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**SOCIAL CAPITAL AND REGIONAL ECONOMIC
GROWTH**

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Discussion paper

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Abstract

We study a cross-section of 54 European regions in the period 1950-1998. The central question is whether social capital, in the form of generalized trust and associational activity, is related to regional differences in economic growth. Based on extensive robustness tests, we present evidence that Fukuyama's (1995) argument on trust does not hold and that Putnam's (1993) thesis on group membership in Italian regions can be generalized. Our analysis suggests that it is not only the mere existence of network relationships that stimulates regional economic growth, but also the level of actual involvement in these relationships.

Keywords: social capital, trust, networks, regional economic growth, Europe

JEL-codes: Z13, R11

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1. Introduction

Recently, economists show an increased interest in the role of culture in relation to economic development. Although Hofstede's publications (1991, 2001) have contributed to the incorporation of the role of culture and cultural differences in the field of business economics, mainly international management, this is not the case for general economics. However, since the mid 1980s there is a revival in the study on the determinants of economic growth. This new or modern growth theory has resulted in a number of empirical studies, in which traditional inputs capital and labor are complemented with human capital and indicators that proxy institutional and geographical differences between countries. Since the pioneering work of Kormendi and Meguire (1985), Baumol (1986), Grier and Tullock (1989), Barro (1991), and Mankiw, Romer and Weil (1992) growth empirics have become rather popular. However, as Temple (1999) argues, despite this stream of research there is only limited progression in this field. He concludes his impressive survey of empirical growth literature by arguing that there is a role for research on the relation between culture and economics. He writes: 'Some of the most interesting thinking on economic growth is to be found on the borders of political science and sociology' (Temple 1999, 146). Temple and Johnson reach a similar conclusion when stating that 'there are many possible reasons why society might matter, and their investigation should be a worthwhile direction for further research' (Temple and Johnson 1998, 987).

An influential contribution in this respect is the publication of "Making democracy work" by Putnam, Leonardi and Nanetti in 1993. These authors study Italian regions and find that social capital matters in explaining the regional differences in economic and institutional (government) performance. Putnam et al. (1993, 167) define social capital as those 'features of social organisation, such as trust, norms, and networks, that can improve the efficiency of society by facilitating co-ordinated actions'. The Worldbank uses a similar definition. According to the Worldbank, social capital refers to the norms and networks that enable collective action. It refers

to the institutions, relationships and norms that shape the quality and quantity of a society's social interactions¹.

In addition to standard economic variables, social capital is considered an important factor in explaining economic success, a statement that we choose to refer to as the Putnam hypothesis. Besides Putnam et al. (1993), Fukuyama (1995) has emphasized the importance of social capital. He argues that social capital in the form of non-family or generalized trust is of crucial importance for successful performance in advanced economies. As becomes clear in Putnam et al.'s definition of social capital, trust and networks are seen as dimensions of social capital. Where Putnam et al. (1993) stress the role of networks, Fukuyama (1995) stresses the role of trust.

A number of studies has appeared on the concept of social capital since then (Fukuyama 1995a; Granato et al. 1996; Helliwell 1996; Swank 1996; Inglehart 1997; Fedderke et al. 1999; Paxton 1999; Van Deth et al., 1999; Inkeles 2000; Putnam, 2000). However, empirical studies that focus on the question if the Putnam hypothesis can be generalized are scarce. Though the concept of social capital is intuitively highly appealing, it is hard to measure it empirically. As Woolcock (1998) puts it, vagueness has plagued social capital scholarship. There are a number of concepts that are used in similar ways as social capital, like social infrastructure (Hall and Jones 1999) and social capability (Abramowitz 1986; Temple and Johnson 1998). The indicators used in the literature on social capital are often trust and social participation. A key empirical paper relating social capital with economic growth is Knack and Keefer's study (1997). Nevertheless, as Beugelsdijk et al. (2001) have shown, the statistical robustness of their study is limited. The question if social capital in terms of generalized trust and associational activity influences economic growth is still not answered. The core question remains if Putnam et al.'s (1993) study on Italian regions can be generalized.

Besides great academic and journalistic attention, policy makers also show increased interest in the concept of social capital. According to the European Committee and the European Investment Bank (EIB) the endowment of social capital in the form of business culture and

¹ See <http://www.worldbank.org/poverty/scapital/>

shared norms of behavior is of particular importance for regional development (EIB 2000; EC 1999). “The need, in sum, is for a long term strategy which addresses simultaneously the many aspects of the problem of a lack of competitiveness and attempt to build up the social capital of a region in parallel with its physical infrastructure, the skills of its work force and its productive base” (EIB 2000, 20). Research on the relationship between social capital and regional economic development in the EU may have consequences for the allocation of the structural funds. At the moment, there is too little known about social capital, its functions and the impact on economic growth to formulate clear policy implications. From a policy point of view it is therefore important to find empirical evidence for the role of social capital in regional economic development.

This paper presents an analysis of the relation between social capital and economic growth for European regions. By doing so, we are able to test Putnam et al.’s hypothesis on an analogous sub-national level used in their study².

Our study has two major findings. First, we do not find that on a regional level trust and growth are associated with each other. Second, associational activity and in specific active - unpaid- voluntary work is positively related to regional economic growth.

The outline of the paper is as follows. First we summarize theory on social capital and how it is perceived in the literature. Thereby, we focus on trust and group membership. We describe several functions of trust and argue that trust fulfils different functions at different stages of economic development. Besides as a substitute for a well-functioning institutional system, trust can be seen as a necessary element in complex transactions with incomplete contracts. The second element of social capital we discuss is group membership. Then we turn to statistical analyses, and test if trust and group-membership are related to regional economic growth. After an extensive robustness analysis, we conclude with suggestions for further research.

² There is small difference however. Putnam et al. analyse regions on a different level than we do. Where we use the NUTS1 level (resulting in 11 regions), Putnam et al. apply another definition resulting in 20 regions. In line with Putnam et al. we study sub-units of a country.

2. Trust

In general, trust can be seen as the perception and interpretation of the other's expected dependability. Trust is based upon the expectation that one will find what is expected. It refers to the confidence that a partner will not exploit the vulnerabilities of the other (Gambetta 1988). Several authors have shown the importance of trust in economic transactions. These studies can be seen as an extension of Williamson's (1975, 1985, 1998) transaction cost theory. Ring and Van de Ven (1992) have shown that informal, personal connections between and across organizations play an important role in determining the governance structures used to organize their transactions. Gulati (1995) pointed to the fact that both transaction cost elements as well as social factors are relevant and important in studying inter-firm relationships and co-operation. Repeated ties between firms engender trust that is manifested in the form of the contracts used to organize subsequent alliances. Trust within social networks provides options for control through third parties and serves therefore as a substitute for a legal system. This function is related to the reduction of transaction costs, the costs of running the economic system. Moreover, trust is linked with the facilitation of highly uncertain and complex transactions. It reduces the uncertainty of these kinds of transactions. Uzzi (1996) shows in a study on the apparel industry in New York that trust facilitates the exchange of resources and information that are crucial for high performance but are difficult to value and transfer via market ties. This second function of trust is related to its information function. As Malecki puts it (2000, 195) 'through the economic and social relationship in the network, diverse information becomes inexpensive to obtain'. When discussing alliances, Gulati (1998, 308) argues that 'trust not only enables greater exchange of information, but it also promotes ease of interaction and a flexible orientation on the part of each partner'. It operates as a mechanism that facilitates communication and co-operation between firms. For example, trust relationships can result in a supplier exceeding contractual requirements, whether by early delivery, higher quality, or some other means of assuring goodwill (Sako 1992). Or as Williamson (1985, 62) states 'where personal integrity is believed to be operative, individuals [...] may refuse to be part of opportunistic efforts to take advantage of the letter of the contract when the spirit of the exchange is emasculated'. Nooteboom (1999) even

reasons that too detailed and formal contracts may seriously inhibit the growth of trust. Trust and contractual safeguards are to some degree substitutes. Among those who see trust as a substitute for rules and contracts, Kenneth Arrow (1971, 22) is perhaps the most explicit:

“It is useful for individuals to have some trust in each other’s word. In the absence of trust, it would become very costly to arrange for *alternative sanctions* and *guarantees*, and many opportunities for mutually beneficial co-operation would have to be foregone”. (emphasis added)

According to Fukuyama (1995), societies endowed with generalized trust enjoy a form of social capital, that - complementary to traditional factor endowments like labor and capital - contributes at least as much to their success in modern economic competition. Generalized trust is based on a set of ethical habits and reciprocal moral obligations internalized by members of a community (Fukuyama 1995). High trust societies can do with fewer regulations and coercive enforcement mechanisms. In this view, trust is seen as a substitute for contracts. But in case an institutional system functions properly, the function of trust should be seen in the light of the facilitation of complex transactions. It lowers transaction costs and moreover, it contributes to flexibility. Fukuyama argues that non-family or generalized trust is therefore of importance for successful performance in advanced economies. First, trust allows for the dis-embedding of social relations and second, trust allows for co-operation without the direct influence of power and market. Korczynski (2000) argues that these two functions are of crucial importance to advanced capitalist economies given their increasingly globalised and turbulent nature. Thus, trust not only serves as a substitute for legal systems, but also functions as a facilitator of complex transactions that even in case of a well-functioning institutional system cannot be fully ‘arranged’ in terms of contracts.

Hence, in general the economic function of trust refers to the reduction of transaction costs and its influence on promoting co-operation and reducing the need (costs) for intervention to prevent or correct dishonesty. But also from a sociological point of view, trust has several functions. Especially Parsons’ (1969) study and Luhmanns’ (1979) study are important in this

respect. Parsons places trust in the center of the construction of social order. In Parsons' view, a common value system based on widely shared norms and values, stabilizes interactions in a social system. Trust is grounded in pre-existing consensus and is a product of an effective integration of norms and values. Trust fulfils an integrative function in the establishment of social order. The second function of trust in sociological thinking has been put forward by Luhmann in 1979. He views trust as a social mechanism that reduces complexity and enables individuals to deal with the complexity and contingency of modern life. This corresponds with Williamson's (1985) argument that exchange relations that feature personal trust will survive greater stress and will display greater adaptability.

3. Group membership

Regarding the function of associational activity and its link to economic growth, theory is less clear than with respect to trust (Bertrand et al. 2000). We distinguish two functions of associational activity or group membership on welfare.

Putnam et al. (1993) show that networks relationships improve the efficiency of society by facilitating coordinated actions. Their study on Italian regions has shown that the critical factor in explaining effectiveness of regional governments and regional economic performance in Italy is to be found in regional differences in social structure. Effective governance hinges critically on traditions of civic engagement and the structure of the civic networks. In regions where social relationships are more horizontal, based on trust and shared values, participation in social organizations is higher and social capital is higher. They conclude that regions, in which the regional government is more successful and the economy is more efficient, are characterized by horizontal relations that both favored and fostered greater networks of civic engagement and levels of organization in society. The reason Putnam et al. specifically study the degree of civic community membership is that 'Citizens in a civic community, though not selfless saints, regard the public domain as more than a battleground for pursuing personal interest' (Putnam et al. 1993, 88). In this way fewer resources are used incurring transaction costs. Or as Leonardi (1995, 169)

writes, high social capital means that citizens accept the positive role played by collective action (organized group behavior) in pursuing collective goods.

The second function of associational activity is closely related to the theory of networks and the advantages of being embedded in networks. There are two theoretical approaches for understanding how social relations and networks create economic and social benefits (Gargiulo and Benassi 2000; Uzzi 1999). The weak-tie approach argues that a large network of arm's-length ties is most advantageous. On the other hand there is the strong-tie approach which claims that a closed tightly knit network of embedded ties is most advantageous. This corresponds with the two opposite views in literature on the optimal structure of networks. Whereas Coleman (1990) argues that closed networks may provide a better basis for co-operation, Burt (1992) stresses cohesive ties as a source of rigidity. However, in both cases the core of the argument relates to the transfer of knowledge between actors. In Burt's (1992) concept, structural holes are important sources of new information. A fundamental idea that inspired Burt's structural-hole theory is Granovetter's description of the "strength of weak ties" (Granovetter 1973). Granovetter reasoned that access to new information is obtained through an ego's weak ties to nodes at a distance from his own local network. The reasoning is that information within the local network is widely shared locally, hence most of the local contacts are redundant. New information comes from non-redundant ties.

Though Coleman's closed network approach seems to be opposite to Burt's view of structural holes (open networks), Coleman states that exactly the closure of the network and the embeddedness of the actors provide opportunities to obtain information that otherwise would be impossible or too expensive to obtain. In both views, embeddedness in networks creates advantages like increased sources of information, and obtaining information that is not easily available (spillover effects).

In sum, the economic function of associational activity contains two elements. The first refers to the concept of collective action and argues that organized group behavior may lead to the generally shared idea that the pursuit of collective goods is not seen as contradictory to the achievement of personal wealth. Associational activity limits the costs of free riding. Secondly,

embeddedness in networks (group membership) promotes the spillover of knowledge and information between the different actors involved.

4. Empirical test

In order to test if social capital influences regional economic growth, we investigate 54 European regions. By doing so, we are able to test if the Putnam hypothesis on social capital based on Italian regions can be generalized. We also test if Fukuyama's statement on generalized trust and its importance for economic growth holds for our sample of European regions. In addition, there are other advantages of investigating regions in Europe. First of all, the set of regions is relatively homogeneous compared with studies on culture and economics that incorporate countries like Taiwan and Germany or Japan and the United States in the same regression analysis. Temple's critical comment (1999) that countries differing widely in social, political and institutional characteristics are unlikely to fall on a common surface, is heeded by taking this relatively homogeneous set of European regions. A second advantage of studying regions is the number of observations. Instead of only 29 countries (Knack and Keefer 1997), we study 54 regions. Most important, however, is the fact that by comparing *national* cultures, 'we risk losing track of the enormous diversity found within many of the major nations of the world' (Smith and Bond 1998, 41). By studying regions and regional differences this risk is limited.

5. Data

Data are taken from the European Value Studies (EVS), which is a survey on norms and values. The survey comprises three waves (1981/1990/1999), of which we use the second one. In order to obtain regional scores on trust we had to regroup the original individual data. We did not use the first wave that was carried out in 1981, because we could not trace the individual scores in terms of regions. The latest wave, 1999/2000 was not completed by the time we finished this paper. Therefore we use the 1990 data. The set comprises 7 countries, i.e. France, Italy, Germany, Spain, The Netherlands, Belgium, and the United Kingdom. In order to compare the data on norms and values with regional economic data we used the Eurostat definition of regions. The

regional level in our analyses is the NUTS1 level. This implies that France consists of 8 regions, Italy 11 (including Sicily and Sardinia), Germany 11 (former eastern regions excluded), Spain 7, The Netherlands 4, Belgium 3, and the UK 10 (including Scotland, excluding Northern Ireland). The total number of regions equals 54 (see figure 1). The numbers of the European regions are defined in Table 1.

<Insert figure 1 about here>

<Insert table 1 about here>

6. Trust

The question we used to assess the level of trust in a society is: “Generally speaking, would you say that most people can be trusted, or that you cannot be too careful in dealing with people?”. After deleting the number of respondents that answered “don’t know”, we took the fraction of people that answered “most people can be trusted”.

For our sample of 54 regions we have obtained scores on trust. These scores range from 5.5% of the respondents answering that most people can be trusted in Sardegna in Southern Italy to 64.6% in the eastern part of the Netherlands. Mean score equals 0.35 with a standard deviation of 0.11. In figure 2 the scores on percentage of people answering that most people can be trusted are shown.

<Insert figure 2 about here>

As can be seen in figure 2, the regional scores on trust differ considerably within Europe. When looking at countries, we see for example that The Netherlands are rather homogeneous in terms of trust, but regions in Italy differ a lot. Putnam et al. (1993) seemed right in the case of Italy, when describing the differences between the Northern and the Southern regions. The North

has higher scores on trust than the South. However, at first sight such a picture for Europe as a whole cannot be obtained. While some researchers have suggested that religion, especially Protestantism, correlates with trust (e.g., Inglehart 1990, Knack and Keefer 1997, 1283), our regional analysis suggests this is not the case. Traditional Catholic regions in the South of the Netherlands, Flanders, Madrid and the North of Italy all fall in the group of regions that have the highest scores on trust (0.447-0.646)³, far above average (see figure 2).

7. Group membership

Besides interest in general trust, Putnam et al. (1993) explicitly studied memberships of clubs and associations. They suggested that dense horizontal networks positively affect the level of trust and citizenship⁴. As mentioned earlier, social capital is often perceived in terms of networks and being member of such a network. Knack and Keefer (1997, 1273) find no direct effect of membership of groups on economic growth or investment. Horizontal networks – as measured by membership in groups – are unrelated to trust and civic norms (controlling for education and income) and to economic performance (1997, 1284). Their explanation is the possible counter-effects of Putnam and Olson groups. Whereas Putnam groups may be evoking positive effects, these may be reduced by harmful effects of the Olson groups. Olson (1982) argued that as a society's networks of associations become highly developed, they strangle economic growth (e.g. lobbying costs).

Similar to Knack and Keefer, we measure the average number of groups cited per respondent in each country. However, as the authors argue, the categories are overly broad (1997, 1274). Second, and more important, is the fact that level of involvement is not measured, which may reduce the validity of this measure of social capital. As mentioned before, the hypothesized benefits of network embeddedness may not be captured when taking passive membership of groups and associations. Therefore, we have taken active membership (A-Groups) of a number of

³ The ranges in the figures are based on the equal count criterion in the Mapinfo Geographical Information System (GIS)-application.

associations instead of passive membership. For reasons of clarity, we depicted an overview of the different measures of social capital in figure 3.

<Insert figure 3 about here>

The question we use to measure group membership, is stated as follows: ‘which, if any do you belong to?’. The categories are:

- a) Social welfare services for elderly handicapped or deprived people
- b) Religious or church organizations
- c) Education, arts, music or cultural activities
- d) Trade unions
- e) Political parties or groups
- f) Local community action
- g) Third world development or human rights
- h) Conservation, the environment, ecology
- i) Professional associations
- j) Youth work
- k) Sports or recreation
- l) Women’s groups
- m) Peace movement
- n) Animal rights
- o) Voluntary organizations concerned with health

The above categories are the same for our measures of passive and active group membership. The difference between the two is that in case of active membership respondents are not only a member but also do voluntary work for the particular association. As described earlier and in line with Putnam et al. (1993), we think of the level of doing unpaid voluntary work as an

⁴ This argument is not new. Already in 1835 Tocqueville argued that membership in voluntary associations was conducive to democracy. Putnam (1993) however extends the argument and argues that voluntary

indication of collective feelings of responsibility. As such these moral norms may have positive effects on the provision of public goods. Moreover, as we argued in the previous section on network theory, these networks may provide spillover channels (Oerlemans et al., 2001).

The scores are obtained by taking the average score per region of respondents answering yes to the question mentioned above. Furthermore, we have calculated regional scores on the Putnam and Olson groups corresponding to Knack and Keefer's analysis at a country level⁵. The Putnam groups refer to membership of b) religious organizations, c) education, arts, music or cultural activities and j) youth work. The Olson groups consist of membership of d) trade unions, e) political parties of groups, and i) professional associations. Figures 4 and 5 show the scores on the P-Groups and O-Groups respectively according to the definition of Knack and Keefer (1997).

<Insert figure 4, 5 and 6 about here>

The mean score on the Putnam groups at the regional level is 0.26 with a standard deviation of 0.18. The highest score is found in the eastern part of the Netherlands, with a score of 0.89. This implies that on average 89% of the people is member of at least one of the organizations included in the Putnam groups. The lowest score can be found in Sardegna, Italy, where only 3% of the people are member of at least one of these organizations. The scores on the Olson groups range from 0 in Sardegna, Italy to 0.55 in the eastern part of the Netherlands. The mean value is 0.22 with a standard deviation from 0.12. Table 2 shows the mean scores and the standard deviation for the social capital variables.

Regarding the question on unpaid voluntary work (A-Groups) we obtained an average score of 0.41 and a standard deviation of 0.17. The highest score is obtained in Bremen, Germany (0.82) and the lowest score on active membership can be found in Sardegna (0.08). The correlation between active membership and Putnam groups is 0.7, between active membership

associations are not only conducive to democracy, but also to economic development.

⁵ Note that Knack and Keefer (1997) have fewer types of associations included in their measure of group membership, because of lack of data. In addition to the associations they analyse, we include items k,l,m,n, and o extra.

and Olson groups 0.69 and between active membership and interpersonal trust 0.21. Table 3a shows the correlation of the social capital variables.

< Insert table 2 and 3a/b about here >

8. Economic data

In order to test if trust and group membership are related to economic growth, we have taken a standard growth framework, that corresponds with Knack and Keefer's empirical test, and which includes initial level of GDP per capita, the investment ratio and the school enrolment ratio.

As the availability of data on the level of European regions is scarce, the number of empirical studies is relatively limited compared to cross-country studies. A basic reference is Barro and Sala-i-Martin (1995). Similar to these authors, we have computed the regional growth figures by relating the regional GDP per capita information to the country mean⁶. There are two reasons to use the country mean as a correction factor. First of all we do not have regional price data. Second, the figures on regional GDP are provided in an index form that is not comparable across countries. Hence, we have used Gross Regional Product (GRP) figures that are expressed as deviations from the means from the respective countries. The 1950 data are based on Molle, Van Holst and Smits (1980), whereas the data for Spain refer to 1955 and are based on Barro and Sala-i-Martin's (1995) calculations. The 1998 data on GRP are drawn from Eurostat information. Regional growth figures are depicted in figure 7.

<insert figure 7 about here>

⁶ Gross Regional Product of a region in 1950 is divided by the mean of the Gross Regional Products of all regions belonging to a certain country. A similar formula is applied to calculate the 1998 relative regional product. Regional growth over the period 1950-1998 is then based on these two indices.

If we compare figure 7 on Growth with figure 2 on Trust it is hard to observe a clear overlap in the two figures. Regions that grow fast do not seem to be characterized by high scores on trust. If we look at the correlation between Growth and Trust this is confirmed by the correlation of only 0.05 (see table 3a). The picture is less clear with respect to the dimensions of group membership. The correlation between Growth and the different measures of group membership is around 0.25 with the highest correlation of 0.29 between Growth and A-Groups (see table 3a). The figures and correlation tables show that the relationship between our social capital variables and regional economic growth do not seem to be that strong. However, the question is if the conclusion is right when controlling for other economic variables, like investment in physical capital.

Investment ratio is measured at country level. Data are taken from the Penn World Tables 5.6. The period for which we have calculated the average of the investment ratio is 1950-1992⁷. Apart from availability of data, another reason to take the *country* level investment data and not the regional scores, is the underlying assumption of a closed economy. Because of spatial interaction, regional investment figures would only provide a limited understanding of regional economic growth (Nijkamp and Poot 1998). Therefore we have taken the country level data.

School enrolment ratio measures the total number of pupils at first and second level in 1977, divided by total number of people in the corresponding age group. The growth period we analyze is 1950-1998. The school enrolment rate in 1977 falls in between these dates and given the fact that school enrolment rates have increased since 1950, the 1977 information is a reasonable proxy for the average over the entire period. Data come from Eurostat. Data on school enrolment rates in Spanish regions refer to 1985. We have taken uncorrected regional figures because it has been shown that migration plays only a minor role in European regions and the relation with per capita GDP is weak (Barro and Sala-i-Martin 1995; Begg 1995).

The basis for our analyses is the standard 'Barro' type of a growth regression, including the investment in physical capital, human capital and the initial level of economic development. In order to control for concentration of human capital in major agglomerations, we included a

variable that consists of the score on the school enrolment rate multiplied by a dummy variable for the region in which a major agglomeration is located⁸. Furthermore we tested if spatial correlation influences our results. Ideally one should use interregional input-output tables to calculate regional multipliers and construct a variable that controls for spatial correlation⁹. However, this information was not available. In order to control for spatial correlation, we applied Quah's (1996) approach and calculated the so-called neighbor relative income. This method implies that we use average per capita income of the surrounding, physically contiguous regions to control for spatial auto-correlation. In our sample, however, the 1950 GRP data are related to national average and therefore reflect regional welfare relative to country mean. By using these data we implicitly assume that scores for neighboring regions in foreign countries influence regional growth if the welfare in this neighboring region is relatively high compared to their own national average. Of the 54 regions in the sample, 19 have neighboring regions in countries other than the region's own host itself, whereas 4 had no neighboring regions at all¹⁰.

Hence, our basic regression analysis includes initial level of welfare (GRP1950), school enrolment rate (SCHOOL), investment ratio (INVEST), spatial correlation (SPILLOVER) and a human capital concentration dummy for agglomerations (AGGLEDU). We considered log-specifications for the first three variables. The results are shown in table 4.

< Insert table 4 about here >

The first model we estimated is the standard model. As the results show, all variables except for the school enrolment rate are significant at the 5% level. Schooling is significant at the 10% level. The initial level of welfare is negatively related to economic growth, which supports the convergence hypothesis. This corresponds with other findings on regional convergence in

⁷ Penn World Tables 5.6 provides data up to 1992.

⁸ We selected the Western part of the Netherlands, Greater Paris, Greater Berlin, Greater London, Barcelona area, Brussels, and the Italian region Lazio (Rome).

⁹ There exist other ways to have a more refined control variable that can be taken into consideration, for example the physical length of abutting boundaries or the physical characteristics of the border terrain. However, these kinds of extensions go beyond the scope of the current paper.

Europe (Martin and Sunley 1998). However, if we take shorter periods of time (e.g. 1970-1998) we cannot find proof for the convergence hypothesis. This corresponds with findings on country (Levine and Renelt 1992) and regional level (Fagerberg and Verspagen 1995). The period in the eighties can be roughly characterized by divergence instead of the observed convergence in the period before (Maurseth 2001). However, based on our sample, we conclude that for the overall after war period, the σ -convergence hypothesis holds, i.e. the growth rate of per capita GDP is negatively related to the starting level of per capita GDP.

To test the hypothesized positive relation between social capital and economic growth, we included social capital variables discussed above. First, as shown in the second model specification in table 4, we added the scores on generalized trust. The Trust variable is not significant. This might seem surprising given the results of Knack and Keefer's (1997) study on country level in which it was found that trust significantly influenced economic growth between 1980 and 1992 in 29 countries. However, as has been shown by Beugelsdijk et al. (2001), Knack and Keefer's findings on trust are not statistically robust.

In the third model we included group membership. In accordance with Knack and Keefer (1997) we split this variable up in two sub-groups, namely O and P-Groups. As can be seen in table 4, P-Groups are not significant and O-Groups are significant at the 5% level. In the fourth model we include the measure for passive group membership. Passive group membership has a significant and positive influence on regional growth rate. In the final step we included the variable that indicates active membership. The active membership variable (A-Groups) is highly significant (1% level) and as a consequence, the resulting model has the highest variance explained. Hence, active membership, doing unpaid voluntary work is significantly correlated with regional economic growth. The question is whether these findings are robust.

9. Robustness test

In order to test if the above findings are robust, we performed several tests. First, we tested for multi-collinearity and heteroskedasticity. As the results in table 4 indicate, these do not

¹⁰ The average number of physical neighbour regions is 3.3, which corresponds with Quah's score of 3.3.

significantly influence the results. The Cook-Weisberg (CW) test for heteroskedasticity and the Variance Inflation Factor (VIF) for multi-collinearity both indicate that in the models specified in table 4, these are not problematic and do not influence the results. However, a sensitivity analysis that only consists of test for multi-collinearity and heteroskedasticity is not complete. We choose to extend our sensitivity analysis in several ways, among which the recursive method and tests based on the Extreme Bounds Analysis (EBA).

First, we performed several regression analyses in which the different social capital variables are combined. Regarding Trust and the Putnam and Olson groups, results do not change. However, if we include both active and passive membership, passive membership becomes insignificant. As the correlation between the active and passive membership is 0.85 (see table 3), this is likely to be due to multi-collinearity problems. In case we perform a regression analysis in which as well Groups and A-Groups are included, multi-collinearity analysis shows that the variance inflation factor for these two variables is larger than 4.9, whereas the rest of the variables do not exceed 1.5. Though rule of thumb reads that VIF's exceeding 10 are problematic, we consider the strong correlation and the VIF analysis as an indication of problematic multi-collinearity.

Next, we have applied the recursive method to test if the composition of the sample influences our results. First we order the 54 observations according to a certain variable. In this case we chose for regional economic growth. This means that the first observation is the region with the lowest growth rate over the period 1950-1998, and observation 54 is the fastest growing region over this period. The recursive method implies that based on the order in which the observations are represented observations are deleted and the coefficients are estimated based on this smaller sample. In figure 8 we have plotted the coefficient of Trust when the order of observations is based on growth, according to the second model of table 4.

<Insert figure 8 about here>

The line in the middle plots the value of the regression coefficient for Trust. The outer lines represent 95% confidence intervals. The horizontal axis represents the observations, where observation 54 is the fastest growing and observation 1 the slowest growing region. The vertical axis represents the value of the Trust coefficient at a certain number of observations. If 54 observations are included the value of the Trust coefficient equals 0.011, which can be seen in the figure on the far right of the horizontal axis and corresponds to the results in table 4. Moving from the right to the left on the horizontal axis means deleting regions that are the fastest growing. For example, observation 50 implies that the 4 fastest growing regions are deleted. The corresponding value of the Trust coefficient based on the sample of 50 regions is close to 0.011. The stable line in figure 8 leads us to conclude that the Trust coefficient is independent of the deletion –or inclusion- of fast growing regions in the sample.

We performed similar tests for the other variables, that all behaved in a stable way or according to economic theory. In the latter case we refer to the initial level of welfare. Inclusion of fast growing regions causes the coefficient of GRP1950 to decrease (more negative), which corresponds to the convergence hypothesis. Figure 9 represents the results of the recursive method for the A-Groups, according to the fifth model of table 4. Observations are again ordered according to regional economic growth. As the figure shows, the coefficient of A-Groups slightly increases when faster growing regions are included.

<Insert figure 9 about here>

A final step in our robustness analysis is the test whether the variables in our model fulfil the weak and – or strong EBA test. The program that is available to perform this robustness test is called *MetaGrowth* and was developed against the background of the robustness discussion in growth literature¹¹. The Extreme Bounds Analysis (EBA) has been developed by Leamer (1985). It labels a relationship between an independent variable and an explanatory variable X_i as robust if the relationship is of the same sign and statistically significant for any possible model

specification. However, subsequent analysis relaxed this requirement. Sala-i-Martin (1997) introduced the criterion that the relationship should be significant in at least 95% of the cases, which has become known as the weak EBA test.

The procedure we applied consists of several rounds, in which we test all possible combinations of the explanatory variables¹². For each variable, the program calculates the fraction of significant results. The strong EBA test is fulfilled when a value of 1 is achieved. This means that a variable has the same sign and is statistically significant in all possible model specifications. The weak EBA-test is fulfilled when the above holds in at least 95% of the cases. If we choose to regress on all possible combinations of the explanatory variables, we estimate 512 regression models. If we limit the number of combinations by running regression models that always include initial level of welfare and exclude the combination of passive and active membership, the number of models that can be run is limited to 32. Based on this extensive robustness analyses, we conclude that two variables fulfil the strong EBA test when explaining regional economic growth in the period 1950-1998. These two variables are level of welfare in 1950 and (active) membership, as an indicator of social capital.

Instead of this linear procedure to test for robustness, it is more common to test the robustness of the regression results using a stepwise procedure that is available in most statistical packages. When applying the stepwise method in *STATA* and starting from an empty model, the same result is achieved as the result using *MetaGrowth*. In both cases, initial level of welfare and active membership are variables that are 100% robust. In sum, our extensive robustness analysis shows that regarding the social capital variables, active membership is robust and fulfils the strong EBA test. Trust is never significant.

10. Implications, limitations and suggestions for further research

Economists show increased interest in the concept of social capital. An important study in this field of social capital is Putnam's study on Italian regions. He showed that differences in

¹¹ More information on the package can be found at <http://www.feweb.vu.nl/re/MasterPoint/>

economic performance and the well functioning of the institutions in Northern and Southern Italy can be traced back to differences in social capital.

In this paper we studied 54 regions in Europe and applied a standard economic model to test if the Putnam hypothesis can be generalized. Social capital is operationalized in terms of generalized trust and associational activity, split up in several elements. Similar to Knack and Keefer (1997) we made a distinction between Putnam groups and Olson groups, and in addition we distinguished active and passive membership.

We have shown several things. First, we found that the convergence hypothesis at the regional level holds. Second, we could not find robust proof for the significant influence of investments and regional school enrolment rates on regional economic growth. Third, social capital in terms of trust is not related to economic growth at the regional level in Europe. Fourth, Knack and Keefer's distinction between P- and O-Groups does not yield additional insights. The findings on O-groups are not robust. However, the main implication of our study is that we found that social capital in terms of (active) group membership contributes to regional economic growth in Europe.

We have shown the hypothesis put forward by Putnam et al. (1993) that social capital matters for regional economic success, can be generalized to the extent that it is not only the existence of social networks that contribute to regional economic growth, but also the actual level of involvement in it. In contrast with the country-level analysis of Knack and Keefer (1997), our regional analysis does not support the hypothesis that trust is positively correlated with economic growth. Besides a lack of statistical robustness of Knack and Keefer's (1997) study (Beugelsdijk et al., 2001), we feel these different results regarding trust are caused by a sample selection bias. In fact, by choosing a sample of nations ranging from a less developed country like Nigeria to wealthy countries like The Netherlands or the USA, Knack and Keefer may have overestimated the importance of trust. The cross-country differences in institutional maturity in their sample may lead to this overestimation of trust. A similar line of reasoning holds for the role of the Olson

¹² As this procedure yields a number of tables, we have decided to discuss the results and not include all output that was generated. Tables are shown in the statistical appendix and/or available upon request.

groups. Remember that the O-Groups include membership of trade unions. Given the institutional differences across countries, the probability that someone is a member of a trade union differs considerably across relatively rich and poor countries. In a country like Nigeria membership of a trade union is not as natural, even impossible in some cases, as in a relatively advanced country like Germany. By taking regions in Europe the danger of overestimation of the importance of social capital as a result of too large institutional differences is limited.

Our findings regarding active membership may have implications for policymakers. We showed that social capital in terms of active volunteering work is positively related to regional economic growth. Does this mean that governments may want to increase active membership of all kinds of associations? Does this imply that policymakers need to take a new look at the relation between labor and leisure? It is clear that a number of factors that policymakers can influence are related to the degree of associational activity. However, as long as we do not exactly know the mechanism between active membership and regional economic growth, it is too early to formulate clear policy implications.

Obviously this study suffers from a number of limitations. First of all, lack of proper regional economic data forced us to use country relative regional products. Second, the period of observation is 1950-1998, whereas the social capital data refer to 1990¹³. Ideally, one would prefer social capital data referring to the start of the period of analyses. However, the earliest period of which we have data on our measurement of social capital (1981) is highly correlated to the 1990 data we used (over .90)¹⁴.

Future research should focus on the exact mechanisms through which social capital in terms of associational activity influences economic growth in the European regions. As we described in the section on group membership, theory argues that associational activity may

¹³ We also performed regression analyses on the period 1970-1998. Although we miss data for Spain in 1970 and the number of observations is reduced to 47, results show that overall fit decreases and significance levels generally go down, but overall conclusion holds.

¹⁴ Knack and Keefer (1997, 1257) also discuss the validity of the trust measure and conclude that there is no severe noise in this survey-based measure of social capital. They base their conclusion on experiments conducted by the *Reader's Digest* and reported in *The Economist*, June 22, 1996. In an experiment of "accidentally" lost wallets, the percentage of wallets returned in each country closely tracks the Values Survey measure of trust.

promote the spillover of knowledge in networks and, second, may limit the costs of free riding through feelings of collectivity. However, there is no clear understanding how these mechanisms exactly work. More insight in these mechanisms is especially important for policymakers at the regional, national and European level. As we discussed above, the importance of (active) membership of all kinds of associations for regional economic growth may lead to a re-thinking of the relation between work and spare time. But before actual policy plans in this field are developed, we need to know more about the mechanism between active group membership and regional economic growth. The current attempts and activities of the Worldbank in the field of social capital and developing countries are worth mentioning. The importance of network relationships and the promotion of associational activity have led to a number of successful development projects. Increasingly, the Worldbank acknowledges that social capital may play a crucial role in the reduction of poverty and the success of development programs. Social capital is integrated into Worldbank policies in a number of ways¹⁵. Nevertheless, these initiatives mainly focus on developing countries and the question remains if the relationship between social capital and economic growth is the same for rich and poor countries.

A related question is if the lack or abundance of social capital influences the success of the regional development programs in the less favored regions of Europe. It would be interesting in future research to relate the degree of success of the Structural Funds of the EU in certain regions to the presence (or absence) of social capital.

¹⁵ For an overview of the Worldbank social capital initiatives we refer to <http://www.worldbank.org/poverty/scapital/bank2.htm>

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Figure 1: map of European regions

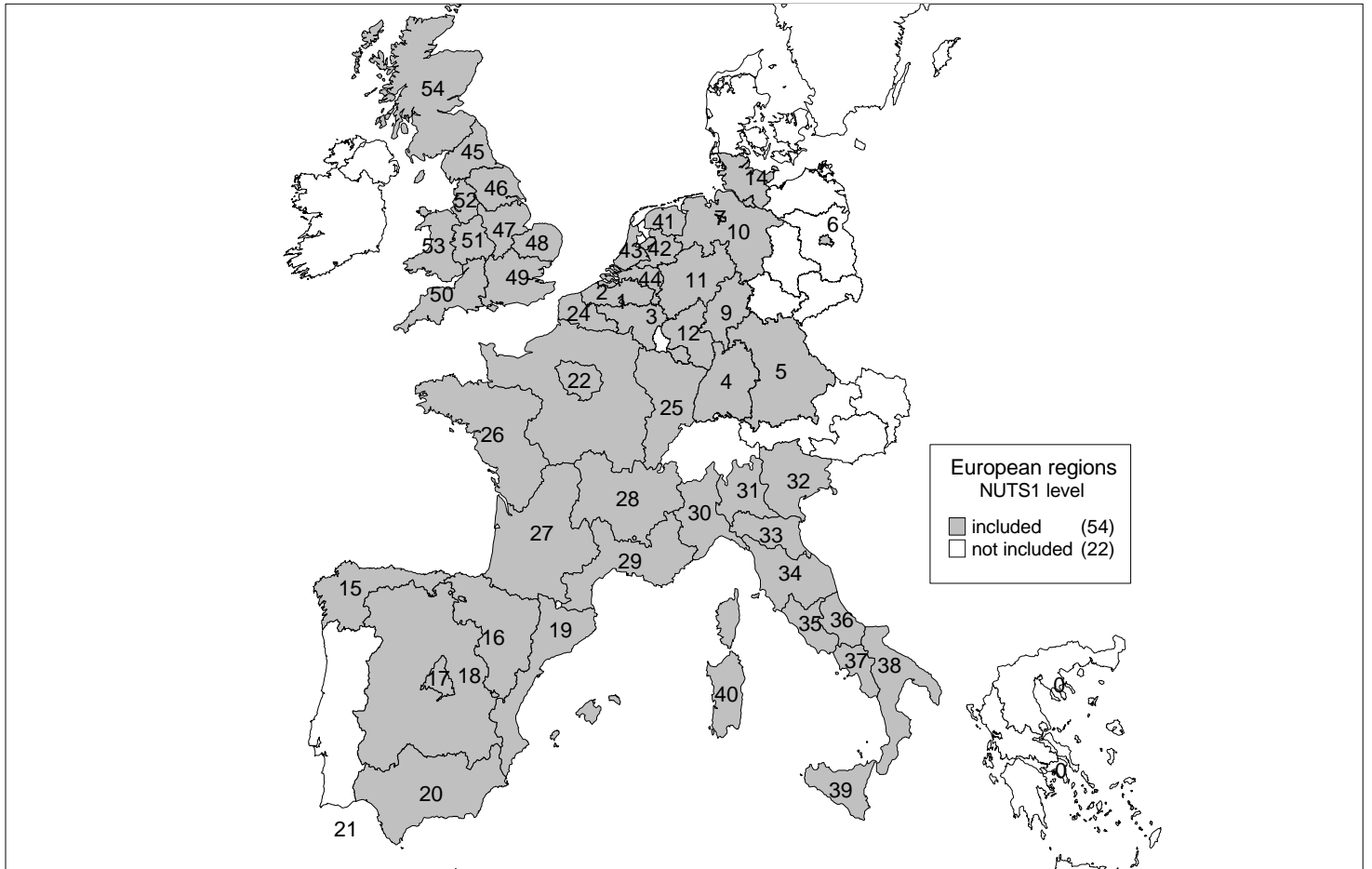


Table 1: Data for European regions

	Region	NUTS1 code
1	Reg. Bruxelles-Cap.	BE1
2	Vlaanderen	BE2
3	Wallonie	BE3
4	Baden-Württemberg	DE1
5	Bayern	DE2
6	Berlin	DE3
7	Bremen	DE5
8	Hamburg	DE6
9	Hessen	DE7
10	Niedersachsen	DE9
11	Nordrhein-Westfalen	DEA
12	Rheinland-Pfalz	DEB
13	Saarland	DEC
14	Schleswig-Holstein	DEF
15	Noroeste	ES1
16	Noreste	ES2
17	Madrid	ES3
18	Centro	ES4
19	Este	ES5
20	Sur	ES6
21	Canarias	ES7
22	Île de France	FR1
23	Bassin Parisien	FR2
24	Nord-Pas-de-Calais	FR3
25	Est	FR4
26	Ouest	FR5
27	Sud-Ouest	FR6
28	Centre-Est	FR7
29	Méditerranée	FR8
30	Nord Ovest	IT1
31	Lombardia	IT2
32	Nord Est	IT3
33	Emilia-Romagna	IT4
34	Centro	IT5
35	Lazio	IT6
36	Ambruzzo-Molise	IT7
37	Campania	IT8
38	Sud	IT9
39	Sicilia	ITA
40	Sardegna	ITB
41	Noord-Nederland	NL1
42	Oost-Nederland	NL2
43	West-Nederland	NL3
44	Zuid-Nederland	NL4
45	North	UK1
46	Yorkshire and Humberside	UK2
47	East Midlands	UK3
48	East Anglia	UK4
49	South East	UK5
50	South West	UK6
51	West Midlands	UK7
52	North West	UK8
53	Wales	UK9
54	Scotland	UKA

Table 2: Descriptive Statistics

	Mean	Std. Dev.
Trust	.35	.11
P-Groups	.26	.18
O-Groups	.22	.12
A-Groups	.41	.17
Groups	.62	.38
Growth 1950-1998	.029	.33
Investment	24.25	3.74
Schooling	.51	.067

N=54; investment data are national.

Table 3a: Correlation table of social capital variables

	Growth 1950-1998	Trust	P-Groups	O-Groups	A-Groups	Groups
Growth 1950-1998	-	.05	.16	.23*	.29*	.25*
Trust		-	.42*	.52*	.21	.46*
P-Groups			-	.72*	.70*	.79*
O-Groups				-	.69*	.79*
A-Groups					-	.85*
Groups						-

*, significant at 0.10.

Table 3b: Correlation table of standard economic variables

	Growth 1950-1998	GRP 1950	Schooling	Investment	Aggl.edu	Spillover
Growth 1950-1998	-	-.55*	-.15	.13	-.07	.05
GRP 1950		-	.29*	-.006	.35*	.17
Schooling			-	-.31*	-.10	-.05
Investment				-	-.03	-.19
Aggl.edu					-	-.19
Spillover						-

*, significant at 0.10.

Figure 2: Trust scores at NUTS1 level in Europe

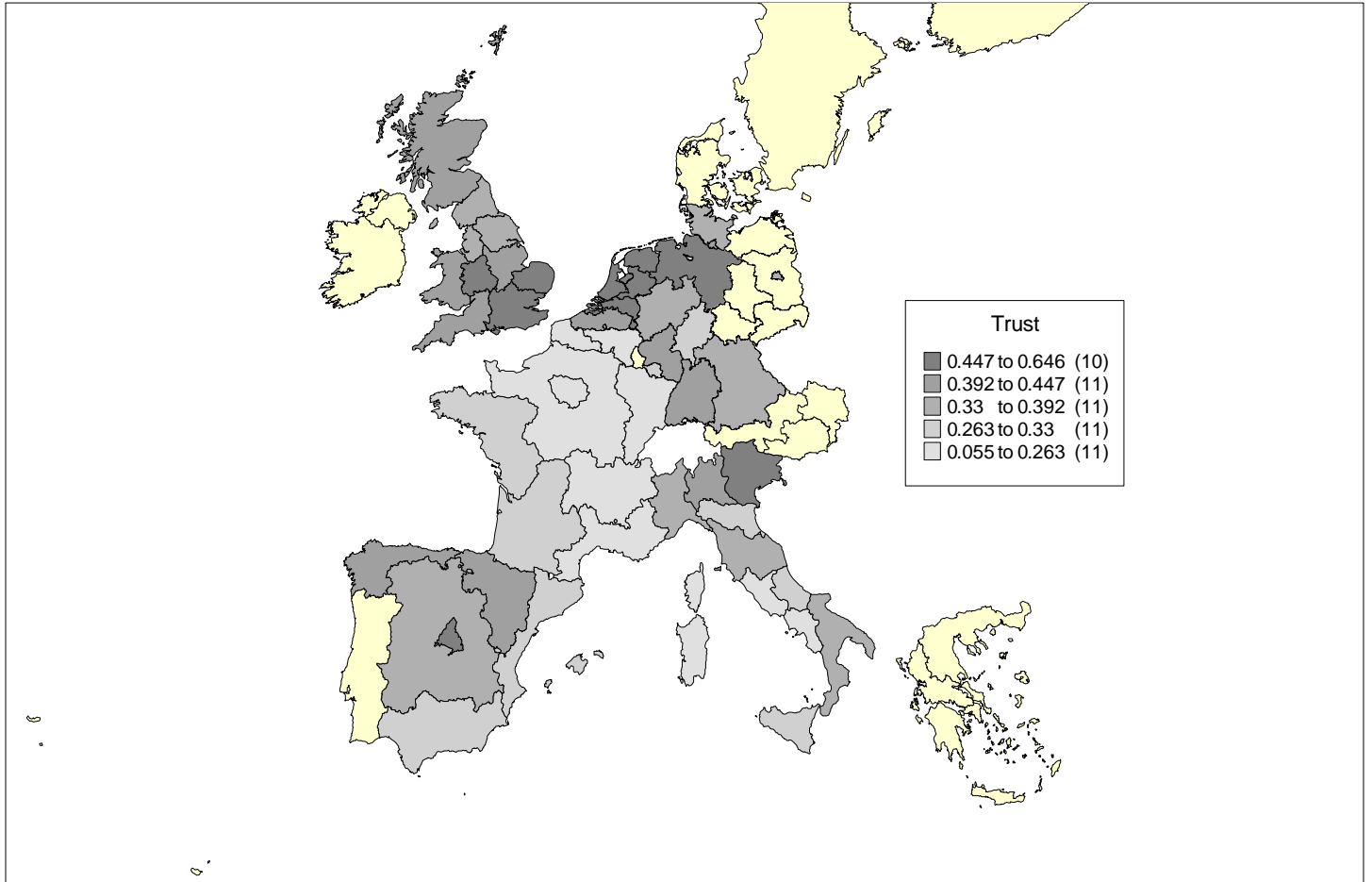


Figure 3: An overview of the different measures of social capital (+ or – indicates direction of hypothesized relationship with regional economic growth)

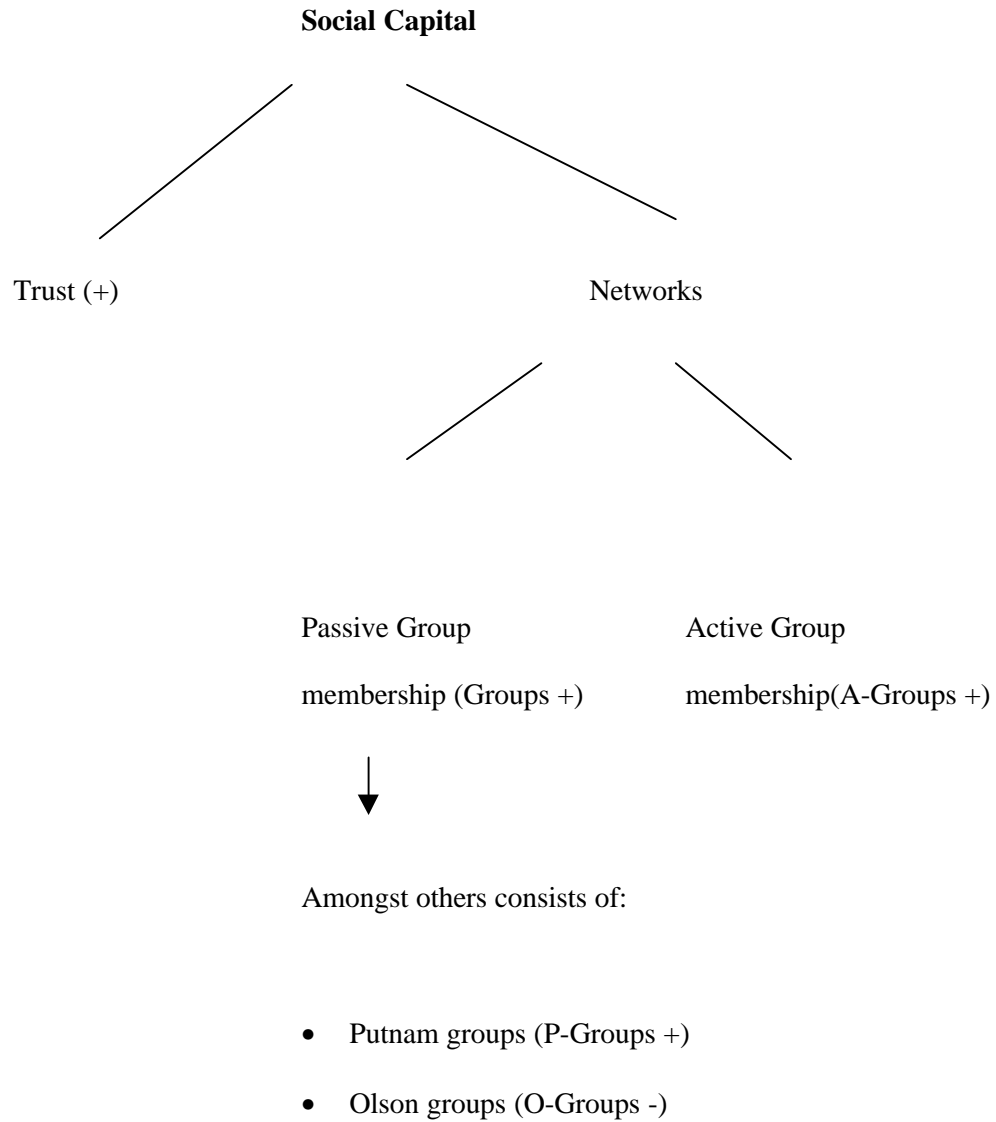


Figure 4: Regional scores on P-Groups in Europe

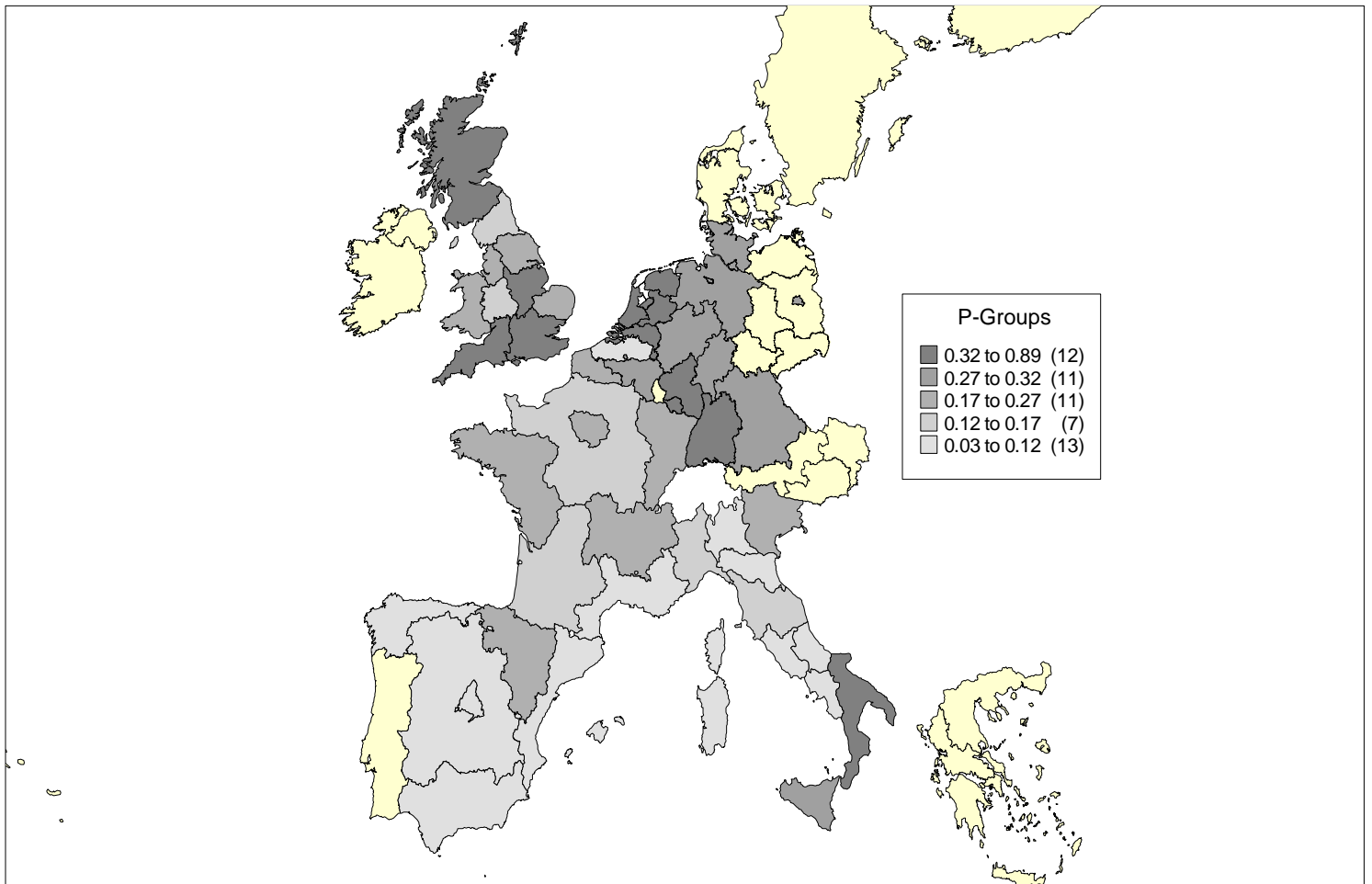


Figure 5: Regional scores on O-Groups in Europe

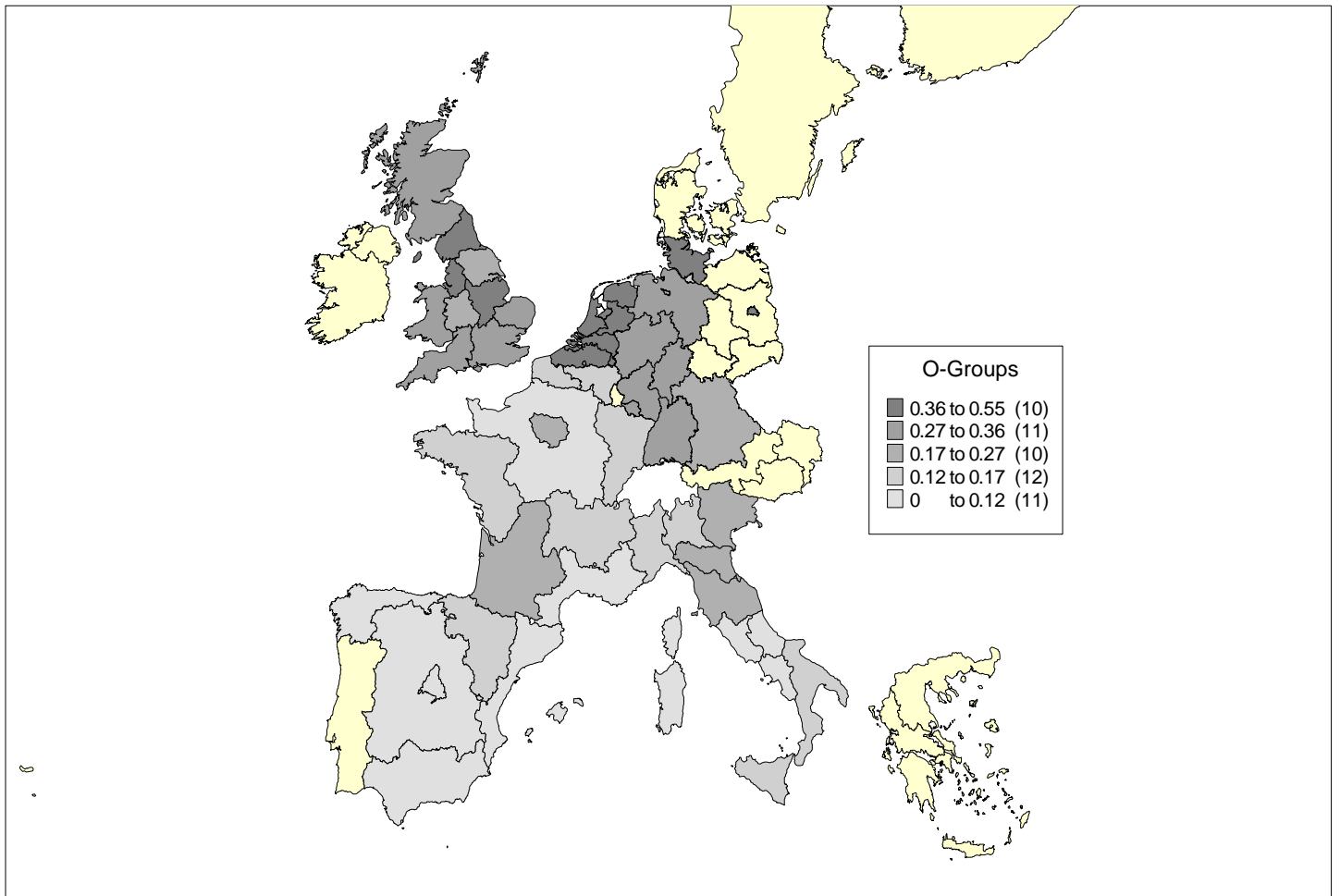


Figure 6: regional scores on A-Groups in Europe

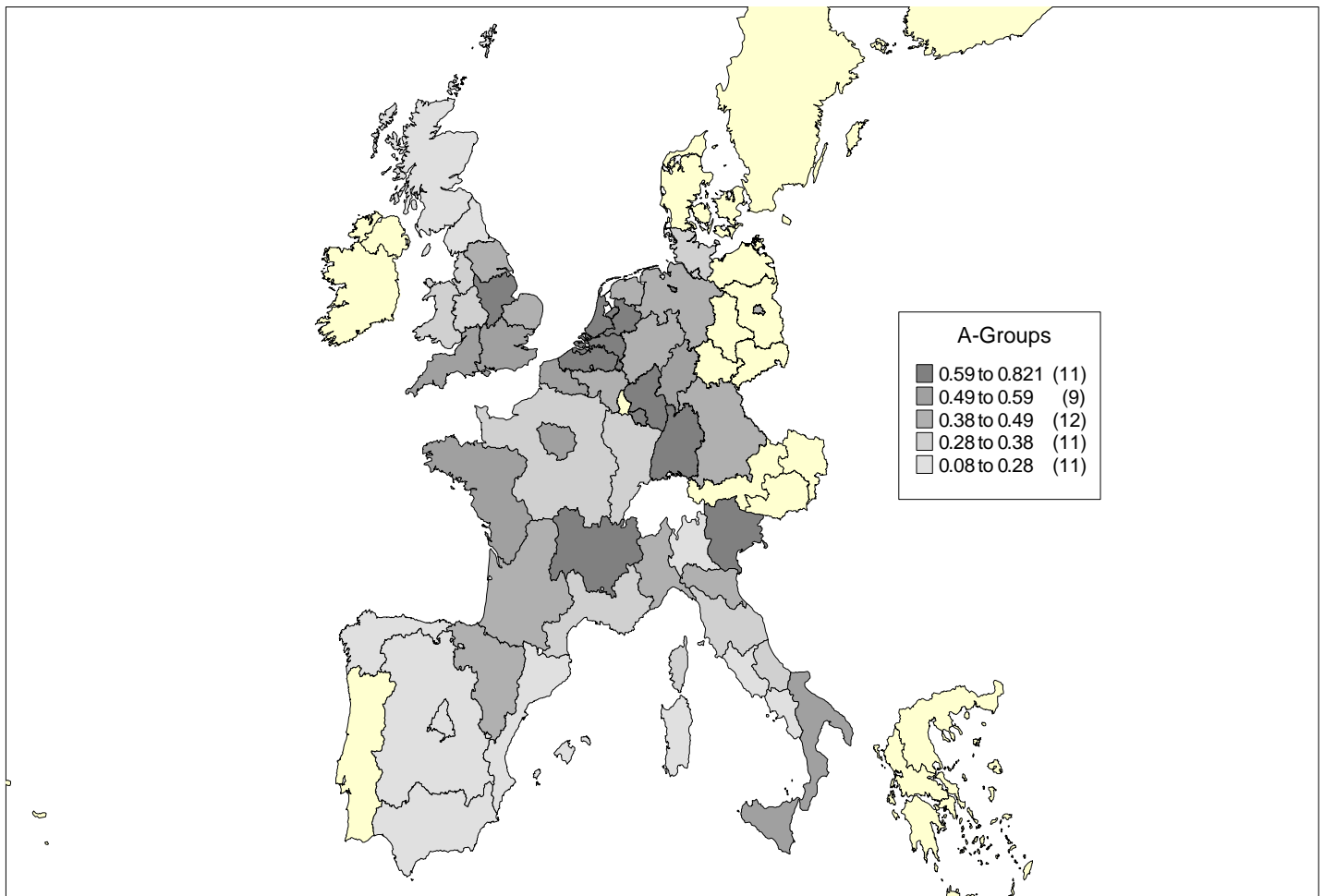


Figure 7: Regional growth 1950-1998

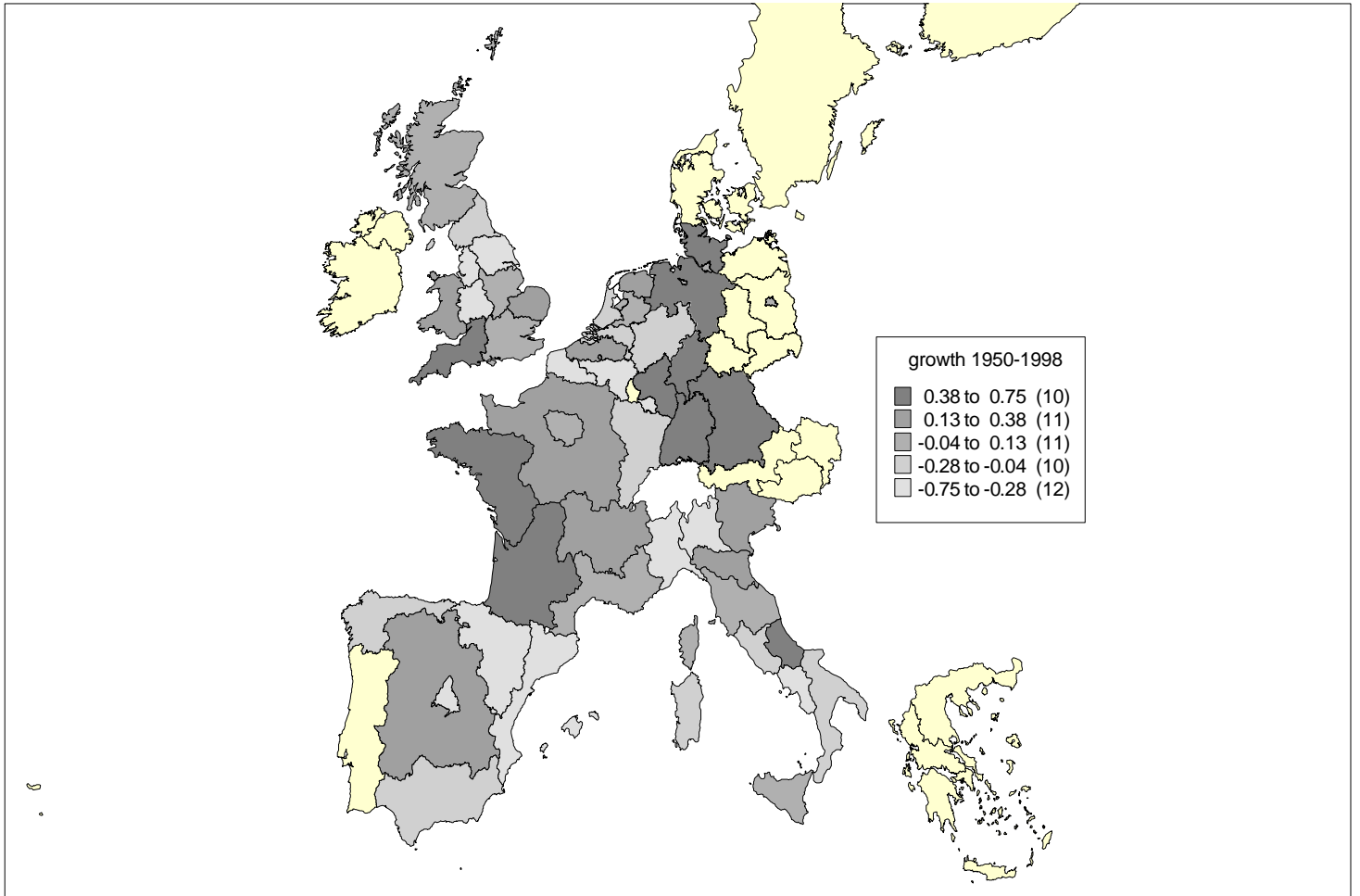


Table 4: Regression results**Trust, Group Memberships and Regional Economic Performance, 1950-1998**

Model	1	2	3	4	5
Dependent Variable	Growth 1950-1998				
Constant	-1.44** (.623)	-1.45** (.629)	-1.49** (.611)	-1.37** (.584)	-1.01* (.582)
GRP1950	-.971*** (.201)	-.968*** (.212)	-.938*** (.196)	-.942*** (.190)	-.969*** (.196)
Investment	.476** (.203)	.481** (.210)	.553*** (.201)	.484** (.188)	.422** (.184)
Schooling	.527* (.314)	.518 (.329)	.397 (.244)	.449* (.258)	.569** (.232)
Aggledu	.528*** (.195)	.522** (.214)	.423** (.204)	.404** (.209)	.472** (.197)
Spillover	.308*** (.093)	.301** (.118)	.213** (.103)	.233** (.101)	.244** (.097)
Trust		.011 (.086)			
P-Groups			.007 (.063)		
O-Groups			.119** (.056)		
Groups				.109** (0.41)	
A-Groups					.175*** (.054)
R-square	0.4089	0.4090	0.4673	0.4641	0.4813
F-value	5.80	5.06	5.63	7.16	7.56
CW-test	.6845	.6907	.4543	.8885	.8596
VIF (Maximum)	1.49	1.53	2.45	1.50	1.49

*Standard errors (White corrected) between parentheses. N = 54. *** 1% significance, ** 5% significance, * 10% significance. CW test refers to the Cook-Weisberg test for heteroskedasticity. Values above 0.05 indicate heteroskedasticity is not problematic. VIF refers to Variance Inflation Factor and values above 10 are indications of multi-collinearity inflating the R-square. We considered log-specifications in our analysis. In case we do not take the log- specifications, results are not influenced. We also tested for country-specific effects and possible interaction effects. Results indicate that O-Groups are not significant when country-specific effects are included. The overall conclusion on A-Groups is not influenced. An overview of these additional tests can be found in a 'statistical appendix', which is available upon request.

Figure 8: Coefficient and bands of Trust based on recursive OLS

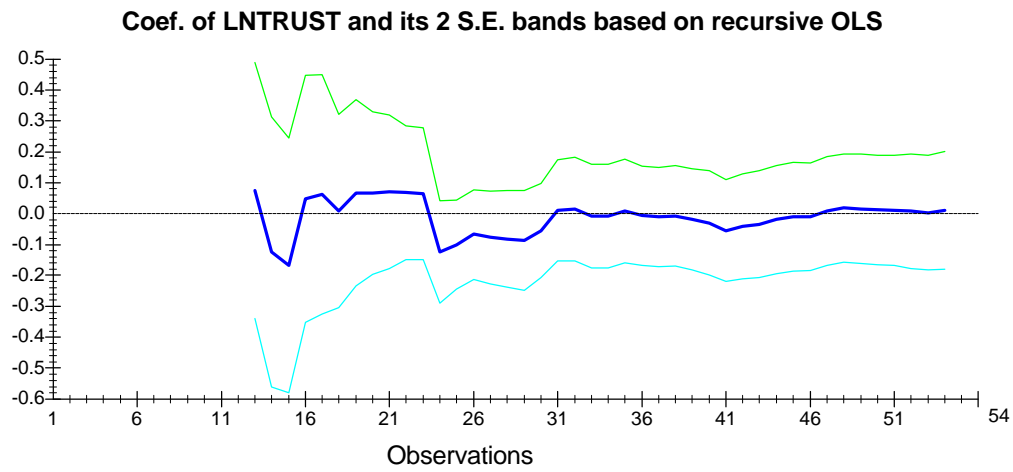


Figure 9: Coefficient and bands of A-Groups based on recursive OLS

