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Abstract

Industrial diversification is considered crucial for economies to prosper. Recent studies have shown that regional economies tend to diversify into sectors that are related to those already present in the region. However, no study yet has investigated the impact of regional institutions. The objective of the paper is to bring together the literatures on related diversification and institutions by analyzing how formal and informal institutions influence regional diversification. Analyzing 118 European regions in the period 2004 and 2012, we find evidence that institutions matter for regions to diversify into new industries. Bridging social capital is a key driver of regional diversification, in addition to relatedness, in contrast to quality of government in regions. Bonding social capital has a negative impact in regions with a low quality of government. This suggests that regional institutions relevant for structural change in regions are predominantly informal in character rather than formal, and bridging rather than bonding.

Key words: regional diversification, social capital, quality of government, institutions

JEL codes: R11, O14

1. Introduction

Institutions are increasingly recognized as important drivers of economic development. Scholars have highlighted how a well-functioning set of institutions fosters knowledge creation, innovation and economic growth (Acemoglu and Robinson, 2012; Crescenzi and Rodriguez-Pose 2013; Rodriguez-Pose and Di Cataldo 2014). Some scholars consider the quality of institutions even more important than factors such as geography and trade integration, or the endowment of economic resources (Rodrik et al., 2004).

Limited attention has yet been paid to the effects of institutions on the process of diversification and structural change in regions. We believe the role of both formal and informal institutions [1] is particularly relevant with respect to structural change and diversification, as institutions can help properly nudging these processes, with significant payoffs in terms of growth and development (MacMillan and Rodrik 2011). There is no study yet to date that has investigated systematically the impact of both formal and informal institutions on regional diversification. Rather, studies on industrial diversification focused almost entirely on the importance of relatedness in driving changes in the industrial composition of an economy, both at the national (Hausman and Klinger 2007) and regional scale (Neffke et al. 2011). Boschma and Capone (2015) has been the only study so far that has assessed whether the probability of countries to develop a comparative advantage in new export products was depending on their national formal institutions (as embodied in regulations that govern labor relations, corporate governance relations, product markets and inter-firm collaborations). However, it remains unclear what the role of regional institutions is for regional diversification.

[1] The concept of institution is divided into formal (also called hard) institutions and informal (soft) institutions. The former refers to rules and bodies hinging upon codified arrangements, such as government policy or competition regulations, while the latter includes more loosely defined sets of incentives and constraints associated with social values, culture and religion.

The objective of the paper is to fill this gap by presenting a study on industrial diversification of 118 European regions in the period 2004-2012. First, we test whether European regions are more likely to develop new specializations in industries that are strongly related to other industries in the region. Our study finds strong support for this thesis, confirming the results of other studies that investigated regional diversification within one country (Neffke et al. 2011; Boschma et al. 2013). Second, we test whether regional diversification is influenced by formal and informal institutions, as they show significant differences across European regions (Rodriguez-Pose 2013). Formal institutions at the regional scale are measured by means of quality of government (Charron et al. 2014). Informal regional institutions will be proxied by social capital, accounting for both the bright and dark sight of social capital by making a distinction between bridging and bonding social capital (Knack and Keefer 1997; Putnam 2001). We find that bridging social capital increases the probability of developing new specializations in European regions, while quality of government and bonding social capital show no effect. Moreover, we test the claim that informal institutions have a greater impact in regions where formal institutions are weak (Woodruff 2006; Parker and Kirkpatrick 2012). We find indeed that the positive effect of bridging social capital on acquiring new industry specializations is stronger in regions with a poor quality of government, while bonding social capital has a negative effect when the quality of government in a region is low.

The paper is organized as follows. The next section introduces the theoretical framework, in which regional diversification is presented as a path-dependent evolutionary process, and which explains how formal and informal institutions can be linked to regional diversification. The third section presents the data and methodology employed. The fourth section presents the main results, while section 5 concludes.

2. Regional diversification, relatedness and institutions

2.1 Relatedness and regional branching

Theoretical contributions in economics have given a central role to knowledge in relation to growth. From endogenous growth theory (Romer 1994), to the agglomeration literature

(Marshall 1920) and evolutionary economics (Nelson and Winter 1982), the performance of national and regional economies has been proven to critically hinge upon the ability to create, absorb, adapt and make use of knowledge. Research underlines that knowledge is neither equally accessible nor equally relevant for economic actors (Nooteboom 2000). Scholars have focused on the importance of cognitive proximity, among other forms of proximity (Boschma 2005), for the transmission of knowledge across an economy. In this sense, the more related the knowledge bases of different actors are, the easier it is for ideas, capabilities and knowledge to be profitably exchanged and applied. In contrast, when the cognitive distance is significant and actors do not "speak the same language", knowledge spillovers are less likely to take place (Breschi et al. 2003).

This idea of relatedness between local actors has been tested in studies on agglomeration economies (Frenken et al. 2007; Bishop and Gripaios 2010; Boschma et al. 2012; Cainelli et al. 2015; Cortinovis and Van Oort 2015). Moreover, there is an emerging body of literature that focuses on the implications of relatedness for the process of regional diversification (Boschma 2016). Incumbent firms are more likely to enter industries that are relatively close to the one they are already operating in (Teece et al. 1994). Similarly, new firms are more likely to start off and be successful in a sector that is closely related to other sectors in the region, as they can benefit from relevant local capabilities (like related knowledge and skills), or what has been referred to as 'local related externalities' (Neffke et al. 2015; Boschma and Frenken 2016). Jumping into a completely unrelated sector, though still possible, would increase fundamental uncertainty and make firms face higher costs and higher risks of failure, due to the lack of required capabilities both at the firm and the regional level.

The consequences of these dynamics at the micro-level is that regions tend to diversify into new industries that are closely related to their existing industrial base. This implies that regional diversification can be considered a path-dependent process, in which the industrial history of regions provides opportunities but also sets limits to diversification. This process of relatedness-driven diversification has been referred to as regional branching, since new activities draw upon and combine capabilities from existing local activities (Boschma and Frenken 2011). Empirical studies have confirmed the predominance of this process of related diversification both at the national (Hausmann and Klinger 2007) and regional scale (Neffke et al. 2011; Boschma et al. 2013). Based on these theoretical considerations, we formulate the following hypothesis:

Hypothesis 1: the probability that a region specializes in a new industry is positively affected by the degree of relatedness with existing industries in the region

2.2 Formal institutions and regional diversification

While the theoretical arguments and empirical evidence supporting the thesis of related diversification are solid, the insights they offer with respect to the heterogeneity in diversification trajectories of economies are still limited. This may be attributed to the fact that that national and regional institutions may matter for diversification but are still relatively unexplored in the diversification literature (Boschma and Capone 2015).

Institutions are recognized as playing an important role in shaping economic performance (Rodrik et al. 2004; North 2005). As discussed by Acemoglu and Robinson (2012), the type of political and economic institutions, and more generally whether institutions are inclusive or exclusive, opens up or reduces opportunities for growth and development. Institutions like property rights, rule of law, competition monitoring and contractual agreements are essential for economic growth (Acemoglu and Johnson 2005) and innovation (Crescenzi and Rodriguez-Pose 2013). The mechanisms explaining the link between the quality of formal institutions and better economic performance mostly refer to the coordination and uncertainty-reduction effects of formal institutions. When political authorities set clear rules, are prevented from taking advantage of their positions (like unduly extracting benefits from economic activities), and provide incentives stimulating the activity of economic actors, they can contribute to the growth and dynamism of an economy (Acemoglu and Robinson 2012).

Against this background, it can be argued that, besides growth and innovation, good governance can also facilitate the development of new specializations in a region. Within a set of clear and inclusive rights and rules, individuals are able to pursue their economic interests. In such an environment of lower risks and uncertainties, local actors are expected to be more entrepreneurial, more innovative and in a better position to invest in new activities. While this holds for indigenous actors, it is also relevant for foreign ones.

In particular, the capacity of an economy to attract and benefit from foreign investment critically hinges upon its institutional settings (Alguacil et al. 2011; Cipollina et al., 2012;). Besides, well functioning governments may implement policies making local actors better able to take advantage of the inflow of ideas, products and knowledge (Sterlacchini 2008; Charron et al. 2014). This implies that formal institutions can provide critical resources for an economy to diversify and enlarge its industrial portfolio.

While research on formal institutions is conducted primarily at the country level (Acemoglu and Robinson 2012), similar arguments apply to the regional level (Rodriguez-Pose 2013). Significant within-country variations in the quality of formal institutions exist in Europe (Charron et al. 2014). Regions characterized by quality government institutions are found to perform better in terms of socio-economic development (Charron et al. 2014), growth and convergence (Ederveen et al. 2006; Arbia et al. 2010) and innovation (Crescenzi and Rodriguez-Pose 2013; Rodriguez-Pose and Di Cataldo 2014). However, no study has yet assessed the impact of quality of regional government on diversification. Therefore, we test the following hypothesis:

Hypothesis 2: the probability that a region specializes in a new industry is positively related to the quality of the government in the region

2.3 Informal institutions and regional diversification

Like formal institutions, the incentives and constraints set by culture, religion and social norms – i.e. informal institutions – impact on human actions in an economy (North 1990, 2005). While there are many types of informal institutions (Nahapiet and Ghoshal 1998), social capital has attracted most attention. Putnam et al. (1993) defines social capital as "those features of social organizations, such as trust, norms and networks that can improve the efficiency of society by facilitating coordinated actions" (p. 167). In this definition, social capital is regarded as a beneficial social feature that enhances economic performance. First, trust among actors reduces information and transaction costs (Fukuyama 1995). Second, trust and involvement in the social community enable the achievement of collective action through cooperation, solidarity and public-spiritedness (Putnam et al. 1993). Third, the social infrastructure and network relations associated with high levels of social capital make it easier to mobilize local resources. This is particularly true for knowledge that circulates more easily when actors are embedded in a system of social relations (Echebarria and Barrutia 2013).

However, the literature has long acknowledged that social capital can also have detrimental effects (Coleman 1988; Portes and Landolt 1996). First, there is the conformity bias that pressure from close social relations may induce. Homogeneous and tightly knitted communities are considered to be less exposed to new information, and less prone to create innovations and accept new ideas (Uzzi 1996; North 2005; De Vaan et al. 2012). Second, tight networks of established groups may lead to opportunistic behavior. Olson (1982) referred to 'distributional coalitions' that hinder economic growth by engaging in rent-seeking activities and fighting over the distribution of existing output rather than the production of new wealth. Examples of such distributional coalitions are lobbies, interest groups, professional associations, and other groups and organizations which impose costs to society as a whole (Knack and Keefer 1997; Coates and Heckman 2003; Yamamura 2011). A review by Westlund and Adam (2010) showed that the empirical literature on social capital and regional development is inconclusive. Some studies found a positive effect (Beugelsdijk and van Schaik 2005; Dincer and Uslaner 2007; Akçomak and ter Weel 2009; Tabellini 2010; Crescenzi et al. 2013), while other studies found no effect or even a negative effect (Casey and Christ 2003; Miguel et al. 2005).

To distinguish the positive effects from the negative effects of social capital, the literature has proposed a distinction between bonding and bridging dimensions of social capital (Knack and Keefer 1997; Putnam 2001). Bonding social capital refers to dense social structures characterized by strong links between like-minded people. It helps mobilizing support and solidarity, but only to the benefit of those who belong to such close groups, like nuclear families (Banfield 1958) and distributional coalitions (Olson 1982). Unlike, bridging social capital refers to associations that are more inclusive and consist of individuals with different socio-economic characteristics. Because of their inclusiveness and cross-cutting nature, bridging-type of relations facilitate diffusion of non-redundant knowledge and trust building between heterogeneous groups. Movements for civil rights, youth associations or ecumenical religious groups are considered typical examples of bridging social capital (Putnam 2001).

Following this line of argumentation, we propose that trust and bridging social capital are crucial for regional diversification because they function as a bridge between disconnected activities. By making the local economy more interconnected and better able to coordinate actions and mobilize resources, higher levels of trust, and especially the presence of bridging-type of social relations, are expected to facilitate the circulation of non-redundant knowledge and other resources among different activities as well as to enable the creation of new combinations of different strands of knowledge and capabilities. These dynamics, in turn, boost regional diversification. A mirroring reasoning applies in the case of bonding social capital. We consider strong bonding relations as potentially detrimental for the ability of regions to adapt and introduce new products. When inward-looking groups are strongly embedded in a local economy, local activities will have a harder time to make crossovers and mobilize and combine the different sorts of skills and knowledge necessary to diversify. Based on these theoretical considerations, we derive the following hypotheses:

Hypothesis 3a: the probability that a region specializes in a new industry is positively related to the level of trust and bridging social capital in the region

Hypothesis 3b: the probability that a region specializes in a new industry is negatively related to the level of bonding social capital in the region

We also test whether the role of relatedness changes according to the regional endowment of institutions. We have no *a priori* expectations concerning the question whether a higher quality of local government will strengthen or weaken the effect of relatedness on regional diversification. The same applies to the interaction effect between relatedness and bonding social capital, also given the fact that we expected a negative relationship between bonding social capital and regional diversification in hypothesis 3b. However, what we do expect is that high levels of trust and bridging social capital may relax the effect of relatedness, in the sense that such social capital may facilitate regions to move into more unrelated activities. Due to their combinatory potential, these two types of informal institutions enable regions to make a jump in their industrial evolution, allowing regions to stay less close to their existing activities when diversifying in new industries, following Boschma and Capone (2015). This idea is tested in the following hypothesis:

Hypothesis 4: relatedness has a weaker effect on the probability that a region specializes in a new industry when the levels of trust and bridging social capital are high

Finally, some scholars have argued that, once a good regulatory framework is in place, the economic need for informal institutions is strongly reduced (Rodriguez-Pose 2013). As quality of government and social capital perform similar functions, once uncertainty is reduced and cooperation is achieved via formal institutions, informal institutions become less relevant. Unlike, when red tape and inefficiencies in the local governance system make them costly to use or ineffective, informal relations and rules within the community provide a more efficient way to coordinate actions and curb uncertainty. On these bases, scholars have theorized a substitution effect between formal and informal institutions, with social capital being relevant only when formal institutions are weak (Ahlerup et al. 2009). However, we expect this only to be the case with bridging social capital: when the quality of government is low, we expect that bridging social capital in a region has a stronger positive effect on regional diversification. By contrast, we expect the combination of low quality of government and bonding social capital in a region to be the worst case scenario for a region. In other words, we expect a stronger negative effect of bonding social capital on regional diversification when the local governance system is weak.

Hypothesis 5a: bridging social capital has a stronger positive effect on the probability that a region specializes in a new industry when quality of government is low

Hypothesis 5b: bonding social capital has a stronger negative effect on the probability that a region specializes in a new industry when quality of government is low

3. Methodology and data

3.1 Relatedness

Following Boschma et al. (2013) among others, we employ the proximity index developed by Hidalgo et al. (2007) to measure industry relatedness. In their approach, relatedness between two industries is reflected by the likelihood that countries have revealed comparative advantage in the two industries simultaneously, given the assumption that industries are more likely to be jointly present if they share similar productive inputs or capabilities, such as factor inputs, infrastructure or institutions. Hidalgo et al. (2007) use the definition of revealed comparative advantage by Balassa (1965), considering country *c* to have a comparative advantage in product *i* if the share of product *i* in the total export of country *c* is larger than the share of product *i* in the total export of all countries. Due to data availability at the EU regional level, we base our analysis on employment instead of trade data. We employ the location quotient (LQ) as a measure of the level of specialization of industry *i* in region *c* relative to the overall specialization of that industry in all regions in our sample. In more formal terms:

$$LQ_{ic} = \left(\frac{E_{ic}/E_{*c}}{E_{i*}/E_{**}}\right) \qquad (1)$$

where *i* and *c* denote industry *i* and region *c* respectively; E_{ic} refers to employment of industry *i* in region *c*; E_{*c} is total employment of all industries in region *c*; E_{i*} is total employment of industry *i* in all regions; E_{**} represents total employment of all industries in all regions.

A higher value of LQ indicates a higher level of specialization of industry *i* in region *c* relative to the overall specialization of that industry in all regions. However, a main criticism in terms of the application of the LQ is that there is no widely accepted cut-off value that can explicitly delimit the specialization of an industry in a region (O'Donoghue and Gleave 2004). Tian (2013) developed a method to obtain a statistically significant cut-off value of the LQ to identify industry specialization in a region. The advantage of this method is that it does not impose any assumptions in terms of the distribution of LQ. Following Tian (2013), we calculate the critical value of LQ as follows. First, we calculate the Standardized Location Quotient (SLQ), as in Equation (2)

$$SLQ_{ic} = \frac{LQ_{ic} - \overline{LQ}_i}{std(LQ_i)} \quad (2)$$

where $\overline{LQ}_i$ is the mean value of the LQ for industry i, and $std(LQ_i)$ is the standard deviation of the LQ for industry i. Second, we divide the SLQ into samples for each industry. Third, we carry out the procedure of re-sampling with replacement 1,000 times for each industry to obtain 1,000 bootstrap samples, each having exactly the same length as the original sample of each industry. Fourth, we calculate the 95th percentile of each bootstrap sample. By calculating the mean value of the 95th percentile of 1,000 bootstrap samples, we get the estimate of the critical value of SLQ at 5% level for each industry.

After obtaining the cut-off values of SLQ for each industry, we calculate the proximity index between each pair of industries. Following Hidalgo et al. (2007), we assume co-occurrence of specialization in industry *i* and *j* in region *c*, if the SLQs of the two industries in that region are both higher than their respective statistically significant cut-off values. After that, we calculate the conditional probability of a region specializing in one industry given it specializes in another. We compute the proximity index between industry *i* and *j* by taking the minimum between the conditional probability of a region specializing in industry *i* given it specializes in industry *j*, and the conditional probability of a region specializing in industry *j* given it specializes in industry *i*, as follows:

$$\varphi_{i,j,t} = \min\{P(x_{i,t} | x_{j,t}), P(x_{j,t} | x_{i,t})\} \quad (3)$$

As we have 323 industries in total in our dataset, we obtain a 323-by-323 matrix of proximities, which is common to all regions included in the analysis. In order to test the first hypothesis on the positive relationship between industrial diversification and the current industrial structure of a region, we follow Hausmann and Klinger (2007) to construct a density indicator, as shown in Equation (4):

$$d_{i,c,t} = \left(\frac{\sum_k \varphi_{i,k,t}\, x_{k,c,t}}{\sum_k \varphi_{i,k,t}}\right) \qquad (4)$$

where k refers to industry k and t refers to year t; $\varphi_{i.k,t}$ refers to the proximity between industry k and i at year t; $x_{k,c,t}$ is a dummy variable and takes the value of 1 if region c specializes in industry k at year t. In this way, $d_{i,c,t}$ measures the density around industry i in region c at year t, equaling the sum of proximities between industry i to all industries that region c is specialized in at year t, divided by the sum of proximities between industry i to all industries. The density indicator ranges from 0 to 1: a value of 0 means region c has no specialization in any industry related to industry i at year t; when $d_{i,c,t}$ is equal to 1, region c is specialized in all industries that are related to industry i at year t.

3.2 Modeling framework

As our focus is on diversification, we opt for an entry model, i.e. we look at what factors can be statistically associated with a region becoming specialized in a sector it was previously not. To this end, we include only industries that each region was not specialized in at the beginning of each time interval and observe over time whether regions have acquired new specializations at the end of each period[2]. The dependent variables is $x_{i,c,t+5}$, a dummy variable taking value 1 if region c specializes in industry i at year $t+5$[3]. With respect to the independent variables, $d_{i.c,t}$ refers to the density around industry i in region c at year t, accounting for the relatedness of the industry with respect to the others; Ins_c is a vector gathering the scores of our institutional variables in region c (these scores are time invariant due to data constraints); $d_{i,c,t} * Ins_c$captures the effect of the interaction between density and the level of formal and informal institutions on developing a new industry specialization; and $C_{c,t}$ is a vector of control variables in region c at year t. In addition, we include $\mu_{i,t}$ to control for fixed effects of each industry

[2] In order to maximize the number of observations given the short time span we have data for, we estimate our models on four overlapping intervals of 5 years (i.e. 2004-2009, 2005-2010, etc). As a robustness check (see Appendix 1), we also estimated our models on a single 9-year interval obtaining comparable results to those presented here.

[3] We considered 5-year intervals as the minimum length in order to properly capture diversification dynamics,. This is in line with the average business cycle length in advanced economies (NBER, 2012).

for each five-year interval, while $\varepsilon_{i,c,t}$ is the error term. More specifically, our baseline model (Model 1 – Equation 5) is:

$$x_{i,c,t+5} = \alpha + \beta * d_{i,c,t} + \theta * C_{c,t} + \mu_{i,t} + \varepsilon_{i,c,t}. \quad (5)$$

We extend this specification in order to account for the direct effects of institutions (Model 2 – Equation 6) and the interaction effects (Model 3 – Equation 7) on diversification.

$$x_{i,c,t+5} = \alpha + \beta * d_{i,c,t} + \gamma * Ins_c + \theta * C_{c,t} + \mu_{i,t} + \varepsilon_{i,c,t} \quad (6)$$

$$x_{i,c,t+5} = \alpha + \beta * d_{i,c,t} + \gamma * Ins_c + \delta * d_{i,c,t} * Ins_c + \theta * C_{c,t} + \mu_{i,t} + \varepsilon_{i,c,t} \quad (7)$$

The models are estimated by OLS with heteroskedasticity-robust standard errors[4]. It should be noticed that beside a linear probability OLS model, a logit or probit specification can be used for a binary outcome regression. However, the large number of dummy variables included in our regressions may lead to biased and inconsistent results for logit or probit models (Greene 2012). For facilitating interpretation and ensuring numerical precision, we standardize the predictor variables before estimating our models.

3.3 Variables and data sources

The data for constructing the dependent variable and the density indicator were obtained from the Orbis database by Bureau Van Dijk. This database offers unique information at firm level for a significant number of countries. For our analyses, we aggregated firm-level employment weighted data into region-industry combinations at NUTS2-level (and sometimes NUTS-1), proportionally fitted into more aggregated region-sector data stemming from Cambridge Econometrics (Cortinovis and Van Oort 2015). Selecting firms in EU countries in Orbis, we were able to retrieve data for about 10 million firms.

[4] We decided not to include clustered errors at regional level, as including these would significantly reduce the number of independent observations in our sample. This would in turn make it impossible to include industry-year fixed effects in the regressions.

For each of these entries, we had information on the location, the 4-digit NACE sector and the number of employees. Data on sales and turnover were also available but not used due to too any missing values. Of the 615 NACE sectors, we only considered 323 tradable industries[5] given our focus on diversification. The choice of the period is based on data availability. Such a limited time span of 9 years only represents a significant limitation compared to previous studies on regional diversification. To maximize the number of observations, we analyze regional diversification for four overlapping five-year intervals: 2004-2009, 2005-2010, 2006-2011 and 2007-2012[6].

While the data are unique in Europe in terms of geographical and industry breakdown, they are not without difficulties (Kalemli-Ozcan et al. 2015). Firstly, small firms are underrepresented in the data. Weighing by employment in broader sectors mitigates this, but the lack of small firms influences the degree of new firm formation and branching into related specializations. Therefore, our observed diversification is conservative by definition. Secondly, missing values at firm level were present in all countries, but their amount was particularly high and constant over the years in some areas. For this reason, we excluded Austria, Czech Republic, Hungary, Slovenia, Slovakia, Ireland and the UK. For some areas, most notably Sweden, regulations prevented full disclosure of the data, further, reducing the sample. Thirdly, small countries for which NUTS0 and NUTS2 levels coincide were also left out from our sample, such as the Baltic states, Cyprus, Malta and Luxembourg[7]. Finally, to avoid variability in employment levels within sectors due to missing values, we interpolated data at firm level using the nearest available year.

To measure formal institutions, we use the European Quality of Government Index (*EQI*) by Charron et al. (2014). This index includes 16 indicators derived from respondents that had to rate public services (education, healthcare and law enforcement)

[5] Tradable industries are defined according to the third version of Standard International Trade Classification (SITC3). In other words, we matched our NACE classes with SITC3 ones, in order to include in the analysis only sectors listed in SITC3.

[6] As robustness check we also used a single 9-year time interval, as reported in the Appendix. The result do not change significantly.

[7] We excluded 72 regions (6 small countries and 8 Swedish regions) due to missing values. Due to the integration with other datasets, we also had to re-aggregate the data for some countries (Poland, France, Greece and Germany) at the NUTS1 level.

with respect to three dimensions of government performance: quality of governance, impartiality, and level of corruption. As the index was firstly computed in 2010, we can only include it as time invariant variable, under the assumption that its score did not change significantly between 2004 and 2012 (see Rodriguez-Pose and Di Cataldo 2014). While the Quality of Government dataset offers data on a finer geographical level (NUTS2) than other sources like the European Value Study, for some countries we estimated the value of *EQI* at the broader NUTS1 level, as the NUTS2 average weighted by the population weight included in the Quality of Government dataset[8].

With respect to social capital, a variety of measures has been proposed, ranging from political participation to blood donation (Ahlerup et al. 2009). In order to include as many regions as possible in our analysis, we follow Knack and Keefer (1997) and Beugelsdijk and Van Schaik (2005) among others, and compute common indicators like level of trust and the active involvement of people in associational life. Similar to the latter study, we resort to the European Values Study 1999 database that contains survey data on the social attitude and values of people at regional level. As we only use data from the 1999 survey, our social capital variables are time invariant. Trust is computed by the share of respondents affirming that most people can be trusted over total number of respondents[9].

Clearly, capturing the bridging and bonding dimension of social capital is far from easy and straightforward (Beugelsdijk and Smulders 2009; Geys and Murdoch 2010; Crescenzi et al. 2013). We follow the seminal contribution of Knack and Keefer (1997) and look at group membership in different types of associations that are divided according to their potential rent-seeking behavior. Groups with inclusive and heterogeneous membership (referred to as “Putnam groups”) are supposed to act as cooperation- and trust-enhancers rather than reflecting rent-seeking conduct. Organizations being exclusive and homogeneous in terms of membership (named “Olson-groups”) are instead considered more likely to act as distributional coalitions. Following Knack and Keefer (1997), we link the bridging dimension of social capital to

[8] As a robustness check, we also used the scores for each of the three dimensions in order to test whether it is through one or more specific dimensions that formal institutions affect regional diversification. The role of formal institutions remains mostly insignificant.

[9] The question that was asked in the survey is “Generally speaking, would you say that most people can be trusted, or that you cannot be too careful in dealing with people?”

associations like cultural activities (e.g. art, music, education), youth work (like scouting groups) and ecumenical religions, while professional associations, political parties/groups and trade unions represent the bonding type of social capital. Rather than simply looking at group membership, we consider whether respondents are directly involved in voluntary work. We argue, in line with Beugelsdijk and Van Schaik (2005), that this is a more accurate way to assess the participation of people in associational life. We calculated for each of type of association the share of people that work as volunteer in at least one organization belonging to each set of associations, over the total respondents in a region.

In order to control for regional characteristics, we include other variables in our regressions. When investigating the role of density only, we include region-year fixed effects in our model. When including the time-invariant institutional variables, we can rely on some control variables. To control for economic conditions in each region, we use the log of Gross Domestic Product (*GDP*), the log of gross capital formation on real gross value added (*Physical K*), the share of employee having attained upper secondary (*HK Sec*) and tertiary education (*HK Tert*) in log scale, and the average rate of economic growth for each five year period[10] (*Growth Rate*). Additionally, we computed the log of population density (*Pop. Density*) to control for the level of urbanization of European regions. All these variables have been taken from the Cambridge Econometrics regional database[11],while part from our human capital measures was obtained from Eurostat.

A potential issue with our modeling strategy is the existence of endogeneity. While the inclusion of control variables can be considered sufficient for reducing the potential omitted variable bias, the issue of reverse causality requires attention. It might be the case that diversifying into a growing sector triggers changes in the amount and type of social capital in a region (e.g. due to firms in new successful sectors sponsoring local associations or events). However, the computation of the social capital indicators from data gathered in 1999 should normally prevent any bias emerging from reverse causality. The *EQI* variable – measured for the first time at regional level in 2010 - could

[10] As we do not have data for GDP in 2012, in the last period the growth rate is computed over four years.

[11] To recap: $dummy\_x_{t+5}$, *Density, Growth Rate, Pop. Density, GDP* and *Capital Formation* are measured in every year between 2004 and 2012. EQI is measured in 2010, while the three social capital variables are measured in 1999. In our models, we look at NACE4 sector level dynamics: the number of observations is determined by sectors times regions for each period. As we exclude sectors in which regions have already a comparative advantage at time *t* ($dummy\_x_t=1$), the number of sectors included changes from year to year.

theoretically be affected by diversification dynamics in previous years. However, the use of instrumental variable techniques to partial out endogenous effects is not less problematic, given the complexity of the variable to be instrumented, the regional dimension of the data, and the multi-country setting of the study. Moreover, the *EQI* variable is unlikely to change significantly in a short time-span, as institutions tend to be inherently stable (Tabellini 2010; Rodriguez-Pose 2013). Therefore, it is safe to assume that diversification hardly has any important short-term effects on the quality of government in European regions.

Table 1 and 2 report descriptive statistics and the correlation matrix for variables. The acquisition of a new specialization by a region occurs in roughly 1% of the cases (Table 1, dummy_x_{t+5}). The short time interval at stake and the severe recession affecting some areas of Europe may explain such a relatively low level. None of the correlation scores of the variables shown in Table 2 are worryingly high. Quality of government is generally positively related to trust, bridging social capital and tertiary educational attainment, but negatively related to bonding social capital. Trust is also correlated with bridging social capital, but basically uncorrelated with bonding social capital. The signs and correlations among these variables are as expected (Charron et al. 2014).

Table 1: Descriptive Statistics

VARIABLES	N	Mean	Std. D.	Min	Max
dummy_x_{t+5}	99,037	0.00993	0.0991	0	1
Density	99,037	0.0287	0.0318	0	0.629
EQI	99,037	-0.148	0.986	-2.735	1.753
Trust	97,768	-0.144	0.906	-1.646	2.919
Bonding SK	97,768	-0.106	0.887	-1.224	4.358
Bridging SK	97,768	-0.180	0.780	-1.382	4.527
Growth rate	99,037	0.00318	0.0180	-0.0604	0.0723
Pop. Density	99,037	-1.803	1.020	-4.254	1.863
GDP	99,037	3.745	1.227	0.745	6.255
Physical K	99,037	-1.39428	.234	-2.241	-.542
HK Sec (log)	99,026	-.916	.426	-2.265	-.307
HK Ter (log)	99,026	-1.54	.410	-2.516	-.545

Table 2: Correlation matrix

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)	(XI)	(XII)
dummy_xt+5 (I)	1											
Density (II)	0.12	1										

EQI (III)	0.01	0.09	1									
Trust (IV)	0.02	0.05	0.53	1								
Bonding SK (V)	0.02	0.11	0.29	0.37	1							
Bridging SK (VI)	0.01	0.06	-0.23	0.03	0.37	1						
Growth rate (VII)	0.01	-0.06	-0.02	-0.12	-0.26	-0.08	1					
Pop. Density (VIII)	0.01	0.00	0.21	0.25	0.29	-0.08	0.05	1				
GDP (IX)	-0.02	-0.07	0.38	0.24	0.26	-0.31	-0.16	0.42	1			
Physical K (X)	0.00	-0.04	-0.17	0.01	-0.17	0.07	-0.16	-0.33	-0.3	1		
HK Sec (XI)	0.02	0.05	-0.11	-0.06	-0.03	0.08	0.43	0.00	-0.04	-0.45	1	
HK Ter (XII)	0.00	-0.01	0.46	0.42	0.11	-0.12	0.13	0.22	0.26	0.09	-0.13	1

4. Results

We first focus on the effect of density. As shown in Table 3, we find that a high density around an industry *i* at year *t* significantly increases the probability of a region to acquire a new specialization in industry *i* five years later. This confirms our hypothesis 1 on the importance of related diversification, and replicates other studies. Of the control variables, we find that the average annual growth rate of GDP per capita within each five-year interval has a positive and significant effect on regional diversification at year *t+5*. As expected, high regional growth is associated with the acquisition of new industry specializations. Similarly, highly urbanized areas and regions with higher investment rates are more likely to diversify into new sectors, as shown by the positive significant coefficient of *Pop. Density* and *Physical K*. Remarkably, the positive effect of human capital is mostly captured by *HK Sec*, rather than *HK Tert*..

Table 3: The effects of density

VARIABLES	Model 1	Model 1 (Control var.)	Model 1 (FE)
density	0.0208***	0.0208***	0.0219***
	(0.00127)	(0.00129)	(0.00137)
growth rate		0.0425*	
		(0.0247)	
Pop. density		0.00118***	
		(0.000367)	
GDP		-0.000533	
		(0.000325)	
HK Sec		0.00261***	
		(0.000921)	
HK Ter		0.000400	

		(0.000822)	
Physical K		0.00545***	
		(0.00194)	
Constant	0.0126***	0.0272***	0.0221***
	(0.000418)	(0.00382)	(0.00422)
Observations	99,037	99,026	99,037
R-squared	0.025	0.025	0.033
Industry_year FE	YES	YES	YES
Region_year FE	NO	NO	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4 reports the results on the direct effects of different types of institutions. Quality of government does not show any effect on regional diversification: hypothesis 2 is therefore rejected. However, trust and bridging social capital are positively and significantly related to diversification: regions with higher trust levels and a higher participation level in bridging type of associations have a higher probability of acquiring new industry specializations. These results confirm hypothesis 3a. Bonding social capital has a negative coefficient, as expected, but it is not significant. Also note that the density effect remains strong and positive after including the institutional variables.

Table 4: The direct effects of institutions

VARIABLES	Model 2 EQI	Model 2 Trust	Model 2 Associational groups	Model 2 EQI - Trust	Model 2 EQI - Associational groups
density	0.0207***	0.0205***	0.0203***	0.0205***	0.0203***
	(0.00130)	(0.00130)	(0.00130)	(0.00130)	(0.00131)
EQI	0.000445			-0.000233	-0.000201
	(0.000430)			(0.000465)	(0.000454)
Trust		0.00117***		0.00126***	
		(0.000446)		(0.000474)	
Brid. SK			0.00238***		0.00245***
			(0.000663)		(0.000680)
Bond. SK			-0.000553		-0.000602
			(0.000459)		(0.000475)
growth rate	0.0423*	0.0623**	0.0769***	0.0638**	0.0776***
	(0.0247)	(0.0253)	(0.0254)	(0.0257)	(0.0255)
Pop. density	0.00120***	0.000969***	0.000793**	0.000942**	0.000774**
	(0.000370)	(0.000367)	(0.000373)	(0.000372)	(0.000378)
GDP	-0.000617*	-0.000575*	-0.000778**	-0.000536	-0.000756**
	(0.000341)	(0.000327)	(0.000356)	(0.000341)	(0.000361)
HK Sec	0.00277***	0.00194**	0.00208**	0.00181*	0.00201**
	(0.000944)	(0.000930)	(0.000929)	(0.000978)	(0.000949)
HK Ter	-3.99e-05	-0.000542	2.18e-05	-0.000379	0.000225
	(0.000908)	(0.000912)	(0.000831)	(0.000957)	(0.000921)
Physical K	0.00585***	0.00441**	0.00553***	0.00413**	0.00535***
	(0.00199)	(0.00197)	(0.00198)	(0.00207)	(0.00202)
Constant	0.0276***	0.0234***	0.0266***	0.0229***	0.0264***

	(0.00388)	(0.00394)	(0.00391)	(0.00412)	(0.00394)
Observations	99,026	97,757	97,757	97,757	97,757
R-squared	0.025	0.026	0.026	0.026	0.026
Industry_year FE	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In Table 5, we add interaction terms to capture the effects of density on developing new industries, depending on the type of institutions in a region. We find that only the coefficient *Density*EQI* is positive and moderately significant. This suggests that the effect of density on diversification increases with the quality of government in a region. We found no confirmation of hypothesis 4 that high levels of trust and bridging social capital weaken the effect of density on regional diversification: bridging social capital does not enhance the ability of regions to diversify in more unrelated activities. Note that the inclusion of the interaction terms does not produce changes in the significance of other variables, with trust and bridging social capital still being positive and significant.

Table 5: The interaction effects between density and institutions

VARIABLES	Model 3 EQI	Model 3 Trust	Model 3 Associational groups	Model 3 EQI - Trust	Model 3 EQI - Associational groups
Density	0.0209***	0.0204***	0.0204***	0.0205***	0.0206***
	(0.00132)	(0.00134)	(0.00133)	(0.00136)	(0.00136)
EQI	0.000703			0.000282	5.03e-06
	(0.000501)			(0.000586)	(0.000530)
Trust		0.00116**		0.000962*	
		(0.000478)		(0.000546)	
Brid. SK			0.00241***		0.00243***
			(0.000659)		(0.000680)
Bond. SK			-0.000683		-0.000707
			(0.000506)		(0.000519)
density*EQI	0.00229*			0.00303**	0.00160
	(0.00139)			(0.00140)	(0.00151)
density*Trust		-0.000247		-0.00193	
		(0.00163)		(0.00169)	
density*Brid. SK			0.00238		0.00170
			(0.00172)		(0.00178)
density*Bond. SK			-0.00155		-0.000858
			(0.00141)		(0.00151)
growth rate	0.0399	0.0626**	0.0721***	0.0603**	0.0720***
	(0.0247)	(0.0254)	(0.0254)	(0.0256)	(0.0256)
Pop. density	0.00105***	0.000973***	0.000800**	0.000810**	0.000690*
	(0.000380)	(0.000368)	(0.000375)	(0.000381)	(0.000387)
GDP	-0.000581*	-0.000583*	-0.000760**	-0.000566*	-0.000732**
	(0.000341)	(0.000328)	(0.000356)	(0.000344)	(0.000361)
HK Sec	0.00255***	0.00194**	0.00193**	0.00168*	0.00178*
	(0.000959)	(0.000931)	(0.000943)	(0.000989)	(0.000965)

HK Ter	0.000151	-0.000571	0.000197	-0.000351	0.000440
	(0.000911)	(0.000931)	(0.000834)	(0.000987)	(0.000923)
Physical K	0.00509**	0.00439**	0.00505**	0.00325	0.00451**
	(0.00207)	(0.00196)	(0.00200)	(0.00212)	(0.00209)
Constant	0.0262***	0.0234***	0.0259***	0.0215***	0.0250***
	(0.00401)	(0.00394)	(0.00392)	(0.00421)	(0.00403)
Observations	99,026	97,757	97,757	97,757	97,757
R-squared	0.025	0.026	0.026	0.026	0.026
Industry_year FE	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

To test our hypotheses on substitution effects between formal and informal institutions, we divided the full sample into a sub-sample of low EQI and a sub-sample of high EQI. The former contains industries located in regions below the 25th percentile of EQI variable, while the latter includes industries in regions above the 75th percentile of same variable[12]. As shown in Table 6, trust does not show any direct relation to diversification, neither in the low nor in the high EQI sub-samples. Differently, bridging social capital is positive and significant in the sub-sample of low EQI and with a larger coefficient in terms of magnitude that in the full sample. In the sub-sample of high EQI, instead, the coefficient of bridging social capital is only marginally significant. This confirms hypothesis 5a: the positive effect of bridging social capital is stronger in regions with a low quality of government. We find that the coefficient of bonding social capital is significantly negative in the sub-sample of low EQI, while it is not significant in the high counterpart. This confirms hypothesis 5b: bonding social capital has a negative effect on diversification, but only in regions with a lower quality of government. So, poor institutions will be less able to properly function when facing strong vested interests and cohesive distributional coalitions. Once the quality of government increases, the negative effect of bonding social capital disappears. In sum, these findings suggest the existence of a substitution effect between informal and formal institutions on regional diversification.

Table 6: The substitution effect between quality of government and social capital

[12] In our robustness checks, we used also the median score and the top and bottom decile as cutoffs for defining the two subsamples. The results are robust for the decile cutoffs, though splitting the sample on the median value of EQI gives less clear-cut results, with bridging social capital being positive and significant and bonding social capital being insignificant in both subsamples.

VARIABLES	Model 2 Low EQI - Trust	Model 2 Low EQI - Associational groups	Model 2 High EQI - Trust	Model 2 High EQI - Associational groups
Density	0.0212***	0.0207***	0.0273***	0.0273***
	(0.00257)	(0.00256)	(0.00387)	(0.00388)
EQI	-0.000194	0.000153	-0.00419	-0.00636
	(0.00108)	(0.00107)	(0.00653)	(0.00667)
Trust	0.000659		0.000541	
	(0.00120)		(0.00123)	
Brid. SK		0.00560***		0.00269**
		(0.00145)		(0.00123)
Bond. SK		-0.00207**		0.00284
		(0.000835)		(0.00234)
growth rate	-0.0108	0.0263	-0.0242	0.158
	(0.0473)	(0.0481)	(0.171)	(0.181)
Pop. density	0.000387	0.000275	0.00327**	0.00396**
	(0.00105)	(0.000986)	(0.00157)	(0.00160)
GDP	0.000733	-0.000541	-0.00158	0.000222
	(0.000759)	(0.000766)	(0.00189)	(0.00187)
HK Sec	0.00313	0.00410	0.0119	0.0169*
	(0.00357)	(0.00349)	(0.0101)	(0.00993)
HK Ter	0.00420*	0.00430**	0.0102*	0.00276
	(0.00233)	(0.00208)	(0.00552)	(0.00669)
Physical K	0.00601*	0.00798**	0.00483	0.0130
	(0.00310)	(0.00332)	(0.00843)	(0.00800)
Constant	0.0306***	0.0409***	0.0583***	0.0599***
	(0.00864)	(0.00936)	(0.0213)	(0.0207)
Observations	28,419	28,419	15,944	15,944
R-squared	0.067	0.068	0.089	0.090
Industry_year FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7 reports the results including the interaction effects in the two sub-samples. Because splitting the sample reduces the heterogeneity across the data, this specification may suffer from collinearity problems. Inspecting the correlations among variables and interaction terms, we find that only the models on associational life and quality of government can be properly estimated[13]. Our findings on the effects of bonding and bridging social capital changing according to the quality of government hold also when looking at the interaction terms. In the low EQI regime, the interaction coefficient for bonding social capital is negative and significant, while the coefficient for bridging social capital is positive and significant. In other words, bridging (bonding) social capital

[13] For the high and low EQI regimes, the interaction terms *Density*Trust* and *Density*EQI* exhibit correlation scores with respect to *Density* and to each other from around 70% up to 90%. Unlike, when the full sample is used, the correlations among interaction terms are not higher than 54%.

enhances (reduces) the effect of density on regional diversification. These effects cannot be found for the high EQI subsample.

Table 7: The substitution effect between quality of government and social capital with interaction terms

VARIABLES	Model 3 Low EQI - Associational groups	Model 3 High EQI - Associational groups
density	0.0274***	0.0283***
	(0.00364)	(0.00428)
EQI	-0.000301	-0.00579
	(0.00107)	(0.00673)
Brid. SK	0.00768***	0.00262**
	(0.00175)	(0.00119)
Bond. SK	-0.00332***	0.00254
	(0.00101)	(0.00232)
density*Brid. SK	0.0168***	-0.000157
	(0.00409)	(0.00419)
density*Bond. SK	-0.00545*	0.00388
	(0.00306)	(0.00518)
growth rate	0.0240	0.173
	(0.0476)	(0.191)
Pop. density	0.000785	0.00394**
	(0.000997)	(0.00161)
GDP	-0.000192	0.000468
	(0.000798)	(0.00197)
HK Sec	0.00559	0.0153
	(0.00346)	(0.0101)
HK Ter	0.00447**	0.00316
	(0.00208)	(0.00665)
Physical K	0.00335	0.0127
	(0.00311)	(0.00812)
Constant	0.0361***	0.0568***
	(0.00911)	(0.0213)
Observations	28,419	15,944
R-squared	0.072	0.090
Industry_year FE	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5. Conclusions

An institutional framework of good quality is considered crucial for regions to achieve and sustain high levels of growth and innovation. However, the influence of various types of formal and informal institutions on the process of regional diversification is still rather unexplored in the literature. This paper contributes to this field by looking at the relation between quality of government and social capital on the one hand, and the development of new sector specializations in European regions on the other hand.

Our study shows that regional institutions matter for future industry specialization, both directly and through the mediation of density. Trust and active participation in bridging type of groups increase the probability of regions to diversify into new sectors. By contrast, participation in bonding type of associations has an insignificant impact on regional diversification in general. The direct effects of quality of government on developing new industrial specializations in European regions turn out to be negligible. However, bridging and bonding social capital have different effects for different levels of quality of government: bridging social capital has a stronger positive effect on acquiring new specializations when the quality of regional government is low, while bonding social capital has a negative effect in regions with weaker government institutions.

Our study also shows that industry relatedness is a key and persistent determinant of acquiring specializations in new industries in European regions. This confirms the predominance of related diversification found in other studies in other countries and regions. Regional institutions do not tend to enhance or weaken the effect of relatedness on regional diversification. Having said that, bridging social capital reinforces the positive effect of density on diversification in regions with low quality of government, while high involvement in groups of the bonding type of social capital increases the negative effect of density in regions with lower quality of government. These effects become insignificant for regions characterized by high quality of government.

These results suggest some policy implications. Firstly, as relatedness is one of the main drivers for regional diversification, taking advantage of the density around stronger sectors could be a point of departure for policy to enlarge the industrial portfolio of regions (Boschma and Gianelle 2013). Secondly, with respect to institutions, we argue that formal institutions and social capital play a somewhat different role in the process of diversification. An important contribution of our work is the recognition given to informal institutions, which are shown to have a positive impact on diversification. Since this impact is stronger where formal institutions are poor and it reduces when the quality of government increases, our results suggest that regions with lower formal institutional capabilities but high levels of social capital might still be able to successfully diversify into new industries. At the same time, a word of caution is in order, as soft institutions are unlikely to represent a perfect substitute for a well-functioning government.

From our results, some potential venues for further research also emerge. First, our results suggest that micro- and sector-level dynamics might be strongly affected by informal institutions. However, more solid confirmation in additional research is needed. Second, this also requires a full treatment of the concepts, interactions and mechanisms related to informal institutions. Defining a clear conceptual toolbox for studying informal institutions represents an important next step for unveiling the complex dynamics behind regional diversification. Third, the institutional literature has focused almost entirely on the structure of institutions at the national and regional level as enabling or constraining factors of regional diversification. This has led to new insights, but it also takes the role of institutions as given, as if institutions do not change, and it ignores the role of agents at the micro-level (Boschma 2016). This violates insights from the evolutionary literature that points to the need of institutional change to enable the emergence and growth of new industries (Nelson 1994), and the need to take a micro-perspective to see how local agents engage in collective action to mobilize knowledge, resources and public opinion to create new or adapt existing institutions to enable new industry formation (Battilana et al. 2009; Strambach 2010; Sotarauta and Pulkkinen 2011). There is still little understanding of which institutional actors make a difference, what types of institutional change can be identified and work best under what conditions, and which regions are better capable of making the required institutional transformation. Fourth, a more detailed analysis on the role of relatedness across different types of regions might provide some key insights. In particular, we suppose that the effect of relatedness for regional diversification, besides changing across different institutional settings, may differ between sectors (e.g. high-tech vs. low-tech), the degree of regional openness (trade networks, presence of multinational corporations), or the level of absorptive capacity (Trippl et al. 2015). Relevant new insights could be obtained by future research focusing on these issues.

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Appendix – Regions

List of regions (NUTS 2010 classification)			
BE10	DEE	FR7	NL21
BE21	DEF	FR8	NL22
BE22	DEG	EL1	NL23
BE23	DK01	EL2	NL31
BE24	DK02	EL3	NL32
BE25	DK03	EL4	NL33
BE31	DK04	ITC1	NL34
BE32	DK05	ITC2	NL41
BE33	ES11	ITC3	NL42
BE34	ES12	ITC4	PL1
BE35	ES13	ITF1	PL2
BG31	ES21	ITF2	PL3
BG32	ES22	ITF3	PL4
BG33	ES23	ITF4	PL5
BG34	ES24	ITF5	PL6
BG41	ES30	ITF6	PT11
BG42	ES41	ITG1	PT15
DE1	ES42	ITG2	PT16
DE2	ES43	ITH1	PT17
DE3	ES51	ITH2	PT18
DE4	ES52	ITH3	RO11
DE5	ES53	ITH4	RO12
DE6	ES61	ITH5	RO21
DE7	ES62	ITI1	RO22
DE8	FR1	ITI2	RO31
DE9	FR2	ITI3	RO32
DEA	FR3	ITI4	RO41
DEB	FR4	NL11	RO42
DEC	FR5	NL12	
DED	FR6	NL13	

Regression on the whole period 2004 – 2012

VARIABLES	Model 2 Trust	Model 2 EQI – Associational groups	Model 2 Low EQI – Trust	Model 2 Low EQI – Associational groups	Model 2 High EQI - Trust	Model 2 High EQI – Associational groups
Density	0.0213***	0.0211***	0.0306***	0.0303***	0.0231***	0.0229***
	(0.00267)	(0.00268)	(0.00587)	(0.00589)	(0.00609)	(0.00602)
EQI	-0.000275	-0.000416	-0.00222	-0.00172	0.0200	0.0160
	(0.00104)	(0.00108)	(0.00253)	(0.00250)	(0.0197)	(0.0196)
Trust	0.00124		0.00149		-0.00354	
	(0.00111)		(0.00293)		(0.00310)	
Brid. SK		0.00297*		0.00547*		0.000987
		(0.00158)		(0.00316)		(0.00409)
Bond. SK		-1.74e-05		-0.00421**		0.0101*
		(0.00115)		(0.00187)		(0.00573)
growth rate	-0.0862	-0.0412	-0.0956	-0.0195	-0.649	1.032
	(0.0627)	(0.0640)	(0.128)	(0.128)	(0.726)	(0.991)
Pop. density	0.00192**	0.00154*	0.000923	0.000353	0.00257	0.00722
	(0.000835)	(0.000884)	(0.00273)	(0.00246)	(0.00465)	(0.00527)
GDP	-0.00222***	-0.00224***	-0.000743	-0.00171	-0.00135	0.00624
	(0.000762)	(0.000785)	(0.00210)	(0.00195)	(0.00490)	(0.00555)
HK Sec	0.00598***	0.00518**	0.00404	0.00270	-0.00884	0.000199
	(0.00226)	(0.00222)	(0.00845)	(0.00792)	(0.0307)	(0.0302)
HK Ter	0.000460	0.000806	0.00837*	0.00777*	0.00796	-0.0232
	(0.00214)	(0.00200)	(0.00481)	(0.00445)	(0.0153)	(0.0198)
Physical K	0.00698*	0.00751*	0.0109	0.0109	0.0294	0.0404*
	(0.00422)	(0.00411)	(0.00695)	(0.00696)	(0.0208)	(0.0219)
Constant	0.0442***	0.0440***	0.0561**	0.0585**	0.0688	0.00487
	(0.0103)	(0.00975)	(0.0259)	(0.0251)	(0.0633)	(0.0591)
Observations	23,293	23,293	7,105	7,105	3,344	3,344
R-squared	0.025	0.026	0.086	0.087	0.105	0.106
Industry_year FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	Model 3 EQI – Trust	Model 3 EQI – Associational groups	Model 3 Low EQI – Trust	Model 3 Low EQI – Associational groups	Model 3 High EQI – Trust	Model 3 High EQI – Associational groups
Density	0.0203***	0.0204***	0.0321***	0.0458***	0.0315***	0.0280***
	(0.00255)	(0.00271)	(0.00677)	(0.00889)	(0.00882)	(0.00850)
EQI	-0.000300	-0.000968	-0.00219	-0.00178	0.0204	0.0170
	(0.00143)	(0.00139)	(0.00251)	(0.00251)	(0.0197)	(0.0199)
Trust	0.00102		0.00184		-0.00394	
	(0.00127)		(0.00326)		(0.00319)	
Brid. SK		0.00322**		0.00734*		0.00184
		(0.00162)		(0.00394)		(0.00395)
Bond. SK		-0.000234		-0.00687***		0.0114**
		(0.00127)		(0.00230)		(0.00565)
density*EQI	-0.000960	-0.00360				
	(0.00320)	(0.00324)				
density*Trust	-0.00332		0.00241		-0.0106	
	(0.00303)		(0.00572)		(0.00734)	
density*Brid. SK		0.00189		0.0238**		-0.0113
		(0.00357)		(0.00959)		(0.00789)
density*Bond. SK		-0.00274		-0.0188**		0.00684
		(0.00314)		(0.00732)		(0.0104)
growth rate	-0.0771	-0.0371	-0.0887	0.0295	-0.657	1.334
	(0.0626)	(0.0639)	(0.130)	(0.126)	(0.727)	(1.042)
Pop. Density	0.00207**	0.00174*	0.000674	-0.000544	0.00241	0.00858
	(0.000849)	(0.000893)	(0.00281)	(0.00253)	(0.00467)	(0.00542)
GDP	-0.00236***	-0.00225***	-0.000576	0.000510	-0.00214	0.00775
	(0.000755)	(0.000785)	(0.00211)	(0.00206)	(0.00487)	(0.00574)
HK Sec	0.00601***	0.00516**	0.00326	0.00112	-0.00668	0.00488
	(0.00228)	(0.00224)	(0.00891)	(0.00808)	(0.0307)	(0.0303)
HK Ter	-5.98e-05	0.000719	0.00873*	0.00800*	0.00604	-0.0279
	(0.00213)	(0.00198)	(0.00466)	(0.00444)	(0.0153)	(0.0203)
Physical K	0.00687	0.00808*	0.0107	0.00117	0.0290	0.0487**
	(0.00440)	(0.00423)	(0.00699)	(0.00674)	(0.0209)	(0.0230)
Constant	0.0440***	0.0450***	0.0552**	0.0362	0.0710	0.00570
	(0.0106)	(0.00997)	(0.0263)	(0.0249)	(0.0632)	(0.0596)

Observations	23,293	23,293	7,105	7,105	3,344	3,344
R-squared	0.026	0.026	0.086	0.094	0.106	0.107
Industry_year FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1