Western and South-Central Bulgaria	3.38	HU1	Central Hungary	5.28
CH0	Switzerland	5.68	HU2	Transdanubia	4.36
CY0	Cyprus	3.64	HU3	Great Plain and North	4.77
CZ0	Czech Republic	4.34	IE0	Ireland	5.06
DE1	Baden-Württemberg	5.22	IS0	Iceland	5.99
DE2	Bavaria	5.18	ITC	North West	5.12
DE3	Berlin	5.13	ITF	North East	4.83
DE4	Brandenburg	4.51	ITG	Centre	3.80
DE5	Free Hanseatic City of Bremen	3.93	ITH	South	5.66
DE6	Hamburg	6.20	ITI	Islands	4.87
DE7	Hessen	5.11	LTO	Lithuania	5.08
DE8	Mecklenburg-Vorpommern	4.77	NL1	North Netherlands	5.80
DE9	Lower Saxony	5.01	NL2	East Netherlands	6.01
DEA	North Rhine-Westphalia	4.96	NL3	West Netherlands	5.98
DEB	Rhineland-Palatinate	4.87	NL4	South Netherlands	5.79
DEC	Saarland	5.45	NO0	Norway	6.70
DED	Saxony	4.61	PL1	Central Region	4.30
DEE	Saxony-Anhalt	4.02	PL2	South Region	3.76
DEF	Schleswig-Holstein	5.24	PL3	East Region	3.77
DEG	Thuringia	4.53	PL4	Northwest Region	3.90
DK0	Denmark	6.98	PL5	Southwest Region	4.70
EE0	Estonia	5.48	PL6	North Region	4.73
GR1	Attica	4.00	PT1	Portugal (Maidland)	3.59
GR2	Nisia Aigaiou, Kriti	3.45	SE1	East Sweden	5.93
GR3	Voreia Ellada	4.30	SE2	South Sweden	6.08
GR4	Kentriki Ellada	4.54	SE3	North Sweden	6.03
ES1	North West	5.03	SLO	Slovenia	4.55
ES2	North East	5.17	SK0	Slovakia	3.94
ES3	Community of Madrid	5.40	UKC	North East England	4.70
ES4	Centre	5.18	UKD	North West England	5.40
ES5	East	5.06	UKE	Yorkshire and the Humber	5.61
ES6	South	5.03	UKF	East Midlands	5.12
ES7	Canary Islands	5.13	UKG	West Midlands	5.10
FI1	Mainland Finland	6.58	UKH	East of England	5.40
FI2	Åland	6.14	UKI	Greater London	5.77
FR1	Île-de-France	4.60	UKJ	South East England	5.26
FR2	Paris basin	4.27	UKK	South West England	5.50
FR3	Nord-Pas-de-Calais	4.37	UKL	Wales	5.55
FR4	East	4.30	UKM	Scotland	5.56
FR5	West	4.51	UKN	Northern Ireland	5.51

Variables and Data

Herfindahl Index of Fragmentation:

$$HHI := \sum_{i=1}^N a_i^2, \quad a_i := \frac{x_i}{\sum_{j=1}^N x_j}$$

A given population is divided by a certain characteristic (like language, citizenship, etc.) into $i = 1 \dots N$ groups. Here, x_i stands for the number of people belonging to each group.

Moran's I (Spatial error):

Figure 10: *Spatial Dispersion*

In order to develop some basic understanding of the diagnostics of spatial dependencies, a short intuitive explanation of the Moran's I test for spatial errors shall be given [Getis and Ord, 2010]. The white and blue squares in figure 10 are perfectly dispersed. In this case, Moran's I would be -1. If the squares of each colour were stacked to each half of the board, Moran's I would be close to +1. A random arrangement would yield a Moran's I value that is close to 0. A two-sided Z-test can then be used to test whether the value of Moran's I is significantly different from zero, which would indicate a spatial dependency of the error terms. The Lagrange multiplier test, on the other hand, tests the hypothesis of λ or respectively ρ having a value different from zero.

Moran's I test (Spatial error):

$$\epsilon = \lambda W\epsilon + v$$

$$I = \frac{n}{S_0} \frac{e' W^* e}{e' e} \quad \text{with} \quad S_0 = \sum_{i=1}^n \sum_{j=1}^n w_{ij}^*, \quad I = \frac{e' W^* e}{e' e}, \quad \text{because of } S_0 = n$$

$$\text{Test statistic : } Z(I) = \frac{I - E(I)}{\sqrt{\text{Var}(I)}} \sim N(0, 1)$$

Lagrange Multiplier (Spatial error):

$$\epsilon = \lambda W\epsilon + v$$

$$H_0 : \lambda = 0, H_1 : \lambda \neq 0$$

$$\text{Test statistic : } LM_e = \frac{(e' W e / s^2)^2}{T}, \quad \text{with } s^2 = e' e / n \text{ and } T = \text{tr}[(W + W')W]$$

$$LM_e > X^2(1; 1 - \alpha) \Rightarrow \text{Reject } H_0$$

Lagrange Multiplier (Spatial lag):

$$t = \rho Wt + \beta X + \epsilon$$

$$H_0 : \rho = 0, H_1 : \rho \neq 0$$

$$\text{Test statistic : } LM_l = \frac{(e'Wy/s^2)^2}{nJ}, \text{ with } nJ = T + (WX\beta)'M(WX\beta)/s^2,$$

$$T = \text{tr}[(W + W')W], \text{ and } M = I - X(X'X)^{-1}X'$$

$$LM_l > X^2(1; 1 - \alpha) \Rightarrow \text{Reject } H_0$$

Variables:

Life Satisfaction - Question reads: *"All things considered, how satisfied are you with your life as a whole nowadays? Please answer using this card, where 0 means extremely dissatisfied and 10 means extremely satisfied."*

Worked in Organisation - Question reads: *"There are different ways of trying to improve things in [country] or help prevent things from going wrong. During the last 12 months, have you done any of the following? Have you ... worked in another (non-political) organisation or association?"*

Trust in Legal System/Politicians/Police - Question reads: *"Using this card, please tell me on a score of 0-10 how much you personally trust each of the institutions I read out. 0 means you do not trust an institution at all, and 10 means you have complete trust. Firstly... the legal system? ... politicians? ... the police?"*

Residence - Question reads: *"Which phrase on this card best describes the area where you live?"* - Answers: 1 A big city, 2 The suburbs or outskirts of a big city, 3 A town or a small city, 4 A country village, 5 A farm or home in the countryside, 7 Refusal, 8 Don't know, 9 No answer.