Institutions and Regional Development

A panel data study of EU regions

By

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Dedication

To the memory of my parents, Betty and Jonathan.

And hope for a better world, where there is peace, progress and prosperity for all.

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supportive. I also found the following seminars immensely enriching: European Week of Regions and Cities Master Class Programme in Brussels, GeoInnovation, DRUID, NORSA, NORSI, Regional Innovation Policy (RIP).

Family, friends, fellowship at WIN Norway Church and other well-wishers were compassionate and supportive during the PhD study. I am grateful to everyone who supported me to make this possible. Finally, I offer a toast to the last line of defence and four superwomen: my wife, Ruramisai and my daughters: Rutendo, Ethel Noluthando Rudo and Anodiwanashe.

Thank you!

Takk!

Tatenda!

Jonathan Muringani

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Abstract

This PhD thesis contributes to the body of knowledge that uses institutions to explain the differences in economic growth and development across regions. While theoretical (e.g., Rodríguez-Pose, 2013; Rodríguez-Pose, 2020) and empirical studies (e.g., Beugelsdijk & Smulders, 2009; Ezcurra & Rodríguez-Pose, 2013; Putnam, Leonardi, & Nanetti, 1993; Rodríguez-Pose & Di Cataldo, 2015) have advanced in this direction, several issues remain unexplored. Overall, we tend to know less about which institutions and their combinations matter for regional economic development. We also know less about how, why and when they matter as well as change over time. This PhD thesis endeavours to address these issues in four papers and uses the level of GDP per capita as a measure of economic growth and development. Doing this enriches our theoretical understanding of how regional institutions affect economic development as well as informs evidence-based and place-sensitive policies.

Paper I examines formal institutions focusing on the quality of government and degree of decentralisation, whereas Paper II examines informal institutions focusing on social capital. Paper III and IV examine the interplay between formal and informal institutions. Specifically, Paper III examines the interaction between social trust and the quality of government, whereas Paper IV looks at the structural relationships between the same variables but adds political trust. The four papers employ secondary data measuring institutions and other regional socio-

economic and demographic characteristics across regions in 21 EU countries, covering eight waves from 2002 to 2016. The analyses use mainly fixed effects panel data in the first three papers. The fourth paper uses a structural equation model (SEM) on pooled cross-sectional data.

Overall, the findings show a complex and interdependent process between formal and informal institutions as well as specific forms of the same type of institutions, and other contextual factors such as human capital that affect economic growth. Specifically, Paper I shows that the quality of government is a better predictor of economic growth than decentralisation but also mediates the economic returns of the latter. Paper II shows that bridging social capital promotes economic growth, and the opposite happens with bonding social capital. At the same time, there is no significant differences of their effects on each other. It also shows that human capital moderates bonding and bridging social capital, reducing the negative effects of the former and working as a substitute for the latter. Paper III shows that social trust and the quality of government work as substitutes and both matter for economic growth. Paper IV shows that social trust and the quality of government, similar to political trust, have a direct positive association with economic growth. Also, through political trust, they have an indirect and positive relationship with economic growth.

These findings have several policy implications for regional economic development. Broadly, they suggest the importance of place-sensitive policies and balance attention to different types and forms of institutions

depending on the conditions. Specifically, the findings suggest the following: first, the need to improve the quality of government before implementing decentralisation reforms. Second, bridging social capital and human capital are both effective tools for promoting economic development. Third, there is a flexibility to use either social trust or the quality of the government to promote economic development. Fourth, attention should be paid to both bottom-up processes of social capital and top-down processes involving the quality of government to promote political trust and promote economic development.

However, the PhD thesis is limited in the generalisability of its findings, choice of variables, econometric methods and the level of analyses. Thus, expanding the regions beyond the EU will increase the generalisability of the findings. Similarly, future research should broaden the scope of institutions and measures of economic development. The same applies to the use of other econometric methods such as spatial econometrics and longitudinal SEM instead of a pooled cross-sectional analysis. Respectively, these two approaches will allow us to explicitly examine the spatial effects of institutions and how their structural relationships change over time. Furthermore, extending the regional level of analysis to a multi-level to include the individual level, allows us to examine how agency and the structure or institutions shape each other and jointly affect economic development.

Key words: regions, institutions, trust, social capital, economic growth, EU

Papers included in the thesis

I: Muringani, J., Dahl Fitjar, R., & Rodríguez-Pose, A. (2019). Decentralisation, quality of government and economic growth in the regions of the EU. *Revista de economía mundial*, 51, 25-50.

II: Muringani, J., Dahl Fitjar, R., & Rodríguez-Pose, A. Bonding and bridging social capital, and economic growth: New evidence from European regions' focus on informal institutions. In review process: *Environment and Planning A: Economy and Space*.

III: Muringani, J. Trust as a catalyst for regional growth in a decentralised Europe. Submitted: *Journal of Regional Science*.

IV: Muringani, J., Dahl Fitjar, R., & Rodríguez-Pose, A. The consequences of trust and its antecedents across regions: Evidence from the EU. Ready to submit.

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1 Introduction

1.1 Background and motivation

Institutions have emerged as a useful concept for understanding and explaining regional economic development, and how it changes over time (Boschma & Frenken, 2018; Boschma & Martin, 2010; Gertler, 2010; Rodríguez-Pose, 2013; Rodríguez-Pose & Ketterer, 2019; Rodríguez-Pose, 2020; Storper, 2018). Broadly, institutions both formal and informal, are the rules of the game that facilitate and constrain human interaction and action (Helmke & Levitsky, 2004; Nelson & Nelson, 2002; North, 1990; Rodríguez-Pose, 2013). Thus, formal institutions refer to widely and officially acceptable and legally binding rules, whereas informal institutions refer to social rules, such as norms, enforceable outside the official channels. The central argument is that institutions matter for economic development, and their variation across regions can explain economic differences across the same regions (Amin, 1999, 2004; Boschma & Frenken, 2018; Boschma & Martin, 2010; Gertler, 2010; Rodríguez-Pose, 2013; Rodríguez-Pose, 2020; Storper, 1995).

Accordingly, this PhD thesis investigates how institutions, both formal and informal, affect regional economic development. It focuses specifically on economic growth at the subnational regional level in the context of the European Union (EU). On formal institutions, the thesis examines two specific forms of political institutions: the degree of decentralisation (e.g., L. Hooghe, Marks, Schakel, Osterkatz, et al.,

2016) and the quality of government (e.g., Charron, Dijkstra, & Lapuente, 2010, 2014; Rothstein, Charron, & Lapuente, 2013). On informal institutions, it examines social capital (e.g., Bourdieu, 1986; Coleman, 1988; Putnam et al., 1993) and political trust (e.g., Newton, Stolle, & Zmerli, 2018; Rothstein & Stolle, 2008).

The motivation for this thesis is the need to understand and explain uneven regional development. The 'region' has been rediscovered as the motor of economic dynamism in contemporary capitalism and the post-Fordist era (Amin, 1999; Rodríguez-Pose, 1998; Storper, 1995, 1997). However, there is a visible "inconstant geography of capitalism" (Storper & Walker, 1989, p. 6). As such, despite the convergence of many factors at the national level, empirical evidence points to growing disparities between regions at the sub-national level (Ascani, Crescenzi, & Iammarino, 2012; Iammarino, Rodríguez-Pose, & Storper, 2019; Rodríguez-Pose, 2018). While this is a global phenomenon, the same is evident in the context of the EU. A recent European Commission report, "My region, My Europe, Our future: The seventh report on economic, social and territorial cohesion" (Dijkstra, 2017) and a subsequent study (Iammarino et al., 2019) show there are different development clubs of regions with striking nuances of very high, high, middle- and low-income regions across the EU as illustrated in Figure 1.
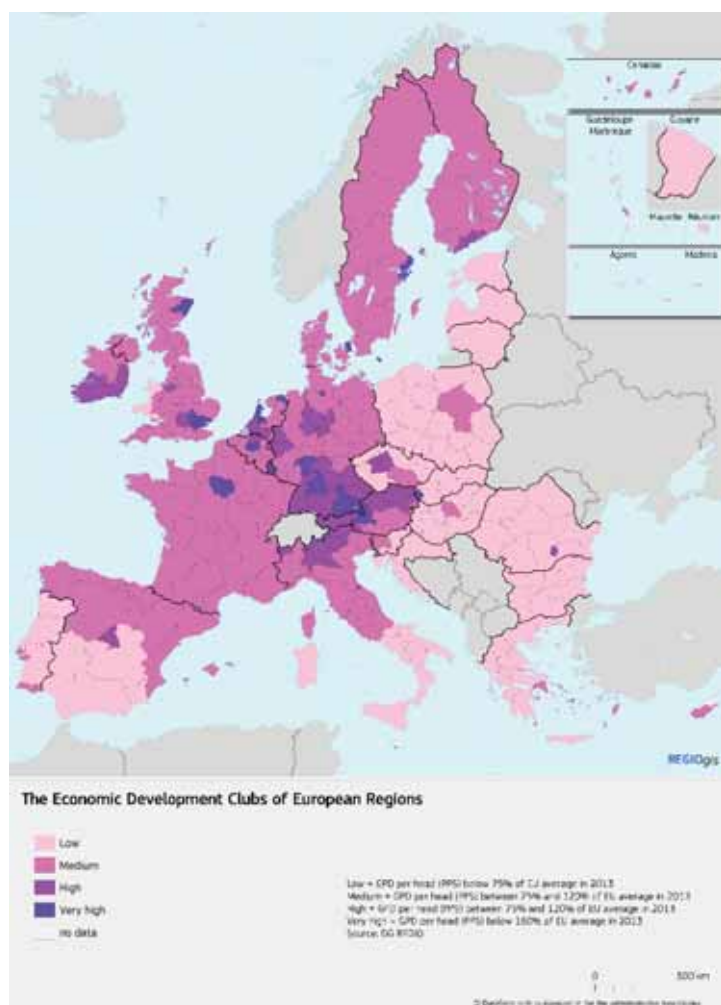
Figure 1: Overview of levels of economic development in EU regions (Dijkstra, 2017, p. 4) and used with permission of the European Commission, Regio-GIS.

The report highlights that although GDP per head in less developed regions is converging towards the EU average, some regions are stuck in a middle-income trap. Also, innovation remains highly concentrated in North-Western Europe, while regions in South-Eastern Europe lag. These findings are consistent with previous studies (Cappelen,

Fagerberg, & Verspagen, 1999; Fagerberg & Verspagen, 1996; Rodríguez-Pose, 1998; Rodríguez-Pose, 1999) which show similar and persistent patterns of uneven regional development. Globally, there are concerns that this is becoming economically, politically and socially untenable (Dijkstra, Poelman, & Rodríguez-Pose, 2020; Iammarino et al., 2019; Rodríguez-Pose, 2018; Storper, 2018). In the context of the EU, this poses a regional dilemma on how to balance the competing goals of social cohesion and economic competitiveness (Amin & Tomaney, 1995; Dijkstra, 2017).

While traditional approaches in mainstream or neo-classical economics have attributed differences in economic development across space to human capital and technology or innovation, a substantially unexplained residual remains (Rodríguez-Pose, 2013; Rodríguez-Pose, 2020). Evidently, these traditional approaches have inspired previous and some of the existing regional policies such as the regional innovation policies and European Union Cohesion Plan (Pike, Rodríguez-Pose, & Tomaney, 2017). Accordingly, some of the expected outcomes of these policies are increased mobility, knowledge and innovation spill-overs across regions. However, there have been mixed results and the intended outcomes are difficult to prove (Rodríguez-Pose, 1999). In response, some scholars (Boschma & Martin, 2010; Iammarino et al., 2019; Rodríguez-Pose, 2013; Rodríguez-Pose, 2020; Storper, 2011, 2018) and policymakers such as the OECD (2001) and the EU (Dijkstra, 2017) have turned to institutions to understand and explain how and why some regions are

doing economically better than others, as well as why such patterns of uneven development persist.

Despite theoretical advances (e.g., Amin, 1999, 2004; Gertler, 2010; Rodríguez-Pose, 2013; Rodríguez-Pose, 2020; Storper, 1995) and the pioneering interest to measure institutions at the regional level (e.g., Charron et al., 2010), empirical studies remain scant. There are at least two reasons for this (Rodríguez-Pose, 2020); firstly, institutions are difficult to define and measure. Secondly, the unavailability of data at the regional level have hampered progress of empirical studies to examine how institutions affect economic development. In recent years, this has changed; for example, the data measuring institutions (e.g., Charron et al., 2010; L. Hooghe, et al., 2016) has increasingly become available at the sub-national level. Therefore, it is now possible to revisit previous empirical studies, assess the existing development theories and push a new research agenda.

1.2 Research question, aim and contribution

There is consensus among scholars (e.g., Boschma & Frenken, 2018; Gertler, 2010; Pike et al., 2017; Putnam et al., 1993; Rodríguez-Pose, 2013; Rodríguez-Pose, 2020; Storper, 2011, 2018) that institutions matter for regional economic development. However, several issues remain unexplored and unexamined. This is because institutions have been treated broadly as a "black box" (Gertler, 2010; Rodríguez-Pose, 2013; Rodríguez-Pose, 2020; Storper, 2011), and their properties or how they work remains "dark matter" (Rodríguez-Pose, 2020; Storper, 2011).

First, methodological nationalism has characterised both theoretical and empirical studies on institutions, resulting in their scant attention at the regional level (Gertler, 2010; Rodríguez-Pose, 2013). Second, there is a general lack of a social and plural understanding of institutions (MacKinnon, Cumbers, Pike, Birch, & McMaster, 2009). In general, it seems the literature on institutions and economic development has emphasised either formal or informal institutions, or just one of their specific forms and overlooked the others (Farole, Rodríguez-Pose, & Storper, 2011; Rodríguez-Pose, 2013; Rodríguez-Pose, 2020). Specifically, "the interaction between local informal institutions and political organisation remains an understudied area" (Andersson & Larsson, 2020, p. 9). Third, there is an acknowledgement that institutions are territorialised and localised (Dosi, 1988; Lundvall, 1998; Nelson & Nelson, 2002). However, there has been no explanation for why this is the case (Storper, 1995). The result is a lack of understanding and explanation of the mechanisms through which institutions work to affect economic development. In summary, we tend to know less about which institutions and their combination matter for regional economic development (Rodríguez-Pose, 2013; Rodríguez-Pose, 2020). We also know less about how, why and when they matter. Furthermore, there is very little understanding of how institutions change overtime. Accordingly, this PhD thesis seeks to address the main research question: How do regional institutions affect economic development?

Overall, the thesis makes a theoretical contribution by enriching our understanding of which specific formal and informal institutions matter,

and how and when they matter for regional economic growth. Also, the thesis contributes by bringing together concepts from economic geography, innovation studies and political science. At a policy level, there is a demand to address uneven regional development as well as the need to incorporate institutions into development policy and make the latter place sensitive (Rodríguez-Pose, 2020). In this respect, the major task of regional policy is change management to identify and respond to fundamental change processes (Andersson & Johansson, 2011). Therefore, policy makers need to understand how actors interact inside and outside the region (Mayer & Baumgartner, 2014), and how institutions facilitate or constrain them. In the context of the EU, a better understanding of institutions will inform cohesion policy (e.g., Barca, 2009), smart specialisation strategies (S3) (e.g., Foray, 2016) and other regional policies which need to be place sensitive. Arguably, this approach is necessary to address the regional dilemma faced by the EU to balance the competing goals between the need for social cohesion and economic competitiveness across regions.

1.3 Overview of the papers

Four papers address the main research question and its sub-research questions in different ways. Paper I: *"Decentralisation, Institutions and Economic Growth in the EU"* focuses on formal institutions. It examines the extent to which the quality of government mediates the economic returns of decentralisation. It shows that the quality of government is a better predictor of economic growth than decentralisation. However, the quality of government mediates the economic returns of decentralisation.

Paper II: *"Bonding and bridging social capital, and economic growth: New evidence from European regions"* focuses on informal institutions. Its findings show that bridging social capital promotes economic development, whereas bonding social capital has adverse effects. Furthermore, they show that there is no interaction between the two. They also show that human capital moderates bonding social capital by reducing its negative effects on economic development while having a substitutive relation with bridging social capital.

Paper III: "*Trust as a catalyst for regional growth in a decentralised Europe"* focuses on the interplay between formal and informal institutions. The paper examines the extent to which differences in social trust affect the economic returns of the quality of regional government and the degree of decentralisation. The findings show that both social trust and the quality of government matter for economic development. Furthermore, they show that social trust is a substitute for the quality of government but not the degree of decentralisation.

Paper IV: "*The consequences of trust and its antecedents across regions: Evidence from the EU"*. This paper examines the interplay between formal and informal institutions, focusing on the quality of government, political trust, social trust and economic growth. The findings show that social trust and the quality of government, similar to political trust, have a direct positive association with economic growth. Also, through political trust, both have an indirect and positive relationship with economic growth.

Table 1: Overview of PhD papers, aims, theory, approach, findings

Paper	Title	Aim	Variables	Findings
I	"Decentralisation, Institutions and Economic Growth in the EU"	To investigate the extent to which the economic returns of decentralisation are affected by differences in government quality.	• Decentralisation • Quality of government • Economic growth	Quality of government is a better predictor of economic growth and mediates the economic returns of decentralisation
II	"Bonding and bridging social capital, and economic growth: New evidence from European regions"	To investigate the economic consequences of bonding and bridging social capital and their interaction with human capital.	• Bonding social capital • Bridging social capital • Economic growth	Bonding and bridging social capital have negative and positive consequences for economic growth, respectively.
III	"Trust as a catalyst for regional growth in a decentralised Europe"	To investigate the extent to which differences in trust affect the economic returns of the quality and authority of regional governments	• Social trust • Quality of government • Decentralisation • Economic growth	Social trust and the quality of government work as substitutes and both affect economic growth
IV	"The consequences of trust and its antecedents across regions: Evidence from the EU"	To understand the structural relationship between political trust, social trust and quality of government and how the three jointly affects economic growth.	• Social trust • Quality of government • Political trust • Economic growth	Political trust is positively associated with economic growth. It is also shaped by social trust and the quality of government which are directly and indirectly, associated with economic growth.

1.4 Outline of the PhD thesis

The rest of the thesis is structured as follows: Chapter 2 is the theoretical framework. This is followed by Chapter 3 which presents the research design and methods. Chapter 4 is the empirical context. Chapter 5 summarises the papers, and finally Chapter 6 presents the conclusion.

2 Theoretical framework

2.1 Introduction

The PhD thesis investigates how regional institutions, both formal and informal matter for economic development. The central argument is that institutions are persistent and their variation across regions can help us understand and explain the differences in economic growth and development across the same regions (Boschma & Martin, 2010; Rodríguez-Pose, 2013; Rodríguez-Pose, 2020). Three key constructs or concepts underpin this argument and the subsequent discussion. They are, as shown in Figure 2 - the region, institutions and economic development.
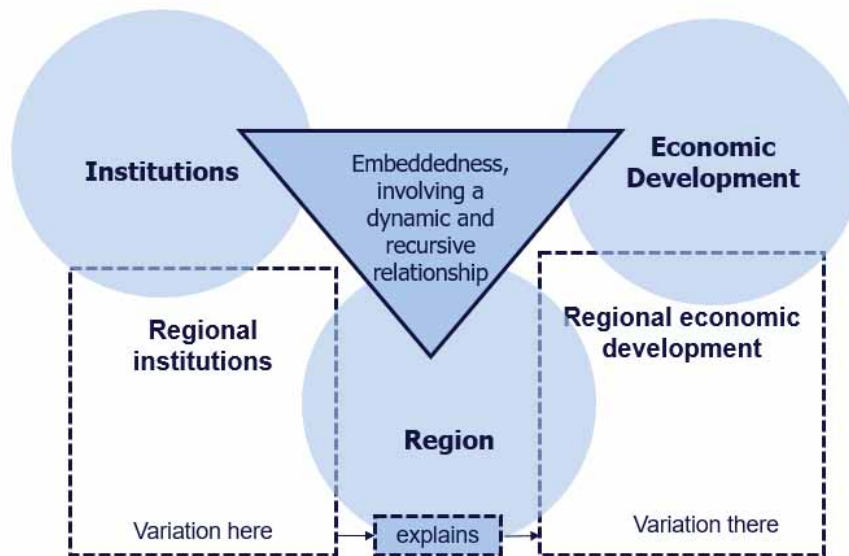
Figure 2: Conceptual framework (Author's construction inspired by Storper (1997, p. 26)

The PhD thesis takes an interdisciplinary approach which brings together economic geography (e.g., Rodríguez-Pose, 2013), political science (e.g., Charron et al., 2010; L. Hooghe, et al., 2016) and innovation studies (e.g., Nelson & Nelson, 2002). Some of the perspectives from old (Veblen, 1889) and new (e.g., North, 1990) institutional economics are acknowledged but not discussed in detail. Rather, the focus in this PhD thesis is to apply an understanding of institutions to explain variation in economic development across regions. The subsequent discussion starts by defining and positioning the key concepts. Next, it explores the relationship between the types and specific forms of institutions and economic development. It concludes with a summary of the main points.

2.2 Key concepts: region, institutions and economic development
The three key concepts in Figure 2: region, institutions and economic development are defined and discussed briefly in their sequential order. First, there is no agreed or explicit definition of a region, and as a result, it remains a rubbery (L. Hooghe, et al., 2010, p4) but contested concept (Fitjar, 2010; L. Hooghe, et al., 2016; Keating & Loughlin, 1997; Paasi & Metzger, 2017). One approach is a narrow conceptualisation which provides a limited understanding of defining a region as a fixed location on a surface or physical container in which economic activities happen (Bathelt & Glückler, 2003; Pike et al., 2017). Another narrow conceptualisation defines a region as a functional unit based on agglomeration economics and territorial politics or both (Amin, 1999; Andersson & Karlsson, 2006; Storper, 1995).

In contrast, a broader conceptualisation defines a region not just as an economic-political unit but a fundamental unit of social life along-side markets, states or families (Storper, 1997). Similarly, political scientists such as L. Hooghe, Marks, Schakel, Osterkatz, et al. (2016) identify a region as a social outcome in which a community wishes politically to retain its independence to set up and implement policies, but also enjoys benefits of scale within a nation-state. Cooke et al (1997) also offer an almost similar definition that a region is a territory less than its sovereign state and different from it in terms from its administrative, political, economic and cultural functions as well as cohesiveness. This PhD thesis builds on these three broad definitions and similar perspectives (Amin, 1999; Bathelt & Glückler, 2003; Keating & Loughlin, 1997; Paasi & Metzger, 2017; Pike et al., 2017) to define a region. Accordingly, the working definition of a region in this PhD thesis refers to an intermediate subnational territory meaning less than its sovereign state at either the Nomenclature of Territorial Units for Statistics (NUTS) level 1 or 2 but not the lowest at NUTS level 3 (see, European Commission. Eurostat, 2012) with political, administrative, economic functions and cohesiveness as well as a distinctive culture.

Second, there is a consensus that institutions matter for economic development (Rodríguez-Pose, 2013). Institutions, formal and informal are humanly devised rules of the game that facilitate and constrain human interaction, and action (Nelson & Nelson, 2002; North, 1990). They are enduring social structures, subject to change, albeit slowly in a path-dependent process but which can also be discontinuous (Glückler

& Lenz, 2016; Rodríguez-Pose, 2020; Scott, 2013). The PhD thesis acknowledges that formal and informal institutions exist side by side and are interwoven in each other, with the formal being embedded in the informal (Huggins, 2016; North, 1990; Rodríguez-Pose, 2013; Rodríguez-Pose, 2020). While it may be difficult to make a dividing line between the two types of institutions (Hodgson, 2006), there is need to make a distinction between them for conceptual clarity to avoid the problem of theory open endedness and operationalisation so that we can measure them.

According to Helmke and Levitsky (2004), a key feature that distinguishes formal and informal institutions is that the former are rules that are widely accepted as official, whereas informal institutions are social rules enforced outside official channels. Another distinguishing feature is that while both formal and informal institutions change slowly, informal institutions change more slowly than formal institutions (Andersson, 2015). Formal institutions include political and economic institutions (Acemoglu, Johnson, & Robinson, 2002, 2005; Huggins, 2016; North, 2006; Tomaney, 2014; Williamson, 2009). Broadly, political institutions are rules that underlie the nature of political governance (Huggins, 2016). The scope of this thesis is limited to political institutions focusing on the degree of decentralisation or regional authority (e.g., L. Hooghe, et al., 2016) and the quality of government (e.g., Charron et al., 2010, 2014).

However, most of the studies in economics and political science have overlooked informal institutions which economic geography brings into perspective using social capital (Rodríguez-Pose, 2013). Broadly defined, social capital is a variety or combination of aspects of social organisation, and aggregates of institutionalised relationships such as trust, networks and norms that facilitate cooperative action (Bourdieu, 1986; Coleman, 1988; Putnam et al., 1993). However, there has been criticism that the concept is normative and a black box which misses the nuances of its beneficial and adverse effects (Portes, 1998). In response, Gittell and Vidal (1998) and Putnam (2000) building on the strong and weak ties by Granovetter (1973, 1983) further developed the concept to two types of social capital: bonding and bridging social capital.

Another form of an informal institution is political trust based on the qualification and differentiation of formal and informal institutions by Helmke and Levitsky (2004). Following their argument, whether one trusts the government and other political actors cannot be enforced by law compared to the formal institutions. On the one hand, some scholars suggest that political trust or one of its aspects is social capital (e.g., Patulny, 2009). On the other hand, other scholars (e.g., Newton, Stolle, & Zmerli, 2018; Rothstein & Stolle, 2008) whose work makes an established body of literature, treat social capital and political trust as separate definitive concepts. According to them, social capital arises out of civic participation and interpersonal relationships, whereas political trust is an impersonal relationship. This PhD thesis applies the same conceptualisation and operationalisation to treat the two as separate

concepts. Overall, it focuses on these four informal institutions: bonding and bridging social capital networks, social and political trust.

Third, the traditional economics view, which includes the neo-classical and endogenous growth theories, argues that capital stock, human capital and technology or innovation, matter for economic growth and development. However, this view often neglects institutions (Acemoglu et al., 2002; Rodrik, 2002, 2004; Farole et al., 2011; Pike et al., 2017; Rodríguez-Pose, 2013; Rodríguez-Pose, 2020). One of its key assumptions is that factors of production are mobile, and knowledge and technology spill-overs will allow lagging regions to catch up or converge with core regions. However, as alluded in chapter 1, empirical evidence shows that instead of convergence, the opposite is happening as differences in economic development across regions continue to diverge. At the same time, these traditional approaches partially explain overall changes in the economy with a large unexplained residual (Rodríguez-Pose, 2020).

An alternative approach adopted in this PhD thesis is the Schumpeterian view (e.g., Schumpeter, 1934, 1942) mainly taken by scholars in both economic geography and innovation studies (Amin, 1999; Fagerberg & Verspagen, 1996; Farole et al., 2011; Nelson & Nelson, 2002; Storper, 1995, 1997). It accounts for differences in the levels of economic development across space and explains the large residuals not explained by the traditional economics approaches. Overall, this view sees economic development as an evolutionary phenomenon and a

qualitative, endogenous, and co-evolutionary and path dependent process, driven by technological change or innovation under appropriate social conditions, such as institutions. Specifically, Schumpeter (1934, p86) acknowledged the social environment to mean the existence of both "legal and political impediments" for formal institutions as well as expected social aspects such "forces of habit" for informal instituions which both constrain the activities of an entrepreneur, and, therefore, the entrepreneur should overcome them. An explanation for the role of institutions is such that they create or provide a selection environment in which routines and variety emerge under conditions of uncertainty, resulting in different outcomes for innovation and related economic activities across places, even under similar initial conditions.

In the same vein, economic development can be understood as an ongoing transformation of the overall economic system, including institutions involving various inputs, such as labour, land, and equipment, human capital and innovation (Feldman, 2014; Pike et al., 2017). However, it is important to note that economic development is a broad term that is used interchangeably with economic growth (Feldman, Hadjimichael, Lanahan, & Kemeny, 2016; Feldman & Storper, 2018; Pike et al., 2017). Although the two are related, they are not the same. An illustration is given by Feldman et al. (2016, p. 8) using an analogy of the economy as a machine in which the various inputs are transformed and "subsequently, growth occurs when output increases" (p8) and "economic development may be viewed as both a precursor to and a

result of economic growth" (p9). Feldman et al. (2016) further argue that economic development is qualitative and difficult to measure, whereas economic growth is quantitative and ease to measure. Therefore, economic growth is used as a proxy for economic development in order to overcome this measurement problem.

At the same time, the growth literature has put forward several theories and approaches to explain economic growth and development (Peiró-Palomino & Tortosa-Ausina, 2015). The literature has two strands; one focuses on levels of GDP per capita and another on its growth rate (Hall & Jones, 1999; Vieira & Damasceno, 2011). Since institutions are relatively stable, one may think they affect the level of GDP per capita more rather than its growth (Hjerppe, 2003, p. 12). Thus, "current levels of GDP are a product of past growth, naturally" (Knack & Keefer, 1995, p. 12). According to Hall and Jones (1999), the levels of GDP per capita, rather than its growth rate, capture the differences in long-run economic performance. Accordingly, this PhD thesis focuses on the levels of GDP per capita as a reflection of long-run economic growth.

Bringing together the region, institutions and economic development, the argument is that they are mutually embedded and interact in a complex, dynamic, recursive and path-dependent process involving co-evolution with other contextual factors, such as human capital (Amin, 1999; Boschma & Frenken, 2018; Boschma & Martin, 2010; Feldman, 2014; Granovetter, 1985, 1992; Rodríguez-Pose, 2013; Rodríguez-Pose, 2020; Storper, 1995). Specifically, the region as a fundamental unit of social

outcomes serves as a site of traded and untraded interdependencies (Storper, 1995, 1997). The untraded dependencies refer to territory-specific and localised social conditions including institutions and other regional characteristics which condition economic activities, making them and their outcomes vary across regions (Storper, 1995, 1997). However, Storper (1997, 2011) argues that these processes of territorialisation and localisation remain unexplained. An explanation is that informal institutions such as social capital arise out of local interactions and is therefore sticky and unique to a place, and defines its character which differentiate the nature and intensity of economic activities as well as their outcomes (Boschma, 2005; Feldman, 2014; Malecki, 2012; Rodríguez-Pose, 2013; Storper, 1995). At the same time, formal institutions exist within the broader informal institutions which mediate their social and economic returns (Huggins, 2016; North, 1990; Rodríguez-Pose, 2013; Rodríguez-Pose, 2020). Since, these institutions are relatively stable but also different across regions, their variation can also explain disparities in levels of economic growth and economic development across the same regions.

However, these institutions have been broadly treated as a black-box and how they work remains 'dark matter' (e.g., Boschma & Frenken, 2018; Gertler, 2010; Rodríguez-Pose, 2013; Rodríguez-Pose, 2020; Storper, 2011). Therefore, the subsequent section unpacks this black box to examine the types and specific forms of institutions and how they affect economic development. It examines two formal and political institutions

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– decentralisation and the quality of government, and four informal institutions which include social capital focusing on bonding and bridging social capital, social trust, and political trust.

2.3 Institutions and regional economic development

2.3.1 Decentralisation

As a political term, according to L. Hooghe, et al. (2016) and L. Hooghe, et al. (2010), decentralisation or regional authority refers to the devolution of power from the central government to lower levels of government; this can be at the intermediate subnational level just below the nation-state and above the local municipal level. In their conceptualisation of the broader definition of decentralisation, L. Hooghe, Marks, Schakel, Osterkatz, et al. (2016) and L. Hooghe et al. (2010) challenge the traditional functional perspective of governance and propose a post-functionalist perspective of governance to emphasise that it is not only what a government does or its functions that matter but also what it means to the people. In contrast to traditional debates which make a distinction between federalism and decentralisation, they reconcile the two to argue that communities wish "to retain their independence" or self-rule but also "want the benefits of scale" from the centre through shared-rule (L. Hooghe, et al., 2016, p. 18). A similar argument is made earlier by Tocqueville (1945) in his observation of the United States of America's federalism in that it combines the different advantages of the magnitude and littleness of nations.

Arguably, there are many shades or types of decentralisation as there are countries. However, this approach makes decentralisation a vague concept and difficult to operationalise. To address this problem, L. Hooghe, et al. (2016) based on their review of the literature, argue that decentralisation can be defined as either a broad or narrow concept. Broadly, they argue that it is a composite measure or multi-dimensional concept along two dimensions: self-rule and shared rule. Self-rule refers to the extent of the fiscal, administrative and political authority a regional government has in areas under its jurisdiction. Shared rule refers to the extent it can co-determine national policy. In contrast, a narrow conceptualisation of decentralisation focuses on one or limited political, administrative and fiscal aspects that constitute self-rule but fail to capture the full phenomenon (Ezcurra & Rodríguez-Pose, 2013; L. Hooghe, et al., 2016; Muringani, Fitjar, & Rodríguez-Pose, 2019; Rodden, 2004; Schakel, 2008). Arguably, the broad definition compared to the narrow conceptualisation is holistic and has all essential features of decentralisation. Therefore, it is adopted in this PhD thesis.

According to L. Hooghe, et al. (2016), decentralisation gives citizens self-rule which allow them to influence economic development in their regions and at the same time, shared-rule to co-determine national policy. There are two mechanisms by which decentralisation is perceived to affect economic development, first the fiscal decentralisation theorem (e.g., Tiebout, 1956) argues that devolving power to lower levels of government allows the matching of the heterogeneous needs and preferences of individuals, thereby improving public policy delivery.

Subsequent theoretical advancements (e.g., Oates, 1972; 1999) emphasise that there are welfare gains from decentralisation as smaller electorates can agree on policies closer to their preferences. The second and most recent approach is the new regionalism (e.g., Keating, 1998; MacLeod, 2001; Muringani et al., 2019; Pike et al., 2017). Its argument is that putting regions in charge of their own development enables the expansion of local capabilities and empowers citizens to participate in decision-making processes. This helps achieve collective action, accountability and support for public policies. Overall, the theoretical propositions on decentralisation posit that it facilitates public goods including economic development.

Despite, these theoretically lauded benefits of decentralisation, there is a heated debate whether it is beneficial or not (Muringani et al., 2019). At the same time, empirical studies on the economic returns of decentralisation show mixed results (Ezcurra & Rodríguez-Pose, 2013; Kuhlmann & Wayenberg, 2016; Torrisi, Pike, Tomaney, & Tselios, 2015; Treisman, 2002, 2007). This prompted Calamai (2009), Torrisi et al. (2015), Kuhlmann and Wayenberg (2016) to argue that there is a need to consider the conditions under which decentralisation reforms take place and whether this influences how they affect economic development. For instance, while Putnam et al. (1993) show that social trust affected the returns of decentralisation reforms in Italy, a single country study with a few exceptions cannot examine variation of regional authority. Subsequent but cross-countries studies provided this variation but examined each of these three separately: the degree of

decentralisation (Ezcurra & Rodríguez-Pose, 2013), the quality of government (Rodríguez-Pose & Di Cataldo, 2015) and social trust (e.g., Kaasa, 2016).

Therefore, this PhD thesis contributes by examining the degree of decentralisation and the quality of government as a combination. Accordingly, Paper I focus on decentralisation and the quality of government. Paper III focuses on decentralisation, the quality of government and social trust. Taken together, these two papers enrich our theoretical understanding on how these specific forms of the same type of institutions affect regional economic development. More so, considering the inconclusive empirical studies on whether decentralisations lead to economic development or not, this PhD allows an examination of whether the quality of government forms the necessary conditions, and if so, the mechanisms at work. Consequently, an understanding of the conditions and mechanisms through which decentralisation affects economic development is important for informing development policies at both national and regional level.

2.3.2 Quality of government

The quality of government is the extent to which a government delivers public goods in an impartial, efficient, non-corrupt and accountable manner (Charron et al., 2010, 2014; Muringani et al., 2019; Rodríguez-Pose & Garcilazo, 2015; Rothstein et al., 2013). The definition builds on the work done on the European Quality of Government Index (EQI) (Charron et al., 2010, 2014; Rothstein et al., 2013) to develop a measure

of the quality of government for both the national and sub-national regional levels across the European Union (EU). The concept of the quality of government and EQI builds on the World Bank Good Governance Indicators (WGI) (Kaufmann, Kraay, & Mastruzzi, 1999). However, the difference between the two is that the WGI is broad and abstract whereas the EQI is more specific and procedural (Rothstein et al., 2013). The focus here is to provide an overview of these two concepts. Otherwise, Rothstein et al. (2013, p. Chpt 1) provides a detailed explanation of the same.

The WGI concept of good governance refers to "the traditions and institutions by which authority in a country is exercised" (Kaufmann et al., 1999, p. 1). It includes the process of government selection, its capacity and respect for citizens and state institutions. The WGI has six indicators: control for corruption, rule of law, government effectiveness, voice and accountability, political instability and violence and regulatory quality. Building on the WGI, the work by Rothstein et al. (2013) on the EQI adopts only four of the six indicators of WGI: control for corruption, rule of law, government effectiveness, and voice and accountability. While Rothstein et al. (2013) maintain the four indicators at the national level, at the sub-national level they drop voice and accountability. Their argument is that voice and accountability is not comparable across EU regions since not all regions elect their regional governments.

In contrast to the approach by Rothstein et al. (2013) on the EQI, Rodríguez-Pose and Garcilazo (2015), and Rodríguez-Pose and Di

Cataldo (2015) maintain the four indicators at the sub-national regional level. They argue that voice and accountability reflect the degree of the citizen's bottom-up political participation. Thus, the perception of what citizens can or cannot do determines their ability to influence decision making and ensure accountability (Lowndes, Pratchett, & Stoker, 2006; Lowndes & Wilson, 2001; Rodríguez-Pose & Tselios, 2019). Therefore, the different electoral processes across regions (c.f Rothstein et al., 2013) represents the varying extent to which citizens have a voice and are also able to hold public officials accountable. These different electoral processes do not make regions incomparable but instead provides enough variation to examine how and why voice and accountability matter for their economic development. This PhD thesis also adopts the same position.

In general, the quality of regional government matters for economic development (e.g., Muringani et al., 2019; Nistotskaya, Charron, & Lapuente, 2015; Rodríguez-Pose & Di Cataldo, 2015; Rodríguez-Pose & Garcilazo, 2015; Rodríguez-Pose & Ketterer, 2019). The seminal contribution by Putnam et al. (1993) based on their observations after decentralisation reforms in Italy, observed that that despite regions having the same power or authority, there were visible differences in their quality of government with similar socio-economic consequences. In the same vein, Treisman (2002) argues that the quality of government differs across regions with some government better than others; this affects their ability to deliver public goods. However, both Putnam et al. (1993) and Treisman (2002) did not make an explicit association

between the quality of government or its components and economic development.

The point of departure for this PhD thesis is that it contributes to the body of literature (Nistotskaya et al., 2015; Rodríguez-Pose & Di Cataldo, 2015; Rodríguez-Pose & Garcilazo, 2015) that explicitly examines the association between the quality of government and economic development at the regional level. Interest in this phenomenon emerged after studies measuring the quality of government (e.g., Charron et al., 2010, 2014) found a correlation between its variation and difference in economic outcomes across regions. In theory, the quality of government affects economic development by promoting the framework conditions such as public policy and social conditions including cooperation and collective action that simultaneously enhance productive economic activities, while reducing opportunism and rent-seeking behaviour (Muringani et al., 2019; Rodríguez-Pose & Di Cataldo, 2015; Rodríguez-Pose & Garcilazo, 2015; Rodríguez-Pose & Ketterer, 2019).

At the same time, according to Rodríguez-Pose and Ketterer (2019), and Muringani et al. (2019) each of the individual dimensions or components of the quality of government plays a unique but complementary role that promotes economic development. For instance, the rule of law provides surety for third party enforcement between economic actors and legal protection of investments. Control of corruption incentivises productive economic activities and efficient allocation of resources for the same. Government effectiveness means the ability to design and implement

effective policies and programmes that drive economic development. Voice and accountability mean that citizens can influence the decision-making process, not just as consumers of public goods but also as co-creators who can also hold public officials accountable.

Empirically, studies (e.g., Rodríguez-Pose & Di Cataldo, 2015; Rodríguez-Pose & Garcilazo, 2015; Rodríguez-Pose & Ketterer, 2019) at the regional level confirm that the quality of government and its four dimensions have a positive association with economic development. Although regions form the context in which decentralisation happens, these studies do not explicitly examine the link between the combination of the quality of government and the degree of decentralisation or regional authority, and economic development. Similarly, there is no known empirical studies that have explored the effect of the interaction between the quality of government and social trust on economic development as well as their structural relationship with political trust, and economic development. Although Kaasa (2016) examined a similar combination of quality of government, social trust and political trust, she did not look at their interaction nor structural relationships. Therefore, extending the existing empirical studies to look at the interaction and structural relationship between these institutional forms is important for understanding how the local conditions and bottom up processes of social capital, and the top down political processes of improving the quality of government, work as a combination to affect political trust and economic development.

Three papers address these research gaps and contributes to address the research question in three different ways. Paper I examines the effect of the combination and interaction between the degree of decentralisation and the quality of government on economic development. By doing so, the paper contributes to our understanding of how formal institutions affect economic development. Paper II examines the effect of the interaction between the quality of government and social trust on economic development. Paper III examines the structural relationship between the quality of government, social trust, political trust and economic development. Both Paper II and III contribute to our understanding of the interplay between formal and informal institutions and how they affect economic development.

2.3.3 Bonding social capital

Bonding social capital refers to "[….] inward-looking [networks that] tend to reinforce exclusive identities and homogeneous groups" (Putnam, 2000, p. 22). Earlier studies have looked at similar networks and used synonymous terms to describe them such as strong ties (Granovetter, 1973, 1983), ingroup-outgroups, Olsonian groups (Knack & Keefer, 1997). Their main characteristics include familiarity, exclusion of others who are non-members of society and is strongest among family members or local communities (Solheim, 2017; Westlund & Larsson, 2016). Typical groups include trade unions, and professional groups, local action groups and churches (Knack & Keefer, 1997; Patulny, 2009; Putnam, 2000; Warren, 2006).

There is debate on how bonding social capital networks operates and affect economic development (Storper, 2013; Westlund & Larsson, 2016). On the one hand, there is an argument (e.g., Boschma, 2005; Crescenzi, Gagliardi, & Percoco, 2013; Farole et al., 2011; Knack & Keefer, 1997) that bonding social capital promotes several growth-limiting vices such as rent-seeking, clientelism and nepotistic practices which discourage innovation and related economic activities. It is based on earlier findings by Olson (1982) that interest groups create benefits for their members only, and their total effect has negative externalities on the broader society. Furthermore, bonding networks (Fukuyama, 1995) or strong ties (Granovetter, 1973, 1983) are limited sources of information and resources. They are also limited because information or knowledge in these networks become redundant and decays overtime (Crescenzi et al., 2013).

On the other hand, another argument (Portes, 1998; Putnam, 2000; Storper, 2005, 2013) is that bonding social capital networks are complementary to bridging social capital and necessary for its development, with some of its useful aspects including enforcement and family support. Perhaps, a reconciling position that cautions against a simplistic view is to consider bonding capital to have both positive and negative externalities depending on its characteristics and the levels of bridging social capital, and human capital (Beugelsdijk & Smulders, 2003; Farole et al., 2011; Halpern, 2005; Portes, 1998; Portes & Landolt, 1996; Putnam, 2000; Rodríguez-Pose & Storper, 2006; Storper, 2013; Svendsen & Bjornskov, 2007; Woolcock, 1998). Based on this, it is

possible that bonding social capital might have benefits that are limited compared to bridging social capital (Putnam, 2000).

It is also possible that human capital can reduce the negative externalities of bonding social capital. Thus, directly through schooling, human capital increases interaction between dissimilar people (Dinda, 2014). Indirectly, human capital through education about values, creates trust and openness that encourage interaction between dissimilar people (Akçomak & Ter Weel, 2009; Fukuyama, 1995; Tabellini, 2010). Potentially, human capital provides the answer to the question by van Staveren and Knorringa (2006) on what are the mechanisms or conditions by which bonding social capital transformed into bridging social capital, if possible.

While these debates and their theoretical propositions apply in general, the same arguments matter for regions (e.g., L. Hooghe, et al., 2016; Pike et al., 2017; Storper, 2011) which form the context in which communities are bonded together by shared norms, language and culture and differentiate themselves from dissimilar 'others' but also co-exist with other communities. However, the extent of bonding social capital will differ across regions such that those with excessive bonding social capital and low levels of bridging social capital will experience poor economic performance (Storper, 2013). Earlier studies by Banfield (1958) attributed excessive bonding social capital as the cause of economic backwardness in Montegrano, Southern Italy. In the same context of Southern Italy, more recent studies by Putnam et al. (1993)

and subsequent scholars have suggested the same. Logically, bonding social capital also forms the local conditions under which decentralisation and other government policies take place, and therefore conditions or mediates their social and economic returns.

Empirical studies have been preoccupied with examining the perceived negative economic consequences of bonding social capital. However, the empirical findings on the perceived negative economic consequences of bonding social capital remain inconclusive. For example, studies on economic growth (Beugelsdijk & Smulders, 2009; Beugelsdijk & Van Schaik, 2005), innovation (Crescenzi et al., 2013) and regional diversification (Antonietti & Boschma, 2018; Cortinovis, Xiao, Boschma, & van Oort, 2017) generally show a negative co-efficient but rarely a significant effect. These inconclusive results could be due to the use of small samples because of challenges with data availability. At the same time, these studies have not considered the theoretical propositions on the interactions between different levels of bonding and bridging social capital, and the influence of contextual factors such as human capital.

Paper III addresses these issues. Overall, it contributes to our understanding of informal institutions. Specifically, it provides an understanding and explanation of how bonding social capital affects economic development at the regional level as well as its interaction with both bridging social capital and human capital. While the lack of data availability might have affected previous empirical studies, we take

advantage of research data improvement to ascertain whether bonding social capital has negative economic consequences compared to bridging social capital. We are also able to examine the interaction between them, and along with human capital, understand the conditions under which bonding social capital affects economic development.

2.3.4 Bridging social capital

While the previous discussion looked at bonding social capital, this discussion looks at bridging social capital. Together, the two are the most studied types of social capital networks and taken as opposites (Westlund & Larsson, 2016). According to Gittell and Vidal (1998) and Putnam (2000), bridging social capital refers to the existence of open networks that connect heterogeneous groups. Earlier studies have described similar type of networks using synonyms such as weak ties (e.g., Granovetter, 1973; Granovetter, 1983) and 'Putnam groups' (Knack & Keefer, 1997). The term 'Putnam groups' by Knack and Keefer (1997) based on Putnam et al. (1993) has been adopted by several scholars (e.g. Beugelsdijk & Smulders, 2009; Beugelsdijk & Van Schaik, 2005; Cortinovis et al., 2017) as a criteria for identifying bridging social capital networks. According to them, typical bridging social capital networks include voluntary associations such as education and cultural groups.

In general, bridging social capital is perceived to be beneficial for achieving collective action and stimulating economic development (Beugelsdijk & Smulders, 2003, 2009; Crescenzi et al., 2013). There are several mechanisms, direct and indirect, by which bridging social capital

is thought to affect economic development. Direct mechanisms include connections between heterogenous groups which increase the diversity of knowledge sources (Jacobs, 2016) by attracting dissimilar people (Florida, 1995, 2005) and new organisation or firm entry (Malecki, 2012) into a region which promotes creativity, innovation (Crescenzi et al., 2013; Iyer, Kitson, & Toh, 2005) and entrepreneurship (Fritsch & Wyrwich, 2016). Related to this, Wollebaek and Selle (2002) argue that networks have a cumulative effect in which more connections leads to more interactions and associated activities. Since bridging social capital networks are open, there is no limit to the numbers of the members of the groups. Therefore, the new members networks can add to this existing network across space, spanning regions or even countries (Westlund & Larsson, 2016). In addition, cross cutting connections between heterogenous groups moderate the quality of their relationships which improves both the intensity and density of bridging social capital networks (Beugelsdijk & Van Schaik, 2005; Putnam et al., 1993). Indirectly, as alluded earlier, networks generate and transmit trust (Putnam et al., 1993). As such bridging social capital networks generate social trust which is important for cooperative behaviour including economic organisation and innovation activities (Beugelsdijk & Van Schaik, 2005; Crescenzi et al., 2013; Fukuyama, 1995). At the same time, participation in one form of network leads to participation in other forms. Therefore, bridging social capital networks promote political participation which improve the quality of government and political trust (Putnam et al., 1993). In turn, the two lead to economic development.

While bridging social capital affects economic development directly and indirectly, other contextual factors also matter. For example, human capital contributes to bridging social capital directly through schooling which increases interaction between people from the heterogeneous group (Dinda, 2014) and indirectly by promoting trust and openness (Akçomak & Ter Weel, 2009; Fukuyama, 1995; Tabellini, 2010). Therefore, it is plausible that the effect of interaction between bridging social capital and human capital on economic development may be complementary or substitutive. However, empirical studies on the same have not been explored.

Like bonding social capital, understanding how bridging social capital works and differs across regions is essential for explaining why some regions do better than others. Since social capital differs from place to place (Boschma, 1999, 2005; Feldman, 2014; Malecki, 2012), the extent of bridging social capital also varies. Although studies on the importance of knowledge spillovers and accessibility in regional innovation system (e.g. Andersson & Karlsson, 2007) do not explicitly mention the role of bridging social capital, they suggest that regions should also access knowledge from other regions. The same applies specifically in the context of periphery region where social networks can foster knowledge exchange to compensate for their loss of skilled individuals (Mayer & Baumgartner, 2014). In the same vein, Amin (1999) cautions that regional policies should not only be inward looking but promote cooperation with other regions and integration to the global economy.

Putnam et al. (1993) and Helliwell and Putnam (1995) in their studies comparing better Northern and poor Southern Italian regions, argue that the places or regions that are rich in associational or civic activities have a better quality of government and economic performance. Subsequent scholars (e.g., Akçomak & Ter Weel, 2009; Beugelsdijk & Smulders, 2009; Cortinovis et al., 2017; Crescenzi et al., 2013) looking at cross-country studies have confirmed the same. However, while these findings show that bridging social capital has a positive association with economic development, it remains inconclusive whether this is an opposite outcome to bonding social. Furthermore, the interaction effect between bonding and bridging social capital and human capital on economic development remains unexplored.

Therefore, understanding how bridging social capital works as a combination with bonding social capital and human capital informs our theoretical understanding on the characteristics and conditions under which social capital affects economic development. The same understanding is also critical to inform policy on how bridging social capital can be used as a tool to promote regional development. Accordingly, Paper II addresses these issues as in general, it contributes to our understanding of informal institutions, and more specifically to how bridging social capital, and its interaction with other contextual factors such as bonding social capital and human capital affect economic development.

2.3.5 Social trust

Social trust also commonly referred to as trust, together with bonding and bridging social capital is the most studied form of social capital (Grillitsch & Nilsson, 2019; Roth, 2009). Its commonly accepted definition is that it is the trust we give to people who are unfamiliar to us, is also referred to as generalised trust, meaning given generally to others, and is different from particularised trust, which refers to trust given to familiar people (Fukuyama, 1995; Newton & Zmerli, 2011; Tabellini, 2010; Uslaner, 2008). Fukuyama (1995) has also defined and described the same as the wide radius of trust which encompass a large group of people or contacts beyond the familiar. Both are forms of inter-personal trust and are different from political trust, which is impersonal and as alluded to earlier, given to the overall political system (Newton et al., 2018; Newton & Zmerli, 2011).

In general, the basic understanding of any form of trust according to Hardin (2002, p. 41) is "my expectation that you will act in a way that I can expect you to act." However, there is debate on how these expectations arise. On one hand, Hardin (2002) argues that it depends on the repeated interaction of individuals who have enough information about each other. On the other hand, according to Reiersen (2019), repeated interactions are not sufficient to explain trust in one-time interactions. At the same time, people still trust even in the absence of information about others (Luhmann, 2018). Therefore, what matters is trustworthiness of the social environment in which social trust exists as a normative part of the social structure or informal institutions (Alesina

& Giuliano, 2015; Patulny, 2009; Putnam et al., 1993; Tabellini, 2010; Whiteley, 2000). In this way, social trust constrains and facilitates human interaction and exchange (Charron & Rothstein, 2018; Nelson & Nelson, 2002; North, 1990; Putnam et al., 1993). Therefore, as part of the enduring social structure, it is relatively stable but changes slowly.

Social trust allows communities or societies to achieve both economic organisation and other collective action outcomes such as civic and political participation. While some of its consequences are not necessarily economic, like social trust itself they are social processes or outcomes in which the economy is embedded (Granovetter, 1985, 1992; Storper, 1995). In this way, social trust affects economic development directly and indirectly (Bjørnskov, 2018; Putnam et al., 1993). Directly, according to Whitely (2000) and Beugelsdijk and Van Schaik (2005), social trust mitigates information asymmetry, enabling people to trust each other in the absence of information and in turn, promotes economic activities such as trade, innovation, entrepreneurship and investments. They also argue that it reduces transaction costs by taking away the need for third party enforcements which frees resources for productive purposes (Beugelsdijk & Van Schaik, 2005). But even in the presence of third parties, it encourages information sharing in complex transactions.

Indirectly, social trust promotes the quality or way in which government works (Putnam et al., 1993), and civic and political participation which also leads to political trust. Although Putnam et al (1993) do not examine the association between the quality of government and economic

development, subsequent empirical studies provide the evidence. Similarly, Putnam et al. (1993) argues that social trust enables civic participation, which in turn, according to Newton and Ramón (2007), leads other forms of participation including political participation, which consequently lead to political trust. As alluded before, political trust affects economic development through government policies and increases accountability.

Following Storper (1995, 1997), regions provide the sites for untraded interdependencies. They provide the local context in which social trust, the quality of government and political trust, together with other contextual factors, interact or at least condition each other to affect economic development. Although empirical studies such as Kaasa (2016) have examined these factors together and found that political trust is a better predictor of economic development than social trust or the quality of government, they did not examine their interaction or structural relationship or whether they affect economic development directly or indirectly through one another.

Paper III and IV address these issues and both contribute to our understanding of the interplay between formal and informal institutions and how they affect economic development. Specifically, Paper III examines the effect of the interaction between social trust and quality of government and Paper IV examines the structural relationship between social trust, the quality of government, political trust and how they affect economic development.

2.3.6 Political trust

At the regional level, there has been an increasing empirical interest in the role of political factors to explain economic development (e.g., Boschma, 1999; Boschma, 2005; Ezcurra & Rodríguez-Pose, 2013; Rodríguez-Pose, 1998; Rodríguez-Pose & Di Cataldo, 2015; Rodríguez-Pose & Garcilazo, 2015; Rodríguez-Pose & Ketterer, 2019). However, empirical studies on political trust (e.g., Kaasa, 2016) are a recent phenomenon. In general, politics (MacKinnon et al., 2009) and the concept of political trust has been given less attention in economic geography and innovation studies. However, this is not the case in political science.

Political science scholars (e.g., Citrin, 1974; M. Hooghe, 2011; Miller, 1974; Newton et al., 2018) have been preoccupied with understanding the meaning and implications of political trust, how and why it came about, and how and why it can change. Broadly, building on the works of some of these earlier scholars (e.g., Citrin, 1974; Miller, 1974) and subsequent scholars (e.g., Christensen & Lægreid, 2005; M. Hooghe, 2011; M. Hooghe & Zmerli, 2011; Levi & Stoker, 2000; Warren, 2006) have addressed salient debates on the concept of political trust and made theoretical and empirical contributions on the same. Revisiting these debates positions the concept of political trust in order to understand and explain differences in economic development across regions.

The first debate is whether political trust is rational based on citizens' experience or a normative expectation (M. Hooghe, 2011; M. Hooghe &

Zmerli, 2011; Levi & Stoker, 2000; Van der Meer, 2010; Warren, 2006). Van der Meer (2010) builds on Hardin (2002)'s rational understanding of trust based on experience to advance a similar view of political trust. Although Warren (2006) accommodates this view, he contests its sufficiency and his argument, consistent with Levi and Stoker (2000), is that not only is a rational understanding of trust based on experience not enough, but more importantly, it requires the trustworthiness of political actors and the system for political trust to emerge. The reason is that citizens do not have enough information about political actors but rather a normative expectation (M. Hooghe & Zmerli, 2011). Therefore, the two views are not necessarily contradictory but complementary such that political trust has both a rational and a normative component.

The second debate is whether political trust is multi-dimensional with two dimensions: trust in politicians and impartial institutions (e.g., Rothstein & Stolle, 2008) or uni-dimensional (e.g., Christensen & Lægreid, 2005; M. Hooghe, 2011; M. Hooghe & Zmerli, 2011). The criticism of the multidimensional position by M. Hooghe and Zmerli (2011) is that it is based on a theoretical choice rather than definitive empirical findings. In contrast, Christensen and Lægreid (2005), and M. Hooghe and Zmerli (2011) provide empirical support for the uni-dimensional position by conducting a factor analysis to show that political trust is explained by one underlying variable. Therefore, bringing the two debates together, political trust can be defined as the overall evaluation of the political system including rational and

normative elements (Christensen & Lægreid, 2005; M. Hooghe, 2011; M. Hooghe & Zmerli, 2011; Newton et al., 2018; Warren, 2006).

Furthermore, taking political trust as both rational and normative enables a theoretical link to the quality of government and social trust. Thus, based on Warren (2006), the relational component of political trust can be built on social trust. Thus, people who trust in general are also likely to trust people in government and the political system. At the same time, the rational component of political trust involves their experience with government services or its quality, and satisfaction with the same increases their trust for it. Therefore, both components are a necessary but not a sufficient condition for political trust.

However, the above studies have been at the national level and use political trust as a dependent variable explained by the economy instead of the opposite. Therefore, examining political trust as an explanatory variable at the regional level is important in the context of decentralisation. The latter is perceived as bringing government close to the people and expanding local capabilities to facilitate both top-down and bottom up processes of policy and politics which consequently stimulates economic development (L. Hooghe, et al., 2016; Muringani et al., 2019; Rodríguez-Pose, 1998; Trigilia, 2001; Trigilia & Burroni, 2009). Top-down, political trust gives legitimacy and support for government policies and actions while bottom-up encourages political participation which also leads to other forms of participation. Political participation works as a vertical link across social cleavages,

cumulatively, broadening the networks for economic activities and also moderating their quality (Boschma, 1999, 2005; Wollebaek & Selle, 2002). The opposite leads to withdrawal of citizens from cooperative participation, clientelism and rent-seeking activities that negatively affect economic development (Boschma, 1999, 2005; Farole et al., 2011; Rodríguez-Pose, 1998; Rodríguez-Pose & Storper, 2006; Tomaney, 2014).

In general, empirical studies on political trust at the regional level remain scant. It seems an exception is Kaasa (2016) who examined how political trust, social trust and the quality of government affect economic development. However, the criticism by Alesina and Giuliano (2015) is that Kaasa (2016) and similar studies only identify which factor is a better predictor than others but do not examine the structural relationships nor how a combination of these factors affects economic development. Therefore, since the quality of government (e.g., Keele, 2007; Khan, 2016) and social trust (Newton et al., 2018; Newton & Zmerli, 2011) are antecedents of political trust, there is a need to ascertain whether they have both a direct and indirect association or just one of the two relationships with economic development. Paper IV addresses these issues and together with Paper III, contributes to our understanding of the interplay between formal and informal institutions, and how they both affect economic development.

2.4 Summary

Institutions, formal and informal are rules of the game that constrain and facilitate human action and interaction, and therefore matter for economic development (Acemoglu et al., 2002; Amin, 1999; Nelson & Nelson, 2002; North, 1990, 2006; Rodríguez-Pose, 2013; Rodríguez-Pose, 2020; Storper, 1995, 1997). As such, when their quality is high, they stimulate growth-promoting factors and when it is weak, growth is inhibited. Arguably, the variation of institutions across regions can help us explain economic differences across the same regions, and why some regions do better than others. While this argument refers to institutions broadly, the same applies to specific types and forms of institutions as well as their combination. Overall, the PhD thesis addresses three research agendas.

The first research agenda examines formal institutions focusing on political institutions. At the regional level, the most common are two isolated strands of literature focusing on decentralisation (e.g., Rodríguez-Pose & Ezcurra, 2011) and quality of government (e.g., Rodríguez-Pose & Di Cataldo, 2015) respectively. While there are heated debates and inconclusive empirical findings on the perceived economic benefits of decentralisation, there is consensus and conclusive findings on the positive association between the quality of government and economic development. This PhD thesis contributes by bringing these two strands of literature together. Doing so helps to understand and explain the conditions necessary for decentralisation to produce the expected social and economic returns (e.g., Calamai, 2009; Kuhlmann &

Wayenberg, 2016; Torrisi et al., 2015). Empirical evidence on decentralisation reforms in Italy (Putnam et al., 1993) and Spain (Dudek, 2005) implicitly suggests that the economic returns of decentralisation are mediated by the quality of government but this has not been explicitly examined. Therefore, Paper 1 investigates the extent to which the economic returns of decentralisation are affected by differences in the quality of government.

The second research agenda examines informal institutions. It considers social capital networks as a proxy, focusing on bonding and bridging social capital. This refers to closed and open networks respectively perceived to have negative and positive externalities for economic development (Beugelsdijk & Smulders, 2009; Gittell & Vidal, 1998; Putnam, 2000; Rodríguez-Pose, 2013). However, there is debate (e.g., Storper, 2013; Westlund & Larsson, 2016) on how bonding social capital works in conjunction with bridging social capital. At the same time, empirical studies (e.g., Antonietti & Boschma, 2018; Beugelsdijk & Smulders, 2009; Cortinovis et al., 2017; Crescenzi et al., 2013) on the perceived negative consequences of bonding social capital remain inconclusive. These empirical studies generally show a negative co-efficient but rarely a significant effect. Furthermore, the interaction between bonding and bridging social capital, and human capital remains unexplored. Therefore, the aim of Paper II is three-fold. First to ascertain whether bonding social capital has negative economic consequences compared to bridging social capital; second to examine the effect of the

interaction between them; and third, the effect of their interaction with human capital.

Finally, the third research agenda examines the interplay between formal and informal institutions. While they do not exist in isolation but side by side with the formal institutions embedded in the broader informal institutions (Alesina & Giuliano, 2015; Farole et al., 2011; North, 1990; Rodríguez-Pose, 2013; Rodríguez-Pose, 2020; Rodríguez-Pose & Storper, 2006), the interplay between the two types of institutions has not been examined empirically. The gap informs the third research agenda in both Paper III and IV. Specifically, Paper III examines the extent to which the economic returns of decentralisation and the quality of regional authority are moderated by local conditions such as social trust. Paper IV examines the structural relationship between political trust, social trust, quality of government and economic development. Kaasa (2016), in a recent study, shows political trust to be a better predictor of productivity than the quality of government and social trust. However, the criticism by Alesina and Giuliano (2015) is that Kaasa (2016) and similar studies overlook the structural relationships between the factors. Accordingly, Paper IV addresses this and aims to ascertain whether social trust and the quality of government have both a direct and an indirect association through political trust with economic development.

Together, Papers, I, III and IV give an understanding of how formal institutions affect economic development. Similarly, Papers, II, III and IV do the same for informal institutions. The last two Papers,

III and IV give an understanding of how the interplay between formal and informal institutions affects economic development. In summary, the three research agendas help us to unpack the black box of institutions and develop a social, and plural understanding of which institutions matter for economic development as well as how, why and when they matter and change over time (Farole et al., 2011; Gertler, 2010; MacKinnon et al., 2009; Rodríguez-Pose, 2013; Rodríguez-Pose, 2020; Rodríguez-Pose & Storper, 2006; Storper, 1995, 1997).

3 Data and methodological approach

The PhD thesis uses quantitative methods to answer the research question. The research design is a comparative cross-country study at the regional level using eight waves of panel data covering the period 2002 to 2016. In total, there are at least 190 and at most 223 regions in 21 EU countries across the four papers in this PhD thesis. The definition of a region is an administrative area at a subnational level making an intermediate level of government between the nation-state and local government (L. Hooghe , et al., 2016). Therefore, excluded are countries without this meso-level administration such as Cyprus, Estonia, Latvia, Lithuania, Luxembourg and Malta. In the remaining 22 countries, Romania and Slovenia are dropped one at a time depending on the availability of data, leaving just 21 countries in the four papers. The first three of the papers use mainly fixed effects panel data methods, whereas the fourth paper uses a structural equation model (SEM) of pooled data making it a pseudo-panel study. The subsequent section further discusses the data, the empirical strategies, and their application in the individual papers.

3.1 Overview of the data

Overall, the panel data is compiled from six sources: the Regional Authority Index (RAI) (e.g., L. Hooghe et al., 2010; L. Hooghe, et al., 2016), the European Quality of Government Index (EQI) (e.g., Charron et al., 2010, 2014; Charron & Lapuente, 2018; Rothstein et al., 2013), the World-wide Governance Indicator (WGI) (e.g., Kaufmann, Kraay, &

Mastruzzi, 2009), the European Social Survey (ESS) (e.g., Jowell, Roberts, Fitzgerald, & Eva, 2007), the European Values Survey (EVS) and the European Statistical Office (Eurostat).

The Eurostat provides data for the dependent variable and control variables. The dependant variable uses economic growth as a proxy for the level of economic development measured by the level of GDP per capita. The control variables are contextual characteristics such as (1) human capital as a percentage of population between the ages of 25 and 64 years that has attained tertiary education, (2) research and development expenditure as a percentage of GDP, (3) the share of employment in manufacturing as a percentage of total employment, (4) population density and (5) road accessibility. The control variables are the same across the four papers but there are some slight variations in Paper IV. The share of employment in natural resources industry is also used as an alternative measure of employment in manufacturing in Paper II. The GDP per capita, population density and road accessibility data are log linearised to avoid skewness.

The data for the explanatory variables are from the other five data sources: The RAI, the EQI, the WGI, the ESS, the EVS. The RAI provides measures for the degree of regional authority or decentralisation and its two dimensions: self and shared rule (L. Hooghe et al., 2010; L. Hooghe, et al., 2016). The RAI data covers regions in 81 countries across the world from 1950 to 2010. The PhD thesis only looks at intermediate subnational regions in 21 EU countries. Some countries have several

regional levels of government. In this case, we use the level with the highest RAI score. Although the RAI index data currently ends in 2010, there have been no major changes in regional authority in Europe over the period from 2010 to 2016. Therefore, the data is extended using the same values for RAI and its dimensions in 2010 to create a full panel with eight waves from 2002 to 2016.

The other three data sources and surveys; the EQI, the ESS and the EVS are based on measuring the perceptions, attitudes and voluntary forms of participation of citizens across regions. A common approach (e.g., Charron et al., 2010; Rothstein et al., 2013) but with slight variations is taken to compile the variables of interest. In the first step, the variables of interest are identified either using a correlation matrix and Cronbach's Alpha followed by factor analysis. In this, variables are reflective and explained by an underlying latent factor in the case of the EQI and ESS or taking the indicators to be formative meaning causing a factor in the case of the EVS. In the second step, the identified variables or indicators are normalised using standardisation to make them comparable at the individual level. In the third step, the data are aggregated from the individual level to the regional level using sampling weights provided in the surveys. The EQI survey data is representative at the regional level whereas the ESS and EVS survey data is representative at the national level although sampling weights are provided at the regional level to make them comparable. Putnam (2001) alluded to the challenge of finding the perfect data and suggested taking advantage of the available data to develop an understanding of the phenomenon of interest and

revisiting it when the data improves. The same applies in this PhD thesis and previous studies at the regional level have used the same ESS and EVS data. Fourth and finally, the individual variables or indicators at the regional level are aggregate using their arithmetic average into their composite indicators.

The EQI surveys is used to construct the overall quality of government indicator and its four dimensions: the rule of law, control of corruption, government effectiveness and voice and accountability (Charron et al., 2010, 2014). The quality of government index aggregates data at the NUTS level, mostly at NUTS 2 level such as Spain, and NUTS 1 level for some such as German, Belgium and some regions in the UK. However, there are cross-country differences on the NUTS level where the regional government is located. For instance, in the case of Sweden and Greece, the strongest regional government is at the NUTS 3 level for the period 2000 to 2016. To make the data comparable, the quality of government data matched closest to that of the strongest regional government. In total, the matching exercise depending on the available data gives us between 190 and 223 regions in the EU at the intermediate subnational level.

There have been three consecutive surveys for the EQI conducted in 2010, 2013, and 2017 (Charron et al., 2010, 2014; Charron & Lapuente, 2018). The EQI surveys are representative at the regional level. Slovenia only has data for one wave and is excluded. The three EQI survey makes a total of about 200 000 observation and an average of 65 000 respondent

per survey. The PhD thesis follows the same approach by Rodríguez-Pose and Di Cataldo (2015), which retains the four of the WGI dimensions at the regional level. The EQI survey asks citizens in European regions to answer 16 questions on their perception of the rule of law, control of corruption, government effectiveness and voice and accountability. Accordingly, the responses at the individual levels are normalised, then aggregated from the individual level to the regional level and finally aggregated into their four dimensions. Since Charron et al. (2010, 2014), Rothstein et al. (2013) and Rodríguez-Pose and Di Cataldo (2015) have validated the same data, there was no need to conduct a factor analysis but only to fit the responses for the 16 questions into the four dimensions. The PhD thesis also follows the same approach by Rothstein et al. (2013), and Rodríguez-Pose and Di Cataldo (2015) to use a trend line of the two-year lag of the WGI data to extend the EQI data into a full panel with eight waves from 2002 to 2016. The same applies to their approach to consider the country effects and remove them from the final regional quality of government index.

The ESS is conducted biennially and has data on the social and political attitudes of European citizens since 2002. Although the data is only representative at the national level, sampling weights provided make it possible to aggregate and make the data comparable at the regional level. Based on the survey data, political trust is an aggregate dimension built from individual responses to trust in a range of political institutions (the United Nations, European Parliament, the national parliament, politicians, political parties, the legal system and the police): 'please tell

me on a score of 0 to 10 how much you personally trust each of the institutions I read out. 0 means you do not trust an institution at all, and 10 means you have complete trust'.

Social trust is an aggregate dimension of individual responses to three trust-related questions scale of 1 to 10: First, "would you say that most people can be trusted or that you can't be too careful in dealing with people?" (trust in people). Second, "do you think that most people would try to take advantage of you if they got the chance, or would they try to be fair?" (fairness in people). Third, "would you say that most of the time people try to be helpful or that they are mostly looking out for themselves? (helpfulness in people). Accordingly, the individual data on social and political trust indicators is first normalised by standardisation, then aggregated to the regional level and finally aggregated to the respective two factors based on factor analysis.

The EVS has robust measures for membership and participation in voluntary association or social capital networks and is conducted every nine years since 1950. Like the ESS, the data is representative at the national level but has sampling weights for the regional level, except for Romania. The recent 1999/2000 and 2008/2009/2010 waves at the individual level are normalised and aggregated to the regional level. Finally, the individual voluntary associations are aggregated into their respective bonding and bridging social capital networks. The PhD thesis adopts the approach by Cortinovis et al. (2017) which builds on Knack and Keefer (1997) as well as their argument that active participation is

the most accurate way of operationalising bonding and bridging social capital, rather than focusing on membership, as previous literature has done (e.g., Putnam, 2000). Since institutions are relatively stable, the two waves of the EVS are adjusted to match the nearest ESS waves. Also, there is a correlation between them (e.g., Patulny, 2009) which makes the ESS data a suitable trend line to extend the EVS into a full panel data with eight waves from 2002 to 2016.

3.2 Empirical strategies

The first three papers, Papers I, II and III, use mainly fixed-effects balanced panel data multiple regression methods. According to Baltagi (2015), panel data combines the properties of cross sectional and time series data allowing to examine respectively, how a phenomenon changes over time and varies across units. Therefore, it is suitable for identifying and measuring effects that are not detectable by the other two methods. In addition, panel data has less collinearity, more degrees of freedom and efficiency, than time series.

Since panel data is heterogeneous in nature, there is a need to control for this heterogeneity to avoid biased results. Thus, a fixed effects model is the most appropriate method compared to the pooled ordinary least squares (OLS) and random effects. In principle, it assumes that there is a correlation between the error terms and the independent variable. However, the drawback is that it is not able to account for time-invariant characteristics which requires a random effects model. Although a Hausman (1978) test is used to determine which model is appropriate,

here the choice of fixed effects is influenced by the theory (e.g., Crescenzi, Di Cataldo, & Rodríguez-Pose, 2016; Rodríguez-Pose, 2013; Rodríguez-Pose & Di Cataldo, 2015) that regions are heterogenous. The last and fourth paper employs a structural equation model (SEM) using pooled panel data. Unlike the regression models explained above, SEM makes it possible to examine the structural relationship between variables (Alesina & Giuliano, 2015).

3.3 Overview of data and methods in the individual papers

Paper I examines how formal institutions affect regional economic development. Specifically, it looks at the combination of two forms of formal and political institutions: quality of government and decentralisation and how they affect economic growth. Economic growth is measured using the regional GDP per capita income taken from the Eurostat database. The data for both the composite measure and dimensions of the quality of government comes from the EQI. The paper uses data from the Eurostat database as controls variables for human capital, R&D expenditure as a percentage of GDP, population density and employment in manufacturing. Although there are 22 EU countries with intermediate sub-national governments at either NUTS 1 or NUTS 2, the final sample has 21 countries with 223 regions and excludes Slovenia due to a lack of sufficient data on the quality of government.

Paper II examines how informal institutions affect regional economic development. The paper uses social capital and specifically examines the perceived differences between bonding and bridging social capital

networks, and their consequences for economic growth as well as the interaction between the two types of networks, with human capital. The EVS provides data for bonding and bridging social capital networks. The sample size is 190 regions from 21 countries, excluding Romania due to its lack of sampling weights in the EVS data. At the same time, all regions in the UK are measured at NUTS 1 level. The paper first conducts an OLS model as baseline to examine cross sectional differences across regions before implementing the robust fixed effects.

Papers III and IV examine the interplay between formal and informal institutions and how it affects regional economic development. Both papers have a sample size of 208 regions in 21 countries which is influenced by the ESS and EQI data and excludes regions with missing data. Specifically, Papers III focuses on social trust, political trust, the quality of government and degree of self-rule as a proxy for degree of decentralisation. The ESS provides data for the political and social trust variables, while the EQI and RAI provide the quality of government data and the degree of decentralisation, respectively.

Papers IV focuses on social trust, political trust, the quality of government and economic growth. The ESS provides data for the political and social trust variables and the EQI for the quality of government. The sample size is the same as Paper III. However, the difference between Paper IV and the first three papers is that instead of fixed-effects regression models, it uses SEM to examine the structural relationship between the factors. Thus, unlike regression methods, SEM

makes it possible to examine structural relationships between factors. Specifically, in this paper, it is suitable to ascertain whether social trust, the quality of government and political trust have a direct and indirect association with economic growth as well as whether political trust mediates the effect of the other two. Table 2 provides a summary of the data and methodological approaches in the four papers.

Table 2:Summary of data and Methodologically approach

Paper	Key variables	Data source	Methods
I	Economic growth Decentralisation Quality of government	European statistical office (Eurostat) Regional authority index (RAI) European quality of government	Fixed effects panel data consisting of eight waves from 2002 to 2016.
II	Economic growth Bonding social capital Bridging social capital Human capital Social trust	Eurostat European values survey (EVS) European social survey (ESS)	Pooled OLS as a baseline and a fixed effects panel data consisting of eight waves from 2002 to 2016.
III	Economic growth Degree of decentralisation Quality of government Social trust	European statistical office (Eurostat) Regional authority index (RAI) European quality of government (EQI) European social survey (ESS)	Fixed effects panel data consisting of eight waves from 2002 to 2016.
IV	Economic growth Quality of government Social trust Political trust	European statistical office (Eurostat) European quality of government (EQI) European social survey (ESS)	Cross sectional structural equation models (SEM) using pooled data of eight waves from 2002 to 2016.

4 Empirical Context

The empirical context of the PhD thesis is intermediate sub-national regions in the European Union (EU) covering the period 2002 to 2016 and includes the UK. The EU started with twelve countries or the EU-12 in 1993 and experienced successive enlargement, becoming the EU-28 before Brexit on 31 January 2020 when the UK left to make them the EU-27.

In theory, the principle of subsidiarity in EU-wide policy is supposed to influence the devolution of power as much as possible to the local level, including regions (Wanzenböck & Frenken, 2018). However, in practice, there are differences among the regions which are influenced by their history and political arrangements (L. Hooghe, et al., 2016). In terms of history, some countries are part of the original EU-13 member states and others are recent members, also termed transitional countries, from the former communistic bloc in Central and Eastern Europe. In addition, the nature of political arrangement is that some countries such as Spain are unitary states whereas others such as Germany are federal states. Overall, some regions wield considerable power whereas other regions are merely statistical units for collecting EU structural funds. While these differences poses a challenge for comparability among the regions (e.g., Rothstein et al., 2013), they create an advantage of high variability among them which is necessary for conducting a comparative study. Similarly, the regions are at different levels of institutional quality such as determined by social trust and the quality of regional governments as

shown in Figures 3 and 4 using data from Papers, III and IV for illustrative purposes.
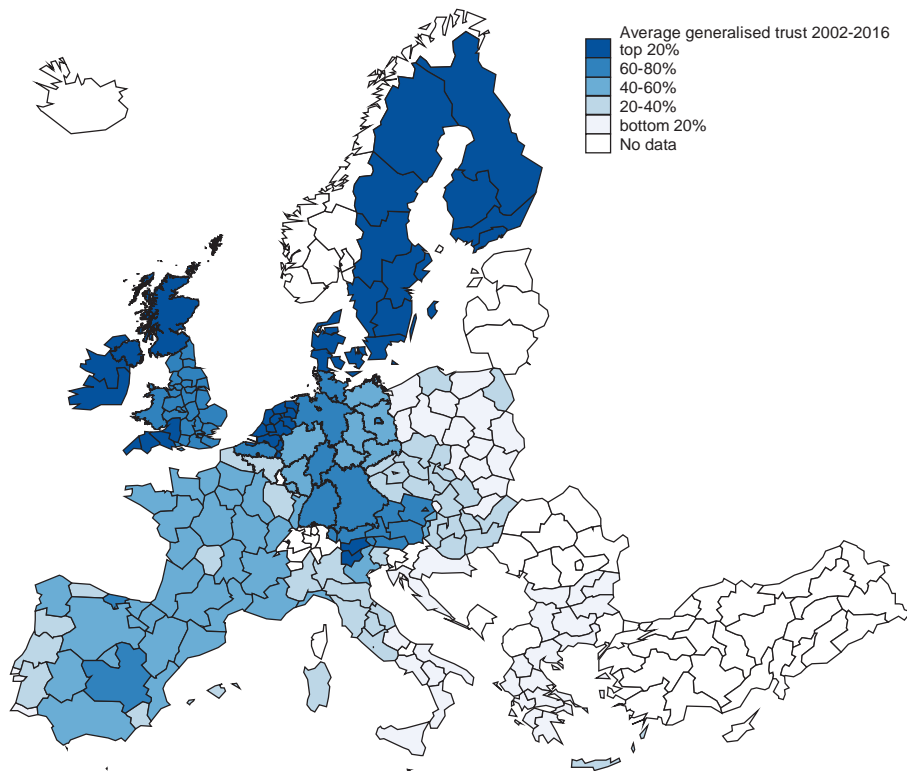
Figure 3: Social trust in EU regions 2002- 2016, ESS data (author's own elaboration)

Both figures 3 and 4 show that Northern Europe, specifically the Nordic countries, which includes Sweden, Denmark and Finland have high levels of social trust and the quality of government, a phenomenon termed as 'Nordic exceptionalism.'
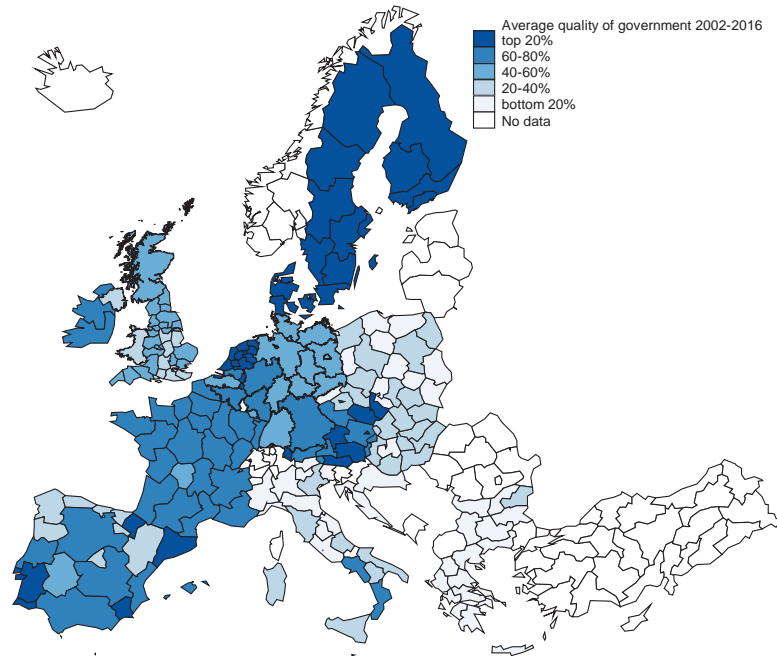
Figure 4: Quality of government in EU regions (2002- 2016), ESS data (author's own elaboration).

The three maps also show that Western Europe is not far behind the Nordic countries but almost at par. The regions in the south and east have generally low levels institutional quality. Although a North-West and South-East divide is visible on the maps, some regions in the south and east show high levels of institutional quality. Overall, the two figures suggest that there is a correlation between social trust and the quality of government and is consistent with previous studies (e.g., Charron et al., 2010, 2014; Putnam et al., 1993). For illustrative purposes, Figure 5 shows that there is a positive correlation between the quality of government and the level of economic development.
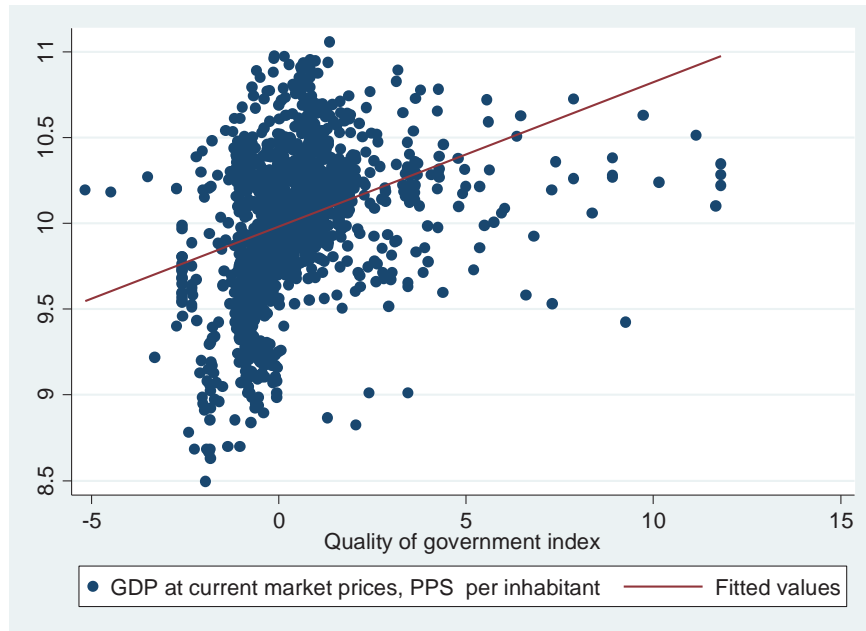
Figure 5: Correlation between GDP per capita and quality of government

Overall, these patterns shown in Figures 2, 3 and 4 are consistent with previous studies (e.g., Charron et al., 2010, 2014) which also show a correlation between institutional quality, the level of economic development and contextual factors such as human capital and rate of unemployment. Also, these patterns and similar previous studies suggest the persistence of economic development and institutional factors which further suggests that regions performing better in the past are likely to do the same in the present and the future. However, the relationships illustrated in Figures 3, 4, and 5 only shows a correlation between the levels of institutional quality and economic development.

5 Summary of papers

From the onset, The PhD thesis set out to understand and explain how institutions, both formal and informal, affect regional economic development. As alluded in the previous chapters, institutions, formal and informal, varies across regions which consequently affects various economic activities, including innovation leading to different economic outcomes across the same regions. Thus, the variation of institutions allows us to understand and explain the variation of economic development across regions and why some regions perform better than others. A summary of four papers that follows demonstrates that this is the case by examining specific types and forms of institutions as well as their combinations.

5.1 Summary of individual papers

Paper I: "*Decentralisation, quality of government and economic growth in the regions of the EU*" examines formal institutions focusing on political institutions. Previous empirical studies on political institutions have looked at decentralisation (L. Hooghe et al., 2010; L. Hooghe, et al., 2016) and the quality of government (Charron et al., 2010, 2014; Charron, Lapuente, & Annoni, 2019) in isolation and not as a combination. To the best of our knowledge, this paper is the first to do this. While empirical studies on decentralisation and economic growth show inconclusive results, similar studies on the quality of government show that it has an association with economic growth. According to

Calamai (2009), Torrisi et al. (2015), Kuhlmann and Wayenberg (2016), the heated debates and inconclusive findings on decentralisation suggest the need to consider the conditions such as the quality of government under which it happens. Therefore, this paper contributes by examining the extent to which the economic returns of decentralisation are affected by differences in government quality. The overall results from a fixed-effects panel data analyses show that the quality of regional government as a composite measure and each of the individual dimensions: the rule of law, control of corruption, government effectiveness and voice and accountability, are better predictors of economic development than decentralisation. Overall, the regional government quality also conditions the economic returns to decentralisation, meaning decentralisation works best in regions with a higher quality of government. Therefore, decentralisation reforms must consider the quality of the regional government to which they would devolve authority.

Paper II: "*Bonding and bridging social capital, and economic growth: New evidence from European regions*" focuses on informal institutions looking specifically on social capital examines. Social capital is the most studied form of informal institutions in economic geography (Rodríguez-Pose, 2013). We specifically examine two types of social capital: bonding and bridging social capital. Existing empirical studies (e.g., Beugelsdijk & Smulders, 2009; Cortinovis et al., 2017; Crescenzi & Gagliardi, 2015; Hoyman, McCall, Paarlberg, & Brennan, 2016) have paid attention to perceived differences between bonding and bridging

social capital and the respective negative and positive consequences for economic development. However, their findings on the perceived adverse effects of bonding social capital remain inconclusive. One of the reasons for this could be the use of small samples due to limited data availability. The recent improvement in the data allows us to revisit these studies.

At the same time, these empirical studies have overlooked the perceived interaction between these two types of social capital (e.g., Halpern, 2005; Storper, 2013; Woolcock, 1998), and with other contextual factors such as human capital (e.g., Dinda, 2014; Fukuyama, 1995; Putnam et al., 1993). This paper first conducts a pooled OLS regression analysis as a baseline followed by the more robust fixed-effects analyses. It contributes to the existing knowledge on how bonding and bridging social capital and their interaction with human capital affect economic growth. The results confirm the perceived differences (e.g., Beugelsdijk & Smulders, 2009; Putnam, 2000; Rodríguez-Pose & Storper, 2006) and respective negative and positive economic consequences of bonding and bridging social capital. Although the combined bonding and bridging social capital have opposite economic outcomes, the paper shows that the two are positive and highly correlated, and individually have a positive and significant effect on economic growth. However, the paper did not explicitly examine their structural relationship. Furthermore, contrary to the theoretical propositions (Storper, 2013), the paper does not find any interaction effects between bonding and bridging social capital on economic growth.

However, the paper finds an interaction effect between bridging social capital and human capital, and between human capital and bonding social capital on economic growth. Specifically, the paper makes a unique contribution by showing that the interaction between bridging and human capital is substitutive and not complementary. Furthermore, it shows that bridging social capital has a more substantial effect on growth in regions with lower levels of human capital. Similarly, the paper is the first to show that human capital (e.g., Akçomak & Ter Weel, 2009; Dinda, 2014; Fukuyama, 1995; Tabellini, 2010) reduces the negative externalities of bonding social capital. It also suggests human capital provides the potential mechanism (e.g., van Staveren & Knorringa, 2006) for transforming bonding social capital into bridging social capital.

Papers III and IV examine how the interplay between formal and informal institutions affect regional economic growth. These two papers bring together the arguments in Papers I and II respectively, examining the formal and informal institutions. However, the difference between the two papers is that Paper III focuses on the quality of government, the degree of decentralisation and social trust, whereas Paper IV focuses on the quality of government, social trust and political trust. Taken together, Paper III and IV allow for a social and plural understanding of how institutions affect economic development. Thus, on the one hand, previous studies, mainly in economics and political science, have examined formal institutions, while on the other hand, studies in economic geography have examined informal institutions looking

specifically at social capital (Rodríguez-Pose, 2013). However, the two do not exist in isolation but with formal institutions embedded in the broader informal institutions (North, 1990; Rodríguez-Pose & Storper, 2006). Therefore, understanding and explaining regional economic growth requires taking into account both types of institutions (Farole et al., 2011, p. 58).

Specifically, Papers III: "*Trust as a catalyst for regional growth in a decentralised Europe"* examines two formal political institutions: the degree of decentralisation and quality of government, and one form of informal institutions: social capital focusing on social trust. At the regional level, the argument is that social conditions such as trust affect the social return such as the quality of government and economic returns of decentralisation (Calamai, 2009; Rodríguez-Pose & Gill, 2005). Although empirical studies on Italy (Putnam et al., 1993) and Spain (Dudek, 2005) after decentralisation reforms implicitly make a suggestion, the extent to which social trust conditions how the quality of government and degree of decentralisation affect regional economic development has not been examined explicitly at the regional level. While existing studies at the national level (e.g., Ahlerup, Olsson, & Yanagizawa, 2009; James, 2015) found that social trust substitutes the quality of government, it has not been ascertained at the regional level. Therefore, Paper III contributes by examining the extent to which differences in social trust affect the economic returns of the quality of regional government and decentralisation. The findings show that social

trust has a substitution relationship with the quality of government but not with the degree of decentralisation.

Similarly, Paper IV: *"The consequences of trust and its antecedents across regions: Evidence from the EU"* examines one formal institution which is the quality of government and two informal institutions which are social trust and political trust. At the same time, there is a gap in the literature on how political trust, social trust and quality of government affect economic development. Kaasa (2016) found political trust to be a better predictor of productivity than the quality of government and social trust. However, studies which only identify predictors have been criticised by Alesina and Giuliano (2015) for overlooking the structural relationships between factors and not ascertaining whether these factors have either a direct or indirect association, or both with economic development. Paper IV addresses this by using the structural equation model (SEM). The results show that political trust is positively associated with economic growth as well as both social trust and the quality of government. Also, it shows that social trust and the quality of government shape economic growth both directly and indirectly through political trust. Overall, these findings point to the complex and interdependent relationship between different types of formal and informal institutions influencing economic growth. Table 3 gives an overview of the four papers, their authorship and status.

Table 3: Overview of research paper included in the dissertation

Paper	Title	Authorship	Status
I	Decentralisation, Institutions and Economic Growth in the EU	Muringani, J., Dahl Fitjar, R., & Rodríguez-Pose, A	Published in *Revista de Economía Mundial*
II	Bonding and bridging social capital, and economic growth: New evidence from European regions	Muringani, J., Dahl Fitjar, R., & Rodríguez-Pose, A	In review: *Environment and Planning A: Economy and Space*
III	Trust as a catalyst for regional growth in a decentralised Europe	Muringani, J.	Submitted to *Journal of Regional Science*
IV	The consequences of trust and its antecedents across regions: Evidence from the EU	Muringani, J., Dahl Fitjar, R., & Rodríguez-Pose, A	Ready to submit

6 Concluding discussion

This PhD thesis contributes to our understanding and better explanation of how formal and informal institutions matter for regional economic development and growth. While there is consensus that institutions matter and their variation across regions can help explain their variation on levels of economic development, (Gertler, 2010; Rodríguez-Pose, 2013; Rodríguez-Pose, 2020; Storper, 2011, 2017), several issues remain unexplored. Broadly, theoretical and empirical studies have paid less attention to institutions at the regional level and have treated them as black boxes. Consequently, we tend to know less about which institutions and their combination matter for regional economic development. We also know less about how, why and when they matter as well as changes over time. Addressing this lack of knowledge has implications for both theory and policy. The empirical findings help us to understand and explain how and why some regions perform economically better than others, persistently over time, and, to make policy recommendations for regional development.

6.1 Theoretical contributions
The PhD thesis contributes by taking an interdisciplinary approach to synthesise institutional perspectives from economic geography, political science and innovation studies. On the one hand, institutions have received more attention in economics, political science and innovation studies at a national level but focusing on formal institutions, and less at the regional level (Gertler, 2010; Rodríguez-Pose, 2010, 2013). On the

other hand, in economic geography, informal institutions have been examined at the regional level focusing on social capital. Therefore, this thesis brings these perspectives together to develop a social and plural understanding of how institutions, both formal and informal, together with other contextual factors affect economic development (MacKinnon et al., 2009).

Overall, the PhD thesis unpacks the black box of institutions to show that the focus should not be whether formal or informal institutions matter but both and how they interact, and jointly affect economic growth and development (Rodríguez-Pose & Storper, 2006; Farole et al., 2011). It shows that specific forms of the same or different types of institutions and their combinations also matter. These may matter differently or under different conditions, including the extent of human capital, and through different mechanisms. In line with our three research agendas, we find the following:

- First, the findings show that formal institutions such as political institutions matter for regional economic development. Specifically, the quality of government is a better predictor for economic growth than differences in decentralisation. It is the case regardless of the dimension of quality of government considered, except for government effectiveness and the dimensions of decentralisation analysed (self-rule and shared rule). The study makes a novel contribution by showing that differences in quality of government condition or mediate

economic returns of decentralisation as a whole and more specifically, the degree of self-rule.

- Second, the study shows that informal institutions matter for regional economic development. The findings confirm the perceived differences between bonding and bridging social capital. Overall, the paper shows that bridging social capital promotes economic development whereas bonding social capital has adverse effects. The findings also show that there are no interaction effects between bonding and bridging social capital, and, therefore, no significant differences in the effects of bonding social capital in regions with bridging social capital, or vice versa. More importantly, this PhD thesis makes a novel contribution by showing two things: one is that there is a substitutions relationship between bridging social capital and human capital. Thus, bridging social capital tends to have a more substantial impact on growth in low-skilled regions. The other is that human capital moderates bonding social capital by reducing the adverse effects. It also suggests that human capital provides the potential mechanisms by which bonding social capital can be transformed into bridging social capital.

- Third, the findings show that there is an interplay between formal and informal institutions in which their specific forms individually and jointly affect economic development. Separately, the findings show two things: one is that social trust substitutes the quality of government but does not affect the

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economic impact of decentralisation. The other is that political trust is positively associated with economic growth and is consistent with the findings by Kaasa (2016) on political trust and productivity. In addition, this PhD thesis makes a novel contribution to show that general trust and the quality of government are also directly and indirectly mediated by political trust positively associated with economic growth.

6.2 Policy

Andersson and Johansson (2011) argues that a current phenomenon is partly a response to the same phenomenon in the previous period. Thus, policies in the current period can promote economic development in the future. Therefore, based on the above findings, this study suggests the following policy recommendations:

- First, formal institutions, especially political institutions such as decentralisation and the quality of government presents a gamut of policy options for regional economic development. Thus, policies directed to decentralisation should aim at improving the quality of government before implementing reforms to devolve power; otherwise, doing so to regions with poor quality of government could result in unintended consequences. In places where there is no regionally defined government, the quality of delegated functions of government at the same level to some extent has a bearing on the success of any planned decentralisation.

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- Second, policy makers should understand that informal institutions present the local social conditions that shape economic and related activities. Therefore, policy interventions should be targeted at simultaneously reducing the negative externalities of bonding social capital while promoting or enhancing bridging social capital. As such, investments in human capital mitigate the negative externalities caused by excessive bonding social capital and has the potential for transforming it into bridging social capital. At the same time, policies in low-skilled regions that promote bridging social capital through civil society and other bridging type associations, can stimulate economic growth.

- Third, there is a need to revisit the policy debates on whether it is formal or informal institutions that matter and overall consider them as interdependent and complex. Furthermore, policy makers should pay attention to the nuances in which the combinations of specific forms of formal and informal institutions interact or jointly affect economic development. Accordingly, policy makers have the flexibility of using either social trust or the quality of government to promote economic development. In addition, improving social trust through civil society is a necessary bottom up approach which works together with improvement in the quality of government as a top down approach for realising political trust and regional economic development.

6.3. Limitations and further research

This PhD thesis is not without limitations, and there are at least four limitations which also suggest opportunities for further research. First, the PhD thesis and its generalisability are limited to the context of the EU. In contrast, including regions in other parts of the world might show different results. Therefore, future studies should consider expanding to regions outside the EU to increase the variability of the sample, improve the explanatory power of institutions and the generalisability of the findings.

Second, the choice of variables is not exhaustive. Thus, the thesis is limited to specific types of formal and informal institutions focusing on political institutions, social capital and political trust. Similarly, the thesis is limited to economic growth as a measure of economic development. Therefore, future research could extend the research agenda by broadening the scope of institutions and measures of economic and human development.

Third, the study is limited to a macro-level analysis at the regional level. There is criticism by Coenen, Asheim, Bugge, and Herstad (2017) that economic geography and innovation studies lack a social ontology for the role of individual agency. Therefore, future studies could yield further insights by incorporating the individual or micro-level to examine how agency and structure or institutions shape each other. Although theoretical and empirical studies implicitly suggest that country-level factors influence regional level factors, this relationship and its inverse

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(Storper, 1995) are hardly explored, except according to Martin (2008), agglomeration. Similarly, future studies could yield further insights by examining how the institutions at regional and national levels work as a combination to affect economic development.

Fourth, the choice of econometric methods is limited to mainly fixed effects panel data in the first three papers, and SEM analyses of pooled data methods in the fourth and last paper. While fixed effects methods take advantage of the heterogeneity of regions, it does not explicitly examine spatial effects nor the structural relationships among variables. Therefore, future studies could yield further insights by using spatial econometrics methods to explicitly examine the extent to which institutions are spatially embedded. Similarly, since Paper II shows a high positive correlation between bonding and bridging social capital, there is a need to use alternative econometric approaches such as SEM to examine their structural relationship and effect on economic development. At the same time, although Paper IV used a pooled cross-sectional SEM analysis, it does not account for changes over-time. Future studies could address this limitation by using a longitudinal SEM model to account for changes over-time.

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Part2-Papers I-IV

List of the papers

I: Muringani, J., Dahl Fitjar, R., & Rodríguez-Pose, A. (2019). Decentralisation, quality of government and economic growth in the regions of the EU. *Revista de economía mundial*, 51, 25-50.

II: Muringani, J., Dahl Fitjar, R., & Rodríguez-Pose, A. Bonding and bridging social capital, and economic growth: New evidence from European regions' focus on informal institutions. In review process: *Environment and Planning A: Economy and Space*.

III: Muringani, J. Trust as a catalyst for regional growth in a decentralised Europe. Submitted: *Journal of Regional Science*.

IV: Muringani, J., Dahl Fitjar, R., & Rodríguez-Pose, A. The consequences of trust and its antecedents across regions: Evidence from the EU. Ready to submit.

Part2-Papers I

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Decentralisation, quality of government and economic growth in the regions of the EU

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Decentralisation, quality of government and economic growth in the regions of the EU

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Abstract: The effect of decentralisation on regional economic growth is a hotly debated topic. In theory, decentralisation should entail welfare benefits by bringing government closer to the people. In practice, the benefits of decentralisation have been hard to prove. A problem is that the quality of regional governments is often lacking, or at least varies widely across different regions. Hence, regional governments may not be capable of delivering public goods in an efficient and accountable manner. Previous analyses have, however, neglected how the benefits of decentralisation may depend on the quality of the regional government whose authority is strengthened by such reforms. This paper considers these two dimensions in conjunction, highlighting that the effect of decentralisation on economic performance is highly mediated by the quality of the devolved government. Using panel data for 223 regions in the EU, the results show that the quality of regional government is a better predictor of economic development than decentralisation. Regional government quality also conditions the economic returns to decentralisation, meaning decentralisation works best in regions with a higher quality of government. Accordingly, decentralisation reforms must consider the quality of the regional government to which they would devolve authority.

Keywords: political institutions, regions, quality of government, regional authority, economic growth, Europe.

1. Introduction

Decentralisation of political power from national to regional governments is a global trend. From Asia to Latin America, from Africa to Europe, national governments have implemented reforms to devolve power to regions. From 1950 to 2007, 21 of 27 EU member states executed decentralisation reforms, increasing the number of countries with elected regional assemblies from 8 to 20 and adding 20 new levels of regional government (Schakel et al., 2015). Pressures from regions for more political power, or even full independence, continued in the following years, from the 2014 referendum in Scotland to the illegal referendum in Catalonia in 2017. Regionalist parties are part of governing coalitions in Belgium and Italy, continuing to renegotiate the balance of power between the central government and the regions. Even in less conflictual settings, the trend towards decentralisation continues. For instance, the Norwegian government announced a regional reform in September 2018 which, according to its minister for local government, represents the largest devolution of power in Norway since the establishment of elected regional assemblies in 1975.

An important motivation for these reforms is that, following the Tiebout (1956) principle, subnational governments can provide a better public policy delivery to match the heterogeneous needs and preferences of individuals living in different cities and regions within a country, thus fostering economic growth at the regional level by giving regions greater control over their own development. Indeed, regions often mobilise for decentralisation at least partly for economic reasons (Rodríguez-Pose and Sandall, 2008; Fitjar, 2009). Theoretical works on fiscal federalism (Oates, 1972; 1999) posit that there are welfare gains from decentralisation, as smaller electorates can agree on policies that are closer to their preferences. However, these must be balanced against the economies of scale arising from more aggregated units (Bolton & Roland, 1997; Alesina et al., 2000; Persson & Tabellini, 2005). Current approaches to regional development build on the idea of new

regionalism, which puts regions in charge of their own development (Keating, 1998). Consequently, regions need to possess sufficient authority to implement appropriate policies. European policy agendas, such as smart specialisation, also presuppose a regional government active in creating a shared vision for the region and implementing policies to realize that vision (Foray 2014; McCann & Ortega-Argilés, 2014).

However, there is still much debate about the effects of such reforms on economic growth (Treisman, 2002, 2007; Rodríguez- Pose & Gill, 2005; Rodríguez-Pose & Ezcurra, 2011; Hooghe et al., 2016; Kuhlmann & Wayenberg, 2016). Critics have argued that decentralisation rarely delivers the economic returns that its proponents had hoped for (Rodríguez-Pose & Gill, 2005). A reason for this might be that regional governments are not always capable of providing public goods in an effective, accountable and non-corrupt manner. There is large variation across regional governments in the quality of government (Charron, Dijkstra, and Lapuente 2014) and, hence, in their ability to reflect public opinion and to carry out sound policies. This is arguably more important than its level of autonomy in shaping development outcomes (Rodríguez-Pose & Di Cataldo, 2015).

It can be very different to decentralise power to a regional government that is functioning well and is capable of delivering good governance, than to decentralise power to a dysfunctional regional government. Yet, no previous studies have looked at whether the returns to decentralisation depend on the quality of the regional government which receives more power. Our contribution is that we do exactly that, analysing how the effects of decentralisation on regional economic development vary across regions with different quality of government. Accordingly, we seek to address this research question: to what extent are the economic returns of decentralisation affected by differences in government quality?

This paper has implications for theory and policy on regional development. First, at a theoretical level, it provides new knowledge on the conditions through which decentralisation may affect regional economic development. Second, at a policy level, specifically in the context of the EU, the findings can inform future decentralisation reforms, as regions are at the core of its principle of subsidiarity (Rodríguez- Pose, 1999, 2013; McCann & Ortega-Argilés, 2014; Wanzenböck & Frenken, 2018), cohesion policy (Farole et al., 2011; Rodríguez-Pose & Garcilazo, 2015; Crescenzi et al., 2016; Bachtler & Begg, 2017), and the EU2020 strategy (Dijkstra et al., 2013).

Accordingly, we develop an empirical model using panel data that allows us to investigate how the degree of decentralisation and the quality of regional government affect regional economic development. We examine the level of regional authority along two dimensions: the region's power to rule itself (self-rule) and its power to shape national policy (shared rule) (Hooghe et al., 2016: 19). For quality of government, we inspect the extent to which the regional government is perceived by its citizens to deliver public goods in an impartial, efficient and non-corrupt manner (Charron et al., 2014). We evaluate how these two dimensions, individually and jointly, affect growth in regional GDP per capita.

The results show that quality of government is a better predictor of regional economic development than decentralisation. They also show that the economic returns to decentralisation are conditioned by differences in government quality. Thus, decentralization works best in regions with a better quality of government. These results provide implications for regional policy, suggesting that decentralisation reforms must take quality of government into account.

The rest of the paper follows this structure: section 2 introduces the relevant literature on how decentralisation and quality of regional government may affect regional economic

development. Section 3 describes the empirical model and provides details on the variables and data. Section 4 presents the results. Section 5 concludes with a summary discussion including policy implications.

2. Decentralisation, quality of government and regional economic development

Hooghe et al. (2016) propose a post-functionalist perspective on multi-level governance in which government is not only what it does (its function) but also what it means. They argue that communities wish "to retain their independence" but also "want the benefits of scale" (Hooghe et al., 2016: 18). We extend this, to look not only at what a government does (its function) but also how it does it (the procedures) or its quality. We adopt the definition that the quality of government is the extent to which a government delivers public goods in an impartial, efficient and non-corrupt manner (Charron et al., 2010: 2014). This approach is relevant as institutions have emerged as a central explanatory factor in understanding uneven regional economic development (Boschma & Martin, 2010). Institutions can be defined as the formal and informal rules of the game, that facilitate and constrain human interaction (North, 1990; Nelson, 2002). Formal institutions are universal, transferable and codified rules. This includes political institutions, such as governments with the power to set and modify those rules (Rodríguez-Pose, 2013; Tomaney, 2014). The capacity of a regional government to shape formal institutions in a way that promotes regional development depends both on its formal authority within the political system (i.e. the level of decentralisation) and on its capacity for good governance (i.e. the quality of government).

In the follow sections, we address the challenges of conceptualisation and operationalisation of decentralisation and quality of government (Treisman, 2002; Ezcurra & Rodríguez-Pose, 2013a; Rothstein et al., 2013; Kuhlmann & Wayenberg, 2016). We elaborate on decentralisation and quality of government, specifically focusing on how both phenomena

affect regional economic development. We conclude with a summary and synthesis of both literatures to derive four hypotheses.

2.1 Decentralisation

The trend towards decentralisation of power from national to regional governments is driven by a combination of demands from the bottom and top-down transfers of authority (Rodríguez-Pose & Gill, 2003; Manor, 2006; Fitjar, 2010; Hooghe et al., 2016). The idea of anchoring political power at the level of the region is associated with economic geography theories about regions as the natural units for economic competition in the global economy (Storper, 1997; Amin, 1999; Gertler, 2010; Hooghe et al., 2016). Associated with this, the ideology of new regionalism gives regions responsibility for their own development outcomes (Keating, 1998; MacLeod, 2001). Top-down regional policies for supporting lagging regions are replaced with bottom-up regional development strategies involving regional governments and coalitions of regional actors. To be sure, early accounts proclaiming "the end of the nation-state" (Ohmae, 1995) have so far proven hyperbolic, as national governments retain their dominant role in the world political system and continue to have the largest say over the rules and laws by which societies are governed. Nonetheless, the last 50 years have seen a sea change in the power of regional governments across the world (Hooghe et al., 2016). Ever more countries have a regional level of government exercising significant political authority. For instance, regional governments have been introduced across the formerly communist Central and Eastern European countries, which were mostly heavily centralised throughout the Cold War. In countries with long traditions of such governments, they have been given more power through a series of reforms. For instance, Spain and Belgium have been transformed from unitary states into quasi- or full-fledged federations, and the United Kingdom – long among the most centralised countries in Western Europe – has set up devolved regional governments.

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This provides an institutional framework for the implementation of place-based policies to promote innovation and economic growth (Barca et al., 2012; Iammarino et al., 2018). Yet, while the political rationale of decentralisation has shifted to incorporate ambitions for economic and social change (Rodríguez- Pose & Gill, 2005), the ability of regional governments to deliver on these ambitions has not always lived up to expectations (Diaz-Serrano & Rodríguez-Pose, 2012).

Decentralisation can take various forms. Rodden (2004) notes that it can involve the transfer of fiscal, policy and political responsibilities. Ebinger and Richter (2016) and Kuhlmann and Wayenberg (2016) distinguish between political and administrative decentralisation, as well as deconcentration. Ezcurra and Rodríguez-Pose (2013a) highlight the power, management and resource dimensions. These forms of decentralisation do not contradict each other. Rather, they are complementary. Hooghe et al. (2016) add the dimension of federalism as an aspect of decentralisation, therefore including the notion of shared rule, or regions' capacity to influence national policy-making, alongside their capacity to form and implement their own policies (self-rule).

There is heated debate on whether decentralisation is beneficial or not in terms of economic outputs, as well as which forms of decentralisation may make a greater difference for economic outcomes (Treisman, 2002; Rodríguez-Pose & Ezcurra, 2010, 2011; Hooghe et al., 2016). On the one hand, decentralisation can improve the delivery of public goods and bring public officials closer to the people. This may facilitate matching and sorting as well as reduce information asymmetries (Tiebout, 1956; Treisman, 2002, 2007; Rodríguez-Pose & Gill, 2003; Manor, 2004; Rodríguez-Pose et al., 2009; Kuhlmann & Wayenberg, 2016). It also facilitates the use of local knowledge to satisfy local tastes and enhances competition between regional authorities. The results are potentially less corrupt, more effective and accountable governments with increased participation of citizens, delivering better economic outcomes.

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However, there is scepticism about whether decentralisation can actually deliver these perceived benefits. Treisman (2002) warns of duplicity, waste of resources, coordination problems and obstacles. He further cautions that close relationships between public officials and the local population might result in corrupt practices. Rodríguez- Pose and Storper (2006) and Ezcurra and Rodríguez-Pose (2013a) add the dangers of strong interest groups and pervasive rent seeking behaviour. Rodríguez- Pose and Gill (2005) warn of the introduction and reproduction of central state tendencies, depending on whether the source of legitimacy is coming from the top or the bottom. Instead of fostering sound competition between regional governments, this might result in a zero sum game or, in the worst cases, to pure waste competition.

Empirical studies have focused more on fiscal decentralisation than other forms of self-government (Rodden, 2004). As such, both policy decentralisation (Rodden, 2004) and political decentralisation (Ezcurra & Rodríguez-Pose, 2013a) have been given less attention and appear more difficult to measure. However, fiscal decentralisation fails to adequately capture the full phenomenon of decentralisation (Rodden, 2004; Schakel, 2008; Ezcurra & Rodríguez-Pose, 2013b; Hooghe et al., 2016). There is therefore a need for studies of decentralisation which consider more of its complexity and multidimensionality (Hooghe et al., 2016) and take into account the factors that may impinge on how decentralisation affects local economic outcomes.

Most of the empirical studies that have delved into the complex relationship between decentralisation and economic growth have shown mixed and/or inconclusive results, both concerning whether decentralisation is beneficial or not, and which forms matter (Treisman, 2002, 2007; Ezcurra & Rodríguez-Pose, 2013a; Kuhlmann & Wayenberg, 2016). The history and process of decentralisation can influence its economic outcomes (Rodriguez-Pose et al., 2009). Furthermore, some regional authorities seem to be more effective than others (Putnam,

1993), and regional authorities may be effective in some areas of policy but not in others (Borghetto & Franchino, 2010).

The proclaimed benefits of decentralisation in bringing government closer to the people and building on local knowledge pertain mainly to the dimension of self-rule. This involves handing over power to the regional government to sort out its own affairs. The idea of self-rule follows from the principle of subsidiarity, in bringing political decision-making down to the level of government closest to those affected by those decisions. The shared rule dimension is conceptually different, being more related to the discussion over federal versus unitary forms of government. Shared rule involves regions participating in national policy-making through e.g. parliament chambers representing regions rather than citizens directly. This is not related to the subsidiarity principle, but rather aims for a more equal representation of regions in national decision-making (i.e. one region one vote, rather than one citizen one vote).

Decentralisation can also affect the quality of government (Treisman, 2002). Smaller local jurisdictions are associated with higher corruption and can be less effective at providing services. While Treisman (2002) is interested in the quality of government as the dependent variable, in this paper, we assess it as a mediating variable, More specifically, we ask how quality of government conditions the effects of decentralisation on regional development. Consequently, we now turn our attention to this phenomenon, discussing how the quality of regional governments might affect development outcomes.

2.2 Quality of government

Quality of government is the extent to which a government delivers public goods in an impartial, efficient and non-corrupt manner (Charron et al., 2010, 2014). According to Putnam (1993: 9), "the quality of government matters to the people's lives: Scholarships are awarded,

roads paved, children inoculated – or (if government fails) they are not." As such, "[g]overnments differ dramatically in quality, however one defines it" (Treisman, 2002: 1). Some governments are extremely corrupt, wasteful and ineffective, while others are honest, efficient and responsive (Treisman, 2002).

A number of empirical studies have examined how quality of government differs between regions. The best known case possibly concerns the gap between Northern and Southern Italian regions (e.g. Putnam, 1993). Despite having the same formal authority, Italian regions differ widely in their capacity to produce favourable socio-economic outcomes. However, most studies covering this question have been limited to one country context, arguably characterised by extreme regional disparities. More recent studies (e.g. Charron et al., 2010; Charron et al., 2014) have generalised this discussion to a cross-national framework involving a large number of countries. Such research has used population surveys (Charron et al., 2014) and, in some cases, leveraged the World Bank's Governance Indicators (Kaufmann, Kraay, & Mastruzzi, 2009), to develop a measure of quality of government for both the national and regional levels across European regions: the quality of government index (QoG). The QoG index adopts four of the six World Bank good governance indicators used by Kaufmann, Kraay, & Mastruzzi (2009) – control of corruption, rule of law, government effectiveness, and voice and accountability – and created a composite index for every single European region. A number of ensuing empirical studies find a link between quality of government and a raft of regional economic outcomes, such as entrepreneurship, innovation or economic growth (e.g. Nistotskaya et al., 2015; Rodríguez-Pose and Di Cataldo, 2015; Rodríguez-Pose and Garcilazo, 2015). Overall, regions with a higher quality of government tend to be more effective at implementing policies and programmes, resulting in better economic outcomes.

Quality of government has various dimensions, each of which is expected to affect regional economic development. First, corruption takes away the incentives for innovation and

productive economic activities, leading economic agents to put their resources into rent-seeking behaviour (Rodríguez- Pose & Storper, 2006; Rothstein & Teorell, 2008; Ezcurra & Rodríguez-Pose, 2013a; Rodríguez-Pose, 2013; Crescenzi et al., 2016). Second, the rule of law affects the investment propensity in a region (Rodríguez-Pose & Di Cataldo, 2015). It lowers transaction costs through ensuring enforcement of contracts and market exchanges (North, 1990; Acemoglu et al., 2002, 2005). Third, government effectiveness stimulates economic activities by the appropriate design and implementation of policies and programmes. Effective governments are capable of carrying out the policies that they set out to do (Charron et al., 2014). However, there is a limit to what regional government can do (Putnam, 1993; MacKinnon et al., 2009; Borghetto & Franchino, 2010; Tomaney et al., 2010). Fourth, voice and accountability are important to allow citizens to influence public policy and ensure politicians and civil servants do what they are supposed to (Rodríguez-Pose, 2013).

Empirical studies have established a link between these components of quality of government and regional economic development. Del Monte and Papagni (2001) found a significant and direct negative effect of corruption on the growth rate. Rodríguez-Pose and Di Cataldo (2015) found that corruption affects innovative performance. It takes away the incentives for innovation and economic activities (Rodríguez- Pose & Storper, 2006). Government effectiveness has also been found to have an effect on innovativeness (Rodríguez-Pose & Di Cataldo, 2015) and regional economic development (Ketterer & Rodríguez- Pose, 2018). In general, the components of quality of government are highly correlated with each other as well as with other socio-economic activities (Ascani et al., 2012; Charron et al., 2010, 2014; Rothstein & Holmberg, 2014).

Some studies on quality of government have touched on the issue of decentralisation, such as Charron et al. (2010, 2014). However, they have only looked at the association between the two phenomena. There are no studies that have investigated how the quality of government

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conditions decentralisation and its effect on regional economic development. In the following section, we discuss this relationship and develop hypotheses for the relationships between quality of government, decentralisation, and regional economic development.

2.3 Putting the two together: Regional authority, quality of government and regional economic development

Despite a few empirical studies looking at the association or correlation between decentralisation and quality of government (e.g. Treisman, 2002; Charron et al., 2010, 2014), there are no empirical studies that have investigated how the combination of these phenomena affects regional economic development. Institutional quality, and more specifically quality of government, have been consistent predictors of economic development (Rodrik et al. 2004). Empirical studies on Italian regions and recent studies involving a larger cross section of EU regions support this (Ascani et al., 2012; Charron et al., 2010, 2014; Rodríguez-Pose & Di Cataldo, 2015). Furthermore, regions that do well continue to do so and those that do badly likewise, reinforcing the core-periphery divide. These findings have also established a link between regional economic development and the four components of quality of government. On the other hand, studies on decentralisation and economic development remain inconclusive (Treisman, 2002; 2007; Rodríguez-Pose and Ezcurra, 2011; Hooghe et al., 2016; Kuhlmann and Wayenberg, 2016). We propose the following hypotheses:

H_1: Regional government quality is positively associated with regional economic growth.

H_2: Regional government authority is positively associated with regional economic growth.

While decentralisation can have negative or positive economic implications, its effect is contingent on the governments involved (Rodríguez- Pose & Gill, 2005) and, notably, their quality (Rodríguez-Pose & Garcilazo, 2015). Our interest is to test how quality of government mediates the effects of decentralisation on regional economic development. While in the past, this could have been difficult to investigate due to the lack of data on these concepts, the availability of data across EU regions from the QoG index (Charron et al., 2010, 2014) and the regional authority index (Hooghe et al., 2016; Hooghe, Marks, & Schakel, 2010) now makes this possible. We propose the following hypothesis:

> H_3: The association between regional government authority and regional economic growth depends on regional government quality.

Finally, we explore how this relationship may differ across various dimensions of regional authority. Specifically, the region's authority to govern itself (self-rule) is more closely related to theories of fiscal federalism and ideas of bringing government closer to the people than its authority to shape national policy. Furthermore, self-rule gives power to a regional administration and is hence more dependent on the quality of that administration, while shared rule is mainly exercised through the executive power of a national government. We thus propose the following hypothesis:

> H_4: The association between regional self-rule and regional economic growth depends on regional government quality.

3. Methods and research design

3.1 The model

This paper employs panel data covering the period 2002 to 2015 for 223 subnational regions across 21 EU countries. A region is defined as an administrative area at a subnational level

making an intermediate level of government between the nation-state and local government (Hooghe *et al.* 2016).

The effect of political institutions on economic development is analysed through multivariate regression analyses using fixed-effect panel regression models. The empirical equation of the basic model adopts the following form: for region $r = 1, ..., 223$ in country $c = 1, ..., 21$ at time $t = 2002, ..., 2015$:

$$LnGDPpc_{r,t} = \alpha + \beta_1 decentralization_{r,t-1} + \beta_2 QoG_{r,t-1} + \gamma_1 decentralization *$$
$$QoG_{r,t-1} + \overline{\chi}_{r,t-1} + \mu_t + \varepsilon_{r,t}$$

$LnGDPpc_{r,t}$ represents the annual GDP per capita in region r at time t. $Decentralization_{r,t}$ denotes the degree of decentralization, measured by the regional authority index (RAI) including its two dimensions: self-rule and shared rule. $QoG_{r,t-1}$ is the quality of government (Charron et al., 2010, 2014), including its four components: (i) Control for corruption, (ii) rule of law, (iii) government effectiveness (iv) voice and accountability. $\overline{\chi}_{r,t-1}$ denotes a vector of control variables. μ_t captures time-specific fixed effects; and $\varepsilon_{r,t}$ denotes the error term.

The data for the variables is merged from four datasets: 1) the European Quality of Government Institute (Charron et al., 2014); 2) the World Bank Governance Indicators (Kaufmann et al., 2009); 3) the Regional Authority Index (Hooghe et al., 2016); and 4) Eurostat data on regional economies (Eurostat, 2018). The variables are explained in more detail in the subsequent section.

3.2 Variables and data

The dependent variable, economic development, is measured using the level of GDP as a proxy for economic growth in fixed effects panel data analysis. The data for regional GDP are

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collected from the Eurostat database (Eurostat 2018) for the years 2002 to 2015. The data are log transformed, due to skewness in the distribution of regional GDP.

There are two main explanatory variables: decentralisation and quality of government. Decentralisation is measured using the regional authority index (RAI), which has two dimensions, self-rule and the shared rule (Hooghe et al., 2016; Hooghe et al., 2010). Self-rule is the authority exercised by the subnational government in its own territory with respect to five components: 1) policy scope, 2) autonomy, 3) executive control, 4) fiscal control, and 5) borrowing control. Shared rule is the authority that a subnational government co-exercises in the country as a whole with respect to five components: 1) law making, 2) executive control, 3) fiscal control, 4) borrowing control, and 5) constitutional change. The RAI is the most comprehensive measure of decentralisation, based on a consolidation of the literature on decentralisation and federalism. It measures the degree of decentralisation as an aggregate or composite index of different forms of decentralisation. Using a composite measure has clear advantages over studying individual types of decentralisation (e.g. fiscal or policy decentralisation) or focusing on particular policy areas. For a detailed description of the individual measures, see Hooghe et al. (2016: 3-30). The data for these variables are taken from the RAI index (Hooghe et al., 2016). However, the RAI index data currently end in 2010. As there have been no major changes in regional authority in Europe over the period from 2010 to 2015, we extend the 2010 data to 2015 in order to create a full panel from 2002 to 2015. Some countries have several regional levels of government. In this case, we use the level with the highest RAI score. This gives a measure of the level of regional authority in each region, proxied by the powers of the most important regional government.

The quality of government index measures regional citizens' perception of how well their regional government performs its function, along four dimensions: (i) control of corruption; (ii) rule of law; (iii) government effectiveness;, and (iv) voice and accountability (Charron et

al., 2010, 2014). We use data from three consecutive surveys, conducted in 2010, 2013, and 2017 (Charron et al., 2010, 2014; Charron & Lapuente, 2018).

The quality of government index aggregates data at the NUTS1 level for all countries and at the NUTS2 level for some countries. The NUTS regions are somewhat arbitrary statistical units which do not always correspond to actual levels of government. Furthermore, there are cross-country differences in whether the regional level of government in a country is defined at the NUTS1, NUTS2 or NUTS3 level. In order to match the quality of government data to the regional authority index, which provides a measurement of the powers of actual regional governments, we use QoG data for the NUTS level closest to that of the strongest regional government. Hence, we resort to, for instance, the NUTS1 level for Germany, where the NUTS1 regions (*Länder*) are the main regional level of government. Meanwhile, we use the NUTS2 level for Spain, where the NUTS2 regions (*comunidades autónomas*) perform the same function. In some cases (e.g. Sweden), regional governments are at the NUTS3 level. In this case, we use QoG data for the lowest available level as a proxy for the quality of the regional governments within each region.

The quality of the regional government is calculated using the method developed in Charron et al. (2010) and (Rodríguez-Pose & Di Cataldo, 2015). The calculation considers country characteristics based on the World Bank Governance indicators as follows:

$$QoG_{r,c} = WGI_c + (Rqog_{r,c} - \overline{Rqog_c})$$

$QoG_{r,c}$ is the final QoG index for region r in country c. It is obtained as the distance from the regional QoG country mean ($\overline{Rqog_c}$) of the regional score ($Rqog_{r,c}$), added to WGI score for country c (WGI_c) (Rodríguez-Pose & Di Cataldo, 2015: 681; Rothstein et al., 2015: 99). The four components of quality of government have been checked for validity and reliability. The

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results show a high correlation between the components. Since we only have data for three waves, we use the World Bank Governance indicators to extrapolate from these, as done in Charron et al. (2010) and (Rodríguez-Pose & Di Cataldo, 2015), to create a full panel from 2002 to 2015. The World Bank Governance indicators survey started in 1996 and was conducted every two years until 2002 and every year thereafter.

We include control variables that are usually considered to affect economic growth at a regional level, including education (percentage of 25- to 60-year-olds with tertiary education), R&D expenditure, population density and employment in manufacturing. The data for the control variables are drawn from Eurostat (2018). Year dummies are included to control for time related effects. We do not include country dummies for two reasons: First, the calculation of the final QoG index for a region r in country c already includes a country dimension based on the WGI score for country c (WGI_c). This is important for ensuring comparability across countries. Second, with few exceptions, the RAI also has little variation within countries. Ideally, we could control for the quality of the central government by including country dummies. However, even if one would argue that the quality of government at national level matters, "there are numerous empirical indications and anecdotal evidence pointing out that the provision and quality of public services controlled by a powerful central government can nonetheless vary largely across different regions (Charron, 2013, 72). Hence, country dummies would not necessarily be able to account for this. Table A1 in Appendix includes an overview of the variables included in the analysis.

4. Regression results

In order to test H_1 and H_2, we first estimate a model using regional authority and quality of government as independent variables, before assessing the potential interaction between them. Table 1 shows the results of this analysis.

Table 1: Fixed-effects panel regression results, main effects of RAI and QoG

VARIABLES	(1)	(2)
Regional authority	0.00138	0.00135
	(0.002)	(0.002)
Regional government quality	0.00702***	0.00731***
	(0.001)	(0.001)
Education, %		0.00167*
		(0.001)
R&D expenditure		0.00743*
		(0.004)
Population density		-0.00016***
		(0.000)
Manufacturing employment, %		0.00643***
		(0.001)
Observations	3,122	3,104
R^2	0.55812	0.56470
Number of regions	223	223
Time FE	YES	YES
Region FE	YES	YES
R^2 within	0.55812	0.56470
R^2 between	0.39760	0.07731
R^2 overall	0.09419	0.01067
F test	242.84174	195.41259
P-value of F	0.00000	0.00000

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

The quality of the regional government has a positive and significant association with regional GDP, supporting H_1. The authority of the regional government does not have a significant link to regional GDP. Hence, we do not find evidence to support H_2. The results are consistent when controlling for education, R&D expenditure, population density and employment in manufacturing. The control variables are positive and significant, as expected, except for population density, which is negative and significant.

Table 2: Fixed-effects panel regression results, components of QoG

VARIABLES	(1)	(2)	(3)	(4)
Regional authority	0.00215	0.00191	0.00164	0.00107
	(0.002)	(0.002)	(0.002)	(0.002)
Control of corruption	0.01347***			
	(0.002)			
Rule of law		0.00642***		
		(0.002)		
Government effectiveness			0.00134	
			(0.001)	
Voice and accountability				0.00758***
				(0.002)
Education, %	0.00180**	0.00178**	0.00191**	0.00194**
	(0.001)	(0.001)	(0.001)	(0.001)
R&D expenditure	0.00874**	0.00778**	0.00769*	0.00728*
	(0.004)	(0.004)	(0.004)	(0.004)
Population density	-0.00016***	-0.00015***	-0.00015***	-0.00016***
	(0.000)	(0.000)	(0.000)	(0.000)
Manufacturing employment, %	0.00659***	0.00644***	0.00624***	0.00583***
	(0.001)	(0.001)	(0.001)	(0.001)
Observations	3,104	3,104	3,104	3,104
R^2	0.56793	0.56288	0.56133	0.56399
Number of regions	223	223	223	223
Time FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
R^2 within	0.56793	0.56288	0.56133	0.56399
R^2 between	0.09255	0.08889	0.08724	0.09107
R^2 overall	0.01471	0.01383	0.01309	0.01462
F test	197.99785	193.96570	192.75093	194.84616
P-value of F	0.00000	0.00000	0.00000	0.00000

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2 decomposes the quality of government index into its individual components. Most components of government quality have a positive and significant connection with regional GDP. The only exception is government effectiveness which is insignificant. The regional authority index remains insignificant – as was the case in Table 1 – in all regressions.

Table 3 does the same for the regional authority index, decomposing it into the dimensions of self-rule and shared rule. Neither of the two dimensions has a significant correlation with regional GDP, reinforcing the idea that, in general, political decentralisation is unrelated to

economic performance (Ezcurra and Rodríguez-Pose, 2013a).

Table 3: Fixed-effects panel regression results, components of RAI

VARIABLES	(1)	(2)	(3)	(4)
Regional authority	0.00138	0.00135		
	(0.002)	(0.002)		
Self-rule			0.00253	0.00457
			(0.004)	(0.004)
Shared rule			-0.00166	-0.00614
			(0.008)	(0.008)
Regional government quality	0.00702***	0.00731***	0.00708***	0.00748***
	(0.001)	(0.001)	(0.002)	(0.002)
Education, %		0.00167*		0.00148
		(0.001)		(0.001)
R&D expenditure		0.00743*		0.00766*
		(0.004)		(0.004)
Population density		-0.00016***		-0.00016***
		(0.000)		(0.000)
Manufacturing employment, %		0.00643***		0.00644***
		(0.001)		(0.001)
Observations	3,122	3,104	3,122	3,104
R^2	0.55812	0.56470	0.55814	0.56485
Number of regions	223	223	223	223
Time FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
R^2 within	0.55812	0.56470	0.55814	0.56485
R^2 between	0.39760	0.07731	0.34572	0.10621
R^2 overall	0.09419	0.01067	0.07732	0.02121
F test	242.84174	195.41259	227.60936	185.68406
P-value of F	0.00000	0.00000	0.00000	0.00000

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results from Tables 1 to 3 indicate that quality of government is a better predictor of regional economic growth than differences in decentralisation. They emphasise and reinforce previous findings on the relationships between these phenomena (Rodríguez-Pose & Garcilazo, 2015). These results further corroborate previous empirical studies looking at the association between quality of government and socio-economic outcomes (Charron et al., 2010, 2014). Further, they stress the importance of each of the components of quality of government. Control of corruption, rule of law and accountability facilitate regional economic

development. These results are consistent with previous studies, such as Rodríguez-Pose & Di Cataldo (2015) or Rodríguez-Pose & Garcilazo (2015).

Our main contribution, however, is related to H_3, namely estimating the extent to which the quality of subnational tiers of government mediates the economic returns of decentralisation. This is assessed by including an interaction between regional government authority and quality in the regression model. Table 4 shows the results of this analysis. The results indicate that there is a positive and significant interaction between RAI and QoG. This provides support for H_3: the potential influence of decentralisation on economic growth greatly depends on the quality of the regional government. Decentralisation is much more beneficial when regions have good government quality than in those cases where transfers of powers and resources are made to areas of the country where the government quality is more deficient.

To test H4, we further include interactions between self-rule and QoG, and between shared rule and QoG. Table 4 also shows the results of these analyses. The interaction between self-rule and QoG is positive and significant at the 10% level. The interaction between shared rule and QoG is positive and significant at the 5% level. However, the significance of the interaction between shared rule and QoG disappears when control variables are included.

The results for hypotheses 3 and 4 highlight that decentralization works best in those areas with better quality of government. Furthermore, the results show that this is specifically the case for decentralisation in the form of enhanced self-rule.

Table 4: Fixed-effects panel regression results, including interaction terms

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Regional authority	0.00081	0.00093				
	(0.002)	(0.002)				
Regional government quality	-0.00137	0.00052	-0.00108	0.00039	0.00466**	0.00550***
	(0.004)	(0.004)	(0.005)	(0.004)	(0.002)	(0.002)
RAI*QoG	0.00063**	0.00051**				
	(0.000)	(0.000)				
Self-rule			0.00125	0.00203		
			(0.003)	(0.003)		
Self-rule*QoG			0.00078*	0.00067*		
			(0.000)	(0.000)		
Shared rule					0.00028	-0.00124
					(0.006)	(0.006)
Shared rule*QoG					0.00082**	0.00064
					(0.000)	(0.000)
Education, %		0.00163*		0.00153*		0.00170*
		(0.001)		(0.001)		(0.001)
R&D expenditure		0.00690*		0.00732*		0.00697*
		(0.004)		(0.004)		(0.004)
Population density		-0.00015***		-0.00016***		-0.00016***
		(0.000)		(0.000)		(0.000)
Manufacturing employment, %		0.00637***		0.00639***		0.00640***
		(0.001)		(0.001)		(0.001)
Observations	3,122	3,104	3,122	3,104	3,122	3,104
R^2	0.55909	0.56534	0.55870	0.56517	0.55873	0.56505
Number of regions	223	223	223	223	223	223
Time FE	YES	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES	YES
R^2 within	0.55909	0.56534	0.55870	0.56517	0.55873	0.56505
R^2 between	0.24786	0.08716	0.30361	0.08691	0.24976	0.10475
R^2 overall	0.07772	0.01300	0.07525	0.01332	0.07006	0.01930
F test	228.47983	186.05735	228.11859	185.92909	228.15187	185.83915
P-value of F	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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To illustrate what these results mean in substantive terms, Figure 1 shows the marginal effects of regional government authority for regions with different quality of government, across the full range of the quality of government index. Figure 2 does the same for the self-rule dimension of regional authority. In both cases, the results show that the effect of regional authority on economic development is close to zero for regions with the lowest levels of regional government quality. Only when the quality of the regional government has an index score of 8 or above does regional authority start to have a significant effect (at the 10% level) on regional development.

Figure 1: Marginal effects of regional government authority at varying levels of government quality

Average Marginal Effects of RAI with 90% CIs

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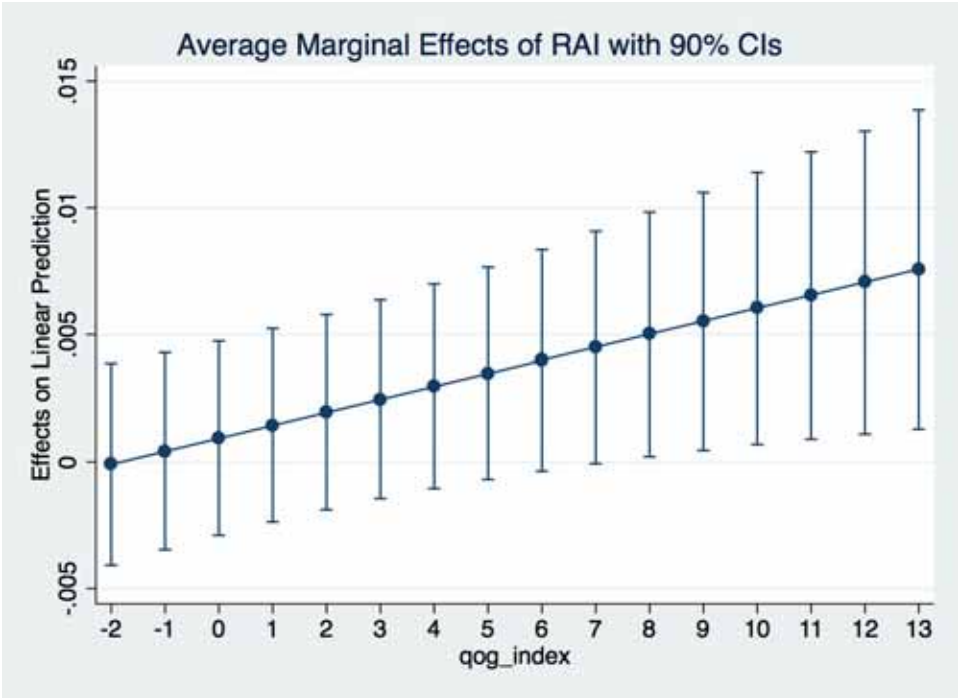
Figure 2: Marginal effects of regional self-rule at varying levels of government quality
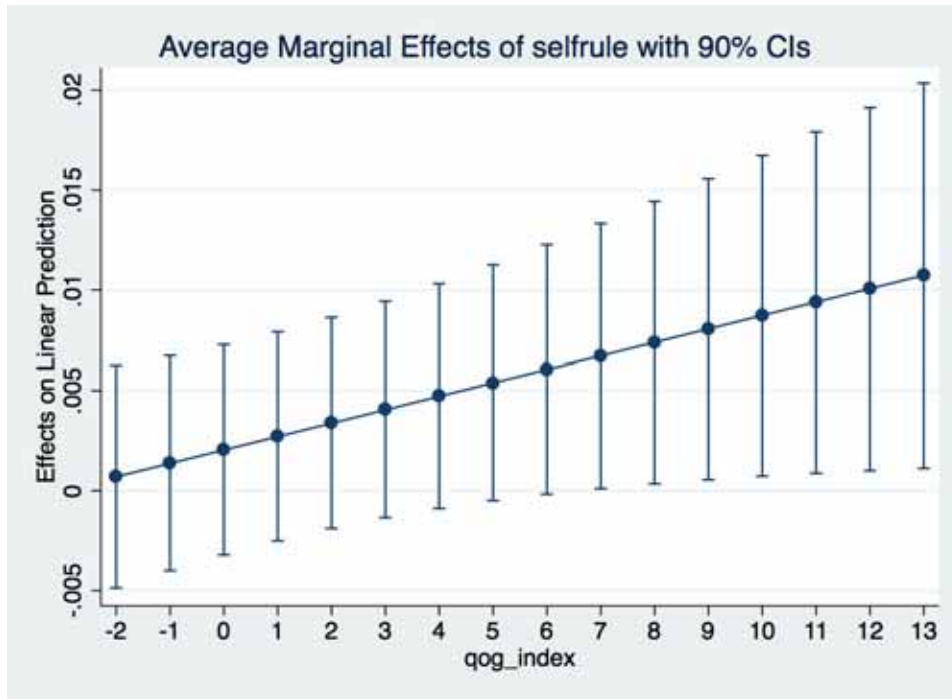
Conclusions

This paper has examined how the economic returns to decentralisation are affected by differences in government quality. Previous empirical studies of decentralisation have tended to consider this topic in isolation, assessing its viability regardless of the quality of the government which actually gets more power through decentralisation reforms. However, previous studies have shown that quality of government is important for economic development (Rodríguez-Pose and Di Cataldo, 2015). It may also play an important role in conditioning the effects of decentralisation reforms. After all, one would rather want to give more power to good regional governments than to bad ones. In light of the dearth of empirical research on how differences in quality of government conditions the economic returns of decentralisation, this paper makes an important contribution to our understanding of how to

obtain the biggest economic returns from transferring powers and resources to subnational tiers of government.

The analysis shows that quality of government is a far more important factor for economic growth than differences in decentralization. This is the case regardless of the dimension of quality of government considered, except for government effectiveness, or of the dimension of decentralization analysed (self-rule and shared-rule). The results also show that differences in quality of government condition the economic effectiveness of decentralization. This applies to the RAI as a whole and, specifically, to its self-rule component.

These results have important policy implications. First, policy-makers and political actors need to understand that quality of government is a more consistent and better predictor for regional economic development than decentralisation. Therefore, mechanisms for improving government quality must be considered first, before other political solutions are sold. Second, the devolution of authority to regions with poor quality of government could result in unintended economic consequences (Treisman, 2002; Rodríguez- Pose & Gill, 2005; Rodríguez- Pose & Storper, 2006; Ezcurra & Rodríguez-Pose, 2013a). Despite its global appeal (Rodríguez- Pose & Gill, 2005; Ezcurra & Rodríguez-Pose, 2013b; Hooghe et al., 2016; Kuhlmann & Wayenberg, 2016), decentralisation must not be seen as a panacea for economic development. Neither should it be regarded as a one-size-fits-all solution, but should be responsive to place-specific conditions. The quality of government differs from region to region (Treisman, 2002; Boschma & Frenken, 2006; Boschma & Martin, 2010; Charron et al., 2010, 2014; Rodríguez-Pose, 2013; Charron & Lapuente, 2018). Hence, proponents of decentralisation reforms need to take into account the quality of the regional government to which they propose to devolve authority when assessing the economic viability of such reforms.

This paper has only looked at decentralisation as an aggregate or composite measure, and has not considered its sub-components nor their types beyond self-rule and shared rule. As such, it does not consider how different public goods and services being devolved might be exposed to a different extent to lack of institutional quality in devolved authorities with low government quality. Decentralisation may place higher demands on regional governments in some areas than in others. Therefore, future research could consider the extent to which the economic returns of individual types or forms of decentralisation are mediated by quality of the regional government and its components. This could help shed further light on which reform solutions are likely to be more effective than others, as well as their performance dimensions, for example, effectiveness, efficiency and coordination (Kuhlmann & Wayenberg, 2016).

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APPENDIX

Table A1: Overview of the variables

Variable	Description	Source
Dependent variable		
Annual growth rate of GDP	Measured using level of GDP	Eurostat (2018)
Explanatory variables		
Regional authority	Degree of decentralisation as an aggregate of scores for self-rule and shared rule	Hooghe et al. (2016)
Self-rule	Authority a region has within its jurisdiction over five functions	Hooghe et al. (2016)
Shared rule	Authority a region shared with the country as a whole to co-determine five functions	Hooghe et al. (2016)
Regional government quality	The extent to which a government delivers the public goods in an impartial, efficient and non-corrupt manner	(Charron et al., 2010, 2014; Charron & Lapuente, 2018
Control of corruption	The extent to which a government delivers its services of public goods free of corruption	(Charron et al., 2010, 2014; Charron & Lapuente, 2018
Rule of law	The extent to which everyone is treated equally before the law as well as impartiality of courts to enforce contracts and markets exchanges, and guarantee of property rights.	(Charron et al., 2010, 2014; Charron & Lapuente, 2018
Government effectiveness	The extent to which a government delivers its services of public goods in a manner that is effective	(Charron et al., 2010, 2014; Charron & Lapuente, 2018
Voice and accountability	The extent to which a citizen can influence government including mechanisms such as competitive, free and fair elections, freedom of press and civic participation.	(Charron et al., 2010, 2014; Charron & Lapuente, 2018
Control variables		
Education	Education as percentage of population with tertiary education from 25 to 60 years	Eurostat (2018)
R&D expenditure	R&D expenditure as a percentage of GDP	Eurostat (2018)
Manufacturing employment	Employment in manufacturing as a percentage of total employment in all sectors	Eurostat (2018)
Population density	Population per square kilometre	Eurostat (2018)

Authors' compilation

Part2-Papers II

Social capital and economic growth in the regions of Europe

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Abstract

Social capital is an important factor explaining differences in economic growth among regions, as research in regional studies has long recognised. However, the key distinction between bonding social capital, which can lead to lock-in and myopia, and bridging social capital, which promotes knowledge flow across diverse groups, has tended to be overlooked in growth research. In this paper, we address this shortcoming by examining how bonding and bridging social capital affect regional economic growth, using data for 190 regions in 21 EU countries, covering eight waves of the European Social Survey between 2002 and 2016. The findings confirm that bridging social capital is linked to higher levels of regional economic growth. Bonding social capital is highly correlated with bridging social capital and is associated with lower growth when this is controlled for. We do not find significantly different effects of bonding social capital in regions with more or less bridging social capital, or vice versa. Furthermore, we examine the interaction between social and human capital, finding that bridging social capital tends to facilitate growth in low-skilled regions. Human capital also moderates the relationship between bonding social capital and growth, reducing the negative externalities imposed by excessive bonding social capital. Overall, bridging social capital is fundamental for stimulating economic growth, especially in low-skilled regions.

1. Introduction

Social capital has become an attractive concept for both scholars and policy-makers. The former (e.g. Asheim, 2003; Beugelsdijk & Smulders, 2009; Boschma, 2005; Crescenzi & Gagliardi, 2015; Farole, Rodríguez-Pose, & Storper, 2011; Putnam et al., 1993; Rodríguez-Pose & Storper, 2006; Storper, 2005, 2013) see it as a useful concept in explaining differences in economic growth among regions. The latter – for example the World Bank (1998), the OECD (2001) and the European Union (Eurobarometer, 2005) – are increasingly thinking about how to use social capital as a policy tool for facilitating growth. While in theory, social capital is an attractive concept, in practice "it is difficult if not impossible to imitate one region's social capital process in other places" (Malecki, 2012, p. 1033). Without understanding how social capital works, policies, programmes and projects using it to foster economic growth across regions are bound to fail.

Broadly, social capital can be defined as a variety or combination of aspects of social structure or features of social organisation, and aggregates of institutionalised relationships, such as trust, networks and norms that facilitate cooperative action (Bourdieu, 1986; Coleman, 1988; Putnam et al., 1993). Within the social capital literature, an important distinction is often made between bonding and bridging forms of social capital (Patulny, 2009; Putnam, 2000; Westlund & Larsson, 2016). Bonding social capital refers to closed networks that link homogenous groups, whereas bridging social capital refers to open networks that link heterogeneous groups (Putnam, 2000). The balance of bonding and bridging social capital either blocks or fortifies the sorting and matching of economic activities with consequences for uneven economic growth among regions (Beugelsdijk & Smulders, 2009; Farole et al., 2011; Putnam, 2000; Rodríguez-Pose & Storper, 2006; Storper, 2005, 2013; van Staveren & Knorringa, 2006).

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Empirical studies have implicitly (Beugelsdijk & Van Schaik, 2005) or explicitly (Beugelsdijk & Smulders, 2009) paid attention to the differences between the effects of bonding and bridging social capital on economic growth. However, empirical findings on the effects of bonding and bridging social capital on regional economic growth remain inconclusive (Beugelsdijk & Smulders, 2009; Westlund & Adam, 2010). The dominant theoretical assumption is that bonding and bridging social capital complement each other (Putnam, 2000; Rodríguez-Pose & Storper, 2006; Storper, 2005, 2013; Woolcock, 2010), but this has so far not been adequately explored.

Furthermore, the relationship between social and other forms of capital, notably human capital, in promoting economic growth remains unclear. Putnam et al. (1993) and Fukuyama (1995) have, for example, suggested that human capital may have a moderating effect on both bonding and bridging social capital. An important question is whether social capital can, to some extent, substitute for human capital and, as such, represent an alternative path to growth for low-skilled regions. Or, conversely, whether the two are mutually dependent, such that social capital requires a high level of human capital in order to foster growth.

This paper extends existing knowledge on how bonding and bridging social capital affect economic growth, as well as on how their effects are moderated by human capital. Accordingly, we address the following research questions: First, we examine how bonding and bridging social capital affect regional economic growth. Second, we look at whether the effects of bonding social capital on economic growth depend on the levels of bridging social capital in the region, and vice versa. Finally, we assess the extent to which the effects of bonding and bridging social capital on regional economic growth vary depending on human capital.

In order to address these questions, we conduct a panel data analysis of 190 regions in 21 EU countries. Using the eight waves of the European Social Survey from 2002 to 2016, we

construct a purpose-built dataset covering more data and for a longer period than prior studies on the role of social capital for economic development at the regional scale (Beugelsdijk & Smulders, 2009). The findings confirm the differences between the effects of bonding and bridging social capital on economic growth. The two are highly correlated, and individually each is associated with higher levels of growth. However, when both are included in the same model, interesting difference emerge: While bridging social capital has a positive effect on regional economic growth when controlling for bonding social capital, bonding social capital is negative for growth when controlling for the level of bridging social capital in the region. Furthermore, the findings confirm that human capital moderates the effects of social capital on economic growth. An increase in human capital reduces the negative effects of bonding social capital – i.e. bonding social capital is particularly harmful in low-skilled regions. Meanwhile, bridging social capital works as a substitute for human capital. Specifically, bridging social capital has a stronger effect on growth in regions with lower levels of human capital. Hence, high levels of bridging social capital can to some extent compensate for a lack of human capital in low-skilled regions.

The rest of the paper follows this structure: Section 2 examines the literature on social capital and economic growth. Section 3 presents the data and empirical model. Section 4 presents the results and discussion. Section 5 is the conclusion.

2. Social capital and regional development

This paper conceptualises and operationalises social capital as an aggregate construct at a regional level (Beugelsdijk & Smulders, 2009; Beugelsdijk & Van Schaik, 2005; Putnam et al., 1993). At the same time, it takes a multi-dimensional approach in which social capital is considered to comprise bonding and bridging social capital (Patulny, 2009; Putnam et al., 1993;

Westlund & Larsson, 2016). Specifically, the focus is on the structural or network dimensions of bonding and bridging social capital and their effects on economic growth.

According to Putnam et al. (1993), networks transmit trust, reduce transaction costs and information asymmetry, and increase the density and intensity of interactions with positive externalities on economic growth in regions. Although the paper focuses on economic growth, it also draws on related studies looking at other socio-economic outcomes, such as innovation (Crescenzi & Gagliardi, 2015), regional diversification (Antonietti & Boschma, 2018; Cortinovis, Xiao, Boschma, & van Oort, 2017), and entrepreneurship (Feldman, Siegel, & Wright, 2019).

The next section starts by separately discussing bonding and bridging social capital and their effect on economic growth. This is followed and concluded with a synthesis that brings the two together to develop the hypotheses that inform the empirical investigation.

2.1 Bonding social capital

Putnam (2000: 22) defines bonding social capital as "inward looking [networks that] tend to reinforce exclusive identities and homogeneous groups". The term is related to concepts such as strong ties and within-group cohesion. Bonding is fundamentally characterised by a tightening of relationships and networks within the group, while, simultaneously, excluding non-members (Granovetter, 1973).

There are three different positions in the literature on how bonding social capital operates. The first position treats bonding social capital networks as "Olson-type groups" or "distributional coalitions" (Antonietti & Boschma, 2018; Cortinovis et al., 2017; Crescenzi & Gagliardi, 2015; Knack & Keefer, 1997; Rodríguez-Pose & Storper, 2006; Storper, 2005; 2013). This builds on the observations by Olson (1982) that interest groups create benefits for members, but impose disproportionate costs on the wider society. Thus, despite their benefits in terms of interest

articulation and preference matching, their total effect is negative on the whole of society. From this perspective, strong bonding within a place will result in rent-seeking, insider-outsider problems, clientelism, and nepotistic practices, which block economic progress (Crescenzi & Gagliardi, 2015; Farole et al., 2011; Rodríguez-Pose & Storper, 2006; Storper, 2005; 2013).

The second position is that bonding social capital is complementary to bridging social capital and therefore leads to beneficial social and economic outcomes (Portes, 1998; Storper, 2005, 2013; Woolcock, 2010). Social control and sanctions, as well as the supporting nature of bonding social capital, are to a certain degree necessary for developing bridging social capital and achieving broader socio-economic outcomes.

The third position, which is perhaps the most reconciling, is that bonding social capital can have both positive and negative consequences, depending on the context (Farole et al., 2011; Patulny & Svendsen, 2007; Portes, 1998). Thus, other contextual factors, such as human capital, influence the effects of social capital on growth. Human capital could either substitute for or complement social capital (Schuller 2001). For instance, building on Putnam et al. (1993) and Fukuyama (1995), human capital can have a moderating effect that reduces the potential negative externalities of bonding social capital. The mechanisms through which human capital works include what Wollebæk and Selle (2002) describe as cumulative and moderating effects. Directly, human capital increases the interaction between heterogenous groups (Dinda, 2014). This process is cumulative in that an increase in interaction leads to more interaction. Indirectly, human capital promotes trust and openness, which encourages interaction beyond bonding social networks (Akçomak & Ter Weel, 2009; Fukuyama, 1995; Tabellini, 2010). This has moderating effects in that it improves the quality of relationships across heterogenous groups of people within and across regions. At the same time, regions with high levels of human capital generate more new knowledge and have higher absorptive capacity that promotes economic growth and development (Andersson & Johansson, 2010; Andersson & Karlsson, 2007; Smith

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& Thomas, 2017), reducing the danger of lock-in associated with bonding social capital. Conversely, the effects of bonding social capital in these contexts can also be positive as it helps to promote the flow of knowledge in the region.

Empirical research on the effects of bonding social capital remains inconclusive. Findings from studies on economic growth (Beugelsdijk & Smulders, 2009; Hoyman, McCall, Paarlberg, & Brennan, 2016), innovation (Crescenzi & Gagliardi, 2015) and regional diversification (Cortinovis et al., 2017) generally show a negative coefficient, but rarely a strong and significant effect. Overall, these findings are inconclusive as to whether bonding social capital has a negative effect on economic growth. However, Beugelsdijk & Smulders (2009) find an indirect negative effect, insofar as bonding social capital tends to reduce the levels of bridging social capital.

2.2 Bridging social capital

Bridging social capital refers to the existence of open networks that connect heterogeneous groups (Antonietti & Boschma, 2018; Beugelsdijk & Smulders, 2009; Boschma, 2005; Cortinovis et al., 2017; Crescenzi & Gagliardi, 2015; Rodríguez-Pose & Storper, 2006; Storper, 2005, 2013). These networks are often also called "Putnam groups", building on the argument by Putnam et al. (1993) that participation in civic or voluntary associations, such as educational and cultural groups, leads to positive social and economic outcomes. There are several mechanisms through which bridging social capital may work directly or indirectly to promote economic growth (Bjørnskov, 2006). Connections between heterogeneous groups increase the diversity of knowledge sources (Rodríguez-Pose & von Berlepsch, 2019; Solheim, Boschma, & Herstad, 2020). This facilitates creativity (Florida, 2002; Florida, Mellander, & Stolarick, 2008), innovation (Crescenzi & Gagliardi, 2015), firm entry (Malecki, 2012), and entrepreneurship (Feldman et al., 2019).

Bridging social capital is generally considered to have positive effects on socio-economic outcomes (Beugelsdijk & Smulders, 2009; Farole et al., 2011; Patulny & Svendsen, 2007; Putnam, 2000; Rodríguez-Pose & Storper, 2006; Storper, 2005, 2013; van Staveren & Knorringa, 2006; Westlund & Larsson, 2016). Although bridging social capital is beneficial both individually and collectively, developing and maintaining it also involves considerable costs.

Since bonding and bridging social capital are presented as opposite concepts in the literature, one might expect regions with a high level of bridging social capital to have low levels of bonding social capital, and vice versa (Bürcher & Mayer, 2018). However, this is not necessarily the case, as regions can often have either high or low levels of both forms of social capital. Indeed, the two forms often go together, as regions develop both strong networks within groups and bridging networks across them.

Furthermore, the effects of bridging social capital may also depend on the degree of bonding social capital in a place (Halpern, 2005; Storper, 2005, 2013; Rodríguez-Pose & Storper, 2006; Woolcock, 1998). Thus, the two interact and operate at a continuum from low to high social capital, and their different mixes produce different outcomes. According to Halpern (2005), Rodríguez-Pose and Storper (2006), and Storper (2005, 2013), high forms of both produce better socio-economic outcomes, whereas high bridging and low bonding social capital result in an 'anomie' or lack of sanctions to ensure common expectations. Low bridging and high bonding results in amoral familism, while low levels of both lead to amoral individualism.

There is a close relationship between social capital and trust (Putnam et al., 1993). Patulny (2009) argues that the concept of a narrow and wide radius of trust (Fukuyama 1995) can be extended to bonding and bridging social capital, respectively. Arguably, bonding social has a limited radius, allowing some exchanges and interactions to happen, while also providing forms of social control and solidarity. This is beneficial, but only to a certain extent. Bridging social

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capital normally involves networking across different groups, which in turn, require some bonding social capital to be formed. However, without a balance between the two types of social capital, high levels or excessive forms of bonding social capital have an overall negative effect. As alluded earlier, the interaction between bonding and bridging social capital remains unexplored in empirical research.

As in the case of bonding, differences in human capital may also affect bridging social capital, as well as moderate its effects on socio-economic outcomes (Akçomak & Ter Weel, 2009; Dinda, 2014; Fukuyama, 1995; Tabellini, 2010). Human capital contributes to bridging social capital directly (Dinda, 2014) and indirectly (Akçomak & Ter Weel, 2009; Fukuyama, 1995; Tabellini, 2010). Directly, schooling increases interaction, which facilitates bridging networks. Indirectly, it promotes trust and openness, which, in turn, reduce conflict among dissimilar groups and increase their interaction, consequently facilitating bridging networks. Although human capital has been used as a control variable in previous empirical studies (Beugelsdijk & Smulders, 2009), its interaction with bridging social capital remains unexplored. Human capital could be expected to strengthen the positive effects of bridging social capital following the same mechanisms that reduces the negative effects of bonding social capital, insofar as it creates or attracts more new knowledge, which is then shared more effectively across heterogeneous groups in regions with high bridging social capital. However, bridging social capital could also be a substitute for human capital. Bridging social capital promotes collaborative problem-solving and the effective exchange of knowledge across diverse groups, which can potentially compensate for stronger capabilities of individual problem-solvers in regions with high human capital.

Overall, empirical studies on economic growth (Beugelsdijk & Smulders, 2009) innovation (Crescenzi & Gagliardi, 2015), regional diversification (Cortinovis et al., 2017), and income inequality (Hoyman et al., 2016) have, by and large, found bridging social capital to have a

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positive and significant effect. However, research on the relationship between bonding and bridging social capital remains inconclusive. There is also little research on how human capital might moderate the effects of bridging social capital.

2.3 Hypotheses

Based on this overview of the literature on how bonding and bridging social capital influence economic growth, we develop three types of hypotheses on how bonding and bridging social capital is associated with economic growth. First, we examine the direct effects of each type of social capital on economic growth. The literature notes that bonding and bridging have opposite effects on economic growth, as bridging tends to be beneficial while bonding can be harmful for growth (Beugelsdijk & Smulders, 2009; Farole et al., 2011; Putnam, 2000; Rodríguez-Pose & Storper, 2006; Storper, 2005, 2013; van Staveren & Knorringa, 2006). However, empirical findings (e.g. Beugelsdijk & Smulders, 2009), especially for bonding, have often not resulted in significant findings. Therefore, we test the following hypotheses:

> **H1a:** *Bonding social capital is negatively associated with economic growth*

> **H1b:** *Bridging social capital is positively associated with economic growth*

Second, there is a theoretical proposition that bonding and bridging social capital are complementary and reinforce one another (Portes, 1998; Putnam, 2000; Rodríguez-Pose & Storper, 2006; Storper, 2005, 2013; van Staveren & Knorringa, 2006; Woolcock, 2010). Accordingly, we derive our second hypothesis:

> **H2:** *There is a positive interaction between the effects of bonding and bridging social capital on economic growth.*

Third, we expect human capital to shape the association of bonding and bridging social capital with economic growth. For bonding social capital, a better endowment of human capital should

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reduce the negative effects of in-groups, as it provides greater potential for the generation of new knowledge within these groups. For bridging social capital, the relationship is less clear. On the one hand, human capital may also generate more new knowledge that can be shared across heterogeneous groups and support the absorptive capacity of these groups. On this basis, we might expect a complementary relationship between the two. On the other hand, bridging social capital could also substitute for human capital. Regions with a lower capacity to generate new knowledge may be able to compensate for this with a superior social structure that allows them to share knowledge more effectively across heterogeneous groups in society. If this is the case, we would expect a negative interaction between bridging social capital and human capital. Hence, we derive the following hypotheses:

H3a: The negative effect of bonding social capital on economic growth is reduced at higher levels of human capital.

H3b: The positive effect of bridging social capital on economic growth is moderated by levels of human capital.

3. Model and data

3.1 Empirical strategy

To examine the association between the two types of social capital and economic growth, we first run a pooled OLS model using levels of GDP per capita across regions as the outcome[1]. We assess the hypotheses H1a and H1b using the following model:

$$LnGDPpc_{r,t} = \alpha + \beta_1 Bonding\ SC_{r,t}\alpha + \beta_2 Bridging\ SC_{\ r,t} + \overline{\chi}_{r,t} + \mu_t + \varepsilon_{r,t} \qquad (1)$$

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1 We focus on the levels of GDP per capita as a measure of economic growth, following a common approach in the literature (e.g. Hall & Jones, 1999; Easterly & Levine, 2001; Vieira & Damasceno, 2011). While some authors focus instead on the rate of GDP per capita growth (Barro & Sala-i-Martin, 1991; Mankiw et al. 1995; Glaeser, Scheinkman & Schleifer, 1995), this is inappropriate here as social capital is relatively stable over time (Hjerppe, 2003). Therefore, one might think of it as affecting the levels of GDP per capita which reflect long-run economic growth, rather than its rate of growth which reflects economic growth in the short term (Hall & Jones, 1999). In the same vein, one should think of the current levels of GDP per capita to be a product of past growth (Knack & Keefer, 1995).

Where $LnGDPpc_{r,t}$ is the log annual GDP per capita in region r at time t. $Bonding\ SC_{r,t}$ and $Bridging\ SC_{r,t}$ represent bonding and bridging social capital. $\overline{\chi}_{r,t}$ denotes a vector of control variables, which, according to the existing literature, affect the growth of GDP per capita at a regional level in Europe. μ_t captures time-specific fixed effects; and $\varepsilon_{r,t}$ denotes the error term.

Second, we estimate a fixed-effects model to account for heterogeneity across regions. The fixed-effect model controls for unobserved heterogeneity across regions by incorporating regional fixed effects, denoted by ρ_r.

$$LnGDPpc_{r,t} = \alpha + \beta_1 Bonding\ SC_{r,t}\alpha + \beta_2 Bridging\ SC_{\ r,t} + \overline{\chi}_{r,t} + \rho_r + \mu_t + \varepsilon_{r,t} \quad (2)$$

For testing H2, we add an interaction term between bonding and bridging social capital, transforming the model in the following way:

$$LnGDPpc_{r,t} = \alpha + \beta_1 Bonding\ SC_{r,t}\alpha + \beta_2 Bridging\ SC_{\ r,t} + \beta_3 Bonding\ SC_{r,t} *$$

$$Bridging\ SC_{r,t} + \overline{\chi}_{r,t} + \rho_r + \mu_t + \varepsilon_{r,t} \quad\quad\quad (3)$$

In order to test H3a and H3b, we include interaction terms between bonding social capital and human capital, and between bridging social capital and human capital, respectively:

$$LnGDPpc_{r,t} = \alpha + \beta_1 Bonding\ SC_{r,t}\alpha + \beta_2 Bridging\ SC_{\ r,t} + \beta_3\ HumanCapital_{r,t} +$$

$$\beta_4 Bonding\ SC_{r,t} * HumanCapital_{r,t} + \overline{\chi}_{r,t} + \rho_r + \mu_t + \varepsilon_{r,t} \quad\quad (4)$$

$$LnGDPpc_{r,t} = \alpha + \beta_1 Bonding\ SC_{r,t}\alpha + \beta_2 Bridging\ SC_{\ r,t} + \beta_3\ HumanCapital_{r,t} +$$

$$\beta_4 Bridging\ SC_{r,t} * HumanCapital_{r,t} + \overline{\chi}_{r,t} + \rho_r + \mu_t + \varepsilon_{r,t} \quad\quad (5)$$

Finally, we bring the three models in equations 2, 3 and 4 into a combined interaction model. We include the two-way interaction terms between the three sets of equations: bonding and bridging social capital, bonding social capital and human capital, and bridging and bonding social capital. Equation 5 shows the overall interaction model:

$$LnGDPpc_{r,t} = \alpha + \beta_1 Bonding\ SC_{r,t} + \beta_2 Bridging\ SC_{r,t} + \beta_3\ HumanCapital_{r,t} + \beta_4 Bonding\ SC_{r,t} *$$

$$Bridging\ SC_{r,t} + \beta_5 Bonding\ SC_{r,t} * HumanCapital_{r,t} + \beta_6 Bridging\ SC_{r,t} * HumanCapital_{r,t} + \overline{\chi}_{r,t} + \rho_r +$$

$$\mu_t + \varepsilon_{r,t} \qquad\qquad (6)$$

3.2 Data and variables

We use data from the European Social Survey (ESS), European Values Survey (EVS), and European Statistical Office (Eurostat) on 190 regions in 21 EU countries at NUTS 1 and NUTS2 level,[2] covering eight waves from 2002 to 2016. The ESS and EVS data are collected at the individual level across regions every two and nine years, respectively. The Eurostat data are compiled on a yearly basis. Appendix 1 shows the definitions of the variables of interest and the respective indicators used to operationalise them.

The dependent variable is regional economic growth, using the level of GDP per capita taken from the Eurostat database. The data are log transformed, due to skewness in the distribution of regional GDP.

For the explanatory variables, bonding and bridging social capital, we use the EVS data to calculate the share of the population in each region which actively participates in different types of organisations. We adopt the approach by Beugelsdijk and Smulders (2009) and Cortinovis et al. (2017) based on their argument that active participation is the most accurate way of operationalising bonding (*bonding social capital*) and bridging (*bridging social capital*) social

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[2] We use regions that correspond as much as possible to meso-level administrative units of their countries. Hence, we use NUTS 1 regions for Germany, Belgium and 4 of the UK regions: Greater London, Scotland, Wales and Northen Ireland. Countries with only one NUTS level such as Estonia are excluded, as we only consider countries with at least an intermediate level of government. Romania and overseas territories for Spain, Portugal and France are excluded due to insufficient data. The same applies to the Åland islands in Finland and two regions in Italy: Valle d'Aosta and Molise.

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capital, rather than focusing on membership, as previous literature has done (e.g. Putnam, 2000).

Similar to Beugelsdijk and Smulders (2009) and Cortinovis et al. (2017), we distinguish between bonding and bridging social capital by classifying different types of organisations into "Olson" and "Putnam" groups which respectively exhibit rent-seeking behaviour, and openness and benefit for non-members, corresponding with Knack and Keefer's (1997) division. Accordingly, we classify participation in political parties, local political action groups, labour or trade unions and professional associations into "Olson" type groups. This is the indicator for bonding social capital networks. In the same way, we assign voluntary associations which exhibit opposite characteristics such as religious or church organisations, welfare, youth work, cultural activities, sports and recreation, women's groups, development and human right, environment and animal rights, peace and health into "Putnam" groups which is the indicator for bridging social capital networks. In Appendix 1, we provide an overview of the individual voluntary associations and their classification into bonding and bridging social capital.

For human capital, we follow existing literature to use the share of the population that has completed a tertiary education degree as a proxy. Ideally, we would have restricted the analysis to human capital among members of "Olson" or "Putnam" groups for the estimation of how human capital interacts with social capital. However, we rely on aggregate data for European regions which do not provide this level of detail.

We control for other factors normally considered to influence economic growth at the regional level, such as research and development expenditure (*R&D*), employment in manufacturing (*employment in manufacturing*), population density (*population density*), and road accessibility (*road accessibility*). The last two variables are log transformed. Employment in natural resources (*employment in natural resources)* is used as an additional control in a robustness check. The control variables are from the Eurostat database.

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For all variables building on individual responses (i.e. the social capital measures), we first normalise the scales for each variable at the individual level by standardisation with a mean of 0 and a standard deviation of 1. Second, we calculate the mean across all individual respondents in each region to create regional level measures. For the social capital variables, we use the EVS data for 1999/2000 and 2009/2010 and match them with ESS data for 2002 and 2010, respectively. This can be done as both surveys consider the same social capital phenomena. Given that the ESS is run biennially – in contrast to the EVS, which is conducted in intervals of nine years – we use the ESS data to extend the EVS data to create yearly measures of social capital. Consequently, the trend line of the ESS is used to extrapolate the EVS data to create a combined panel dataset for the period between 2002 and 2016[3]. The advantage of combining both datasets is that they are unique surveys that complement each other: The ESS is more precise at measuring generalised trust, while the EVS contains several more robust indicators for voluntary associations. The summary statistics for all the variables is presented in Table 1.

Table: 1 Summary statistics

Variable	N	Mean	SD	Min	Max
Bonding social capital	1,520	-0.00851	0.173	-0.686	1.236
Bridging social capital	1,520	-0.00611	0.185	-1.019	1.208
Human capital	1,520	24.14	8.842	6.800	57.10
R&D	1,520	1.414	1.175	-5.384	17.47
Employment in manufacturing	1,520	16.89	6.867	2.900	39.40
Employment in natural resources	1,520	6.612	6.423	-4.500	40.60
Population density	1,520	4.887	1.119	1.194	8.910
Road accessibility	1,520	14.48	0.817	11.62	16.00
GDP per capita	1,520	10.01	0.405	8.497	11.06

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[3] The ESS has variables that measure social capital aspects broadly, such as participation in voluntary associations. However, it covers fewer dimensions than the EVS, which has several and more specific variables. However, the ESS covers more periods. This makes it helpful to use it as a trend line to extrapolate from the EVS data. The rationale behind this is that a common underlying factor explains similar social capital related variables in both surveys.

Table 2 shows the pairwise correlations between the variables. All variables are significantly and positively correlated with GDP, except for employment in manufacturing and employment in natural resources, which are both negative and significant. The correlations between most of the variables are low. However, bonding and bridging networks are highly correlated with a coefficient of 0.669. This strong and positive correlation supports the argument made earlier that bonding and bridging social capital are not opposites, but can – and frequently do – go together. Indeed, the close association between them suggests that bonding social capital is necessary for the formation of bridging social capital (e.g. Halpern, 2005; Storper, 2005, 2013; Woolcock, 1998). Analysing this relationship further is beyond the scope of this paper, but the high positive correlation provides an important background for the analysis of the data.

We check for multicollinearity and get an average variance inflation factor (VIF) of 1.87, with VIF scores between 2 and 2.5 for bonding and bridging social capital, as shown in Appendix 2. This indicates that there is no severe multicollinearity affecting the analysis.

Table 2: Pairwise correlations

Variables	1	2	3	4	5	6	7	8
Bonding social capital	1.000							
Bridging social capital	0.669***	1.000						
Human capital	-0.012	0.057**	1.000					
Research and Development	0.096***	0.203***	0.460***	1.000				
Employment in manufacturing	-0.002	-0.048*	-0.430***	-0.129***	1.000			
Employment in natural resources	-0.070***	-0.214***	-0.407***	-0.394***	-0.019	1.000		
Population density	-0.005	0.093***	0.286***	0.226***	-0.176***	-0.425***	1.000	
Road accessibility	0.026	0.172***	0.210***	0.282***	0.086***	-0.537***	0.721***	1.000

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

3.3 The distribution of bonding and bridging social capital in the EU

The maps in Figures 1 and 2 display the average intensity of bonding and bridging social capital, respectively, in EU regions across the period 2002-2016. Overall, Western Europe has a higher intensity of both types of social capital than Eastern Europe. Nordic countries also show high levels of bridging social capital. Important within-country differences are detected in both bonding and bridging social capital in many countries.
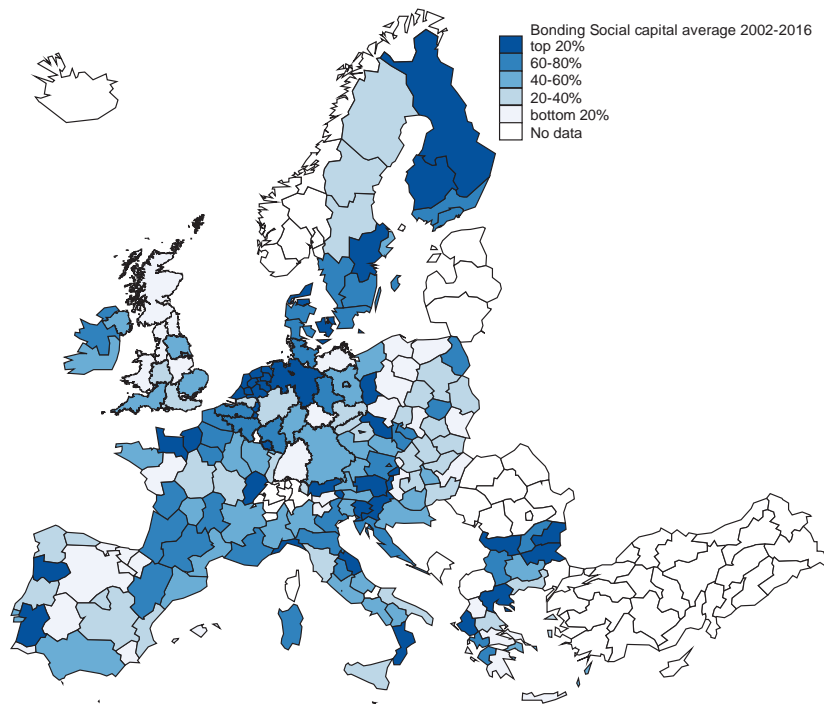
Figure 1: Bonding social capital networks, average for 2002-20
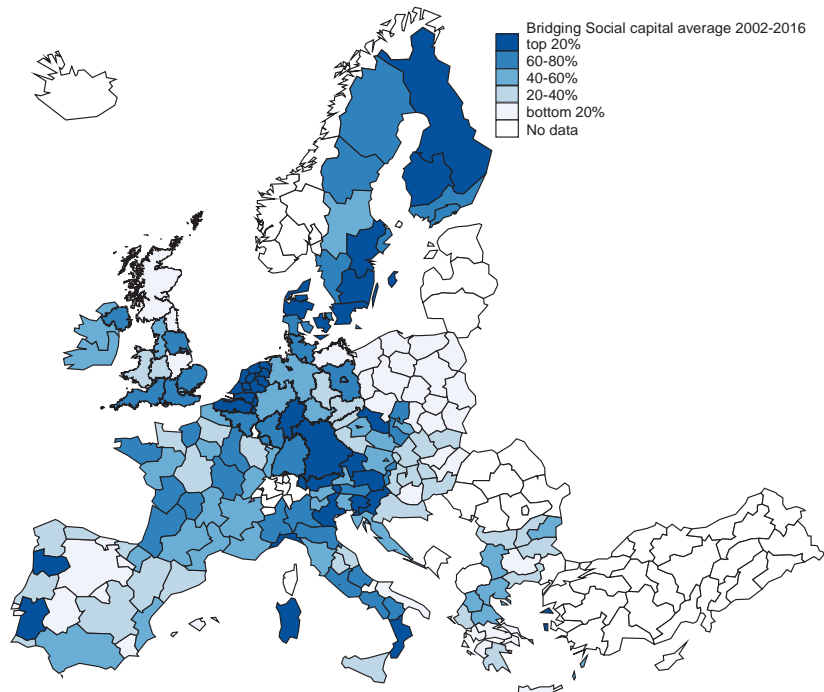
Figure 2: Bridging social capital networks, average for 2002-2016

The maps confirm the positive correlation between bridging and bonding social capital at the regional level. The extent to which the distribution of bonding and bridging social capital is relatively similar on the maps is consistent with the idea that the two types of social capital can co-exist and are present in various mixes (e.g. Halpern, 2005; Storper, 2013; Woolcock, 1998).

4. Findings

4.1 Regression results

First, we conduct a pooled OLS regression as a baseline to estimate model 1 to test hypotheses H1a and H1b, using a stepwise approach, as shown in Table 3. We start with bonding social capital in regression 1, followed by bridging social capital in regression 2 and both types of social capital in regression 3. Finally, we add the control variables in regression 4.

Table 3: OLS- The effects of bonding and bridging social capital on economic growth

Variable	1	2	3	4
Bonding social capital	0.118**		-0.546***	-0.303***
	(0.060)		(0.076)	(0.055)
Bridging social capital		0.588***	0.931***	0.506***
		(0.054)	(0.072)	(0.053)
Human capital				0.013***
				(0.001)
R&D				0.074***
				(0.007)
Employment in manufacturing				-0.011***
				(0.001)
Population density				0.008
				(0.010)
Road accessiblity				0.150***
				(0.014)
Observations	1,520	1,520	1,520	1,520
R-squared	0.003	0.072	0.102	0.541
Adjusted R-squared	0.00190	0.0716	0.101	0.539
F test	3.890	118.1	86.55	254.5

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3 shows that when bonding and bridging social capital are entered separately as in regression 1 and 2, both have a positive and significant association with the level of GDP per capita. Even though bonding and bridging are highly correlated, the coefficient for bridging social capital is almost five times higher than that for bonding social capital. When bonding and bridging social capital are entered into the analysis together in regression 3, bonding social capital turns negative, while bridging social capital remains positive, supporting H1a and H1b. This implies that – when controlling for bridging social capital – high levels of bonding social capital can limit economic performance. Meanwhile, bridging social capital is a fundamental factor for economic growth. When control variables are included in regression 4, the signs of the coefficients do not change, although the magnitude of both is reduced.

The control variables give the expected results. Economic growth is linked to higher human capital and R&D investment, as well as to better accessibility. However, population density does not have a significant effect. Employment in manufacturing has a negative association with the level of GDP per capita. Consistent with Beugelsdijk and Smulders (2009), we find

that bridging social capital is positive and significant at the 1% level, and is a fundamental factor for economic growth and development. Furthermore, we find a direct negative association between bonding social capital and GDP per capita, which is significant at the 1% level. It is worth restating that this result depends on controlling for bridging social capital. Hence, if bonding social capital is associated with higher levels of bridging social capital, as the strong positive correlation between them indicates, the relationship between bonding social capital and economic growth could be more complex that the simple negative coefficient would suggest. However, what the results do indicate is that the direct relationship between bonding social capital and economic growth is negative when controlling for bridging social capital. Hence, if two regions have the same level of bridging social capital, the one with lower bonding social capital would be expected to have higher levels of GDP per capita.

The results imply that a one standard deviation increase in bridging social capital is associated with an increase of approximately 9.8 % in the level of GDP per capita. On the other hand, one standard deviation increase in bonding social capital is associated with a reduction of approximately 5.1 % in the level of GDP per capita in the region. These increases should be viewed in the context that social capital is relatively stable and changes slowly, and therefore, such increases happen over a long term.

However, a pooled OLS estimation method does not account for unobserved heterogeneity across regions. Therefore, we move on to a more robust fixed effects estimation to exploit the richness of the panel data. Table 4 shows the fixed effects estimation results.

Table 4: Fixed effects-The effects of Bonding and bridging social capital on economic growth

Variables	1	2	3	4
Bonding social capital	0.060***		-0.056**	-0.048**
	(0.018)		(0.024)	(0.023)
Bridging social capital		0.134***	0.173***	0.179***
		(0.017)	(0.024)	(0.023)
Human capital				0.005***
				(0.001)
Research and development				0.006*
				(0.003)
Employment in manufacturing				0.011***
				(0.002)
Population density				-0.212***
				(0.046)
Road accessibility				0.190***
				(0.043)
Time FE	Yes	Yes	Yes	Yes
Observations	1,520	1,520	1,520	1,520
R-squared	0.607	0.621	0.623	0.657
Number of regions	190	190	190	190
Adjusted R-squared	0.549	0.564	0.566	0.604
F test	255.6	270.7	242.2	179.8

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results from the fixed effects regression confirm the signs of the coefficients of the OLS results. However, the magnitude of the coefficients is reduced. More bonding social capital tends to be associated with a reduction of GDP at constant levels of bridging social capital, while bridging social capital is associated with higher GDP at constant levels of bonding. A one standard deviation increase in bridging social capital is associated with an increase of approximately 3.4% in the level of GDP per capita. Conversely, one standard deviation in bonding social capital is associated with a reduction of approximately 0.8% in the level of GDP per capita in the region. Overall, these results confirm the theoretical proposition (Beugelsdijk & Van Schaik, 2005; Putnam, 2000; Storper, 2013) that bonding social capital is not conducive to – and can even be detrimental for – economic growth, while bridging social capital is beneficial for growth.

Third, in Table 5, we test hypotheses H2, H3a and H3b by examining the three interaction terms in a stepwise approach. We start by entering the interaction between bonding and bridging social capital in regressions 1, followed by bonding social capital and human capital in

regression 2 and bridging social capital and human capital in regression 3. Finally, we bring the interaction into a combined model in regression 4. We report all the regressions but only base our conclusions on the margin plots for regression 4.

Table 5: Fixed Effect-Interaction models

Variables	1	2	3	4
Bonding social capital	-0.033	-0.026	-0.053**	-0.203***
	(0.023)	(0.052)	(0.023)	(0.074)
Bridging social capital	0.178***	0.178***	0.312***	0.430***
	(0.023)	(0.023)	(0.049)	(0.068)
Human capital	0.005***	0.005***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
R&D	0.005	0.006*	0.006	0.005
	(0.003)	(0.003)	(0.003)	(0.003)
Employment in manufacturing	0.011***	0.011***	0.012***	0.012***
	(0.002)	(0.002)	(0.002)	(0.002)
Population density	-0.203***	-0.211***	-0.199***	-0.185***
	(0.046)	(0.046)	(0.046)	(0.046)
Road accessibility	0.199***	0.189***	0.183***	0.195***
	(0.043)	(0.043)	(0.043)	(0.043)
Bonding social capital * Bridging social capital	-0.125***			-0.121***
	(0.037)			(0.037)
Bonding social capital*human capital		-0.001		0.006**
		(0.002)		(0.003)
Bridging social capital*human capital			-0.005***	-0.010***
			(0.002)	(0.002)
Time Effects	Yes	Yes	Yes	Yes
Observations	1,520	1,520	1,520	1,520
R-squared	0.660	0.657	0.659	0.664
Number of regions	190	190	190	190
Adjusted R-squared	0.607	0.604	0.606	0.611
F test	169.9	167.7	169.6	152.5

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In regression 1, we test H2. We expect bonding and bridging social capital to be complementary and hence to find a positive interaction term. The interaction effect, as shown in Table 5, is significant, but, in contrast to expectations, with a negative sign suggesting that bonding and bridging social capital are substitutes. In regressions 2 and 3, we estimate how variations in human capital endowments shape the relationship between social capital and economic growth, testing hypotheses H3a and H3b, respectively. The interaction between bonding social capital

and human capital is negative but not significant. The interaction between bridging social capital and human capital is negative and significant, suggesting that the two are substitutes; that is, at lower levels of human capital, bridging social capital is more important for economic growth.

Finally, we bring all the interactions into a combined model in regression 4. The results are consistent with those from regressions 1-3. The interaction between bonding and bridging social capital is negative and significant, suggesting that the two are substitutes. Furthermore, the interaction between human capital and bonding social capital is positive and significant, suggesting that human capital moderates the negative influence of bonding social capital on growth. Finally, the interaction between human capital and bridging social capital is negative and significant, suggesting that bridging social capital can act as a substitute for human capital.

In order to interpret the interaction effects, we proceed, as advised by Brambor, Clark, and Golder (2006) and Kingsley, Noordewier, and Bergh (2017), to plot the marginal effects (Figures 3 to 6) in order to visualise what these results mean in substantive terms. Accordingly, we plot the marginal effects of bonding social capital at different levels (from the 10th to the 90th percentile) of bridging social capital in the region as shown in Figure 3.

Figure 3: Marginal effect of bonding social capital by level of bridging social capital
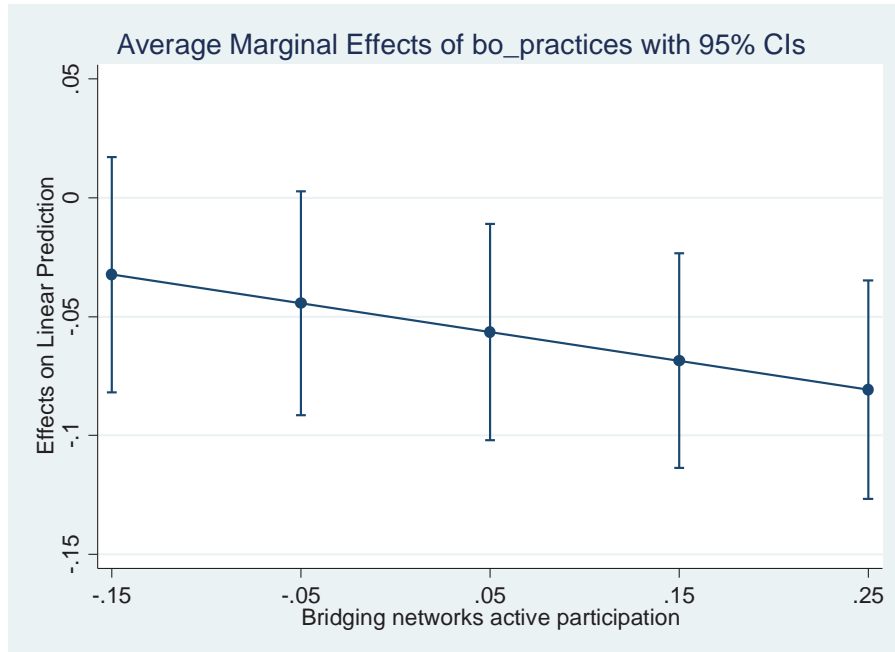
Figure 3 shows the marginal effects of bonding social capital at different levels (from the 10th to the 90th percentile) of bridging social capital in the region. Although there is a negative slope, there are no significant differences between the marginal effects of bonding social capital at the 10th and 90th percentile of bridging social capital. The effect of bonding social capital is significantly negative at levels of bridging social capital above around -0.03, which is slightly above the median score on this variable (53rd percentile). Thus, bonding social capital tends to reduce economic growth only in regions with high levels of bridging social capital. Hence, we find no evidence or support H2 that there is a positive complementarity between bonding and bridging social capital.

Figure 4: Marginal effect of bridging social capital by level of bonding social capital
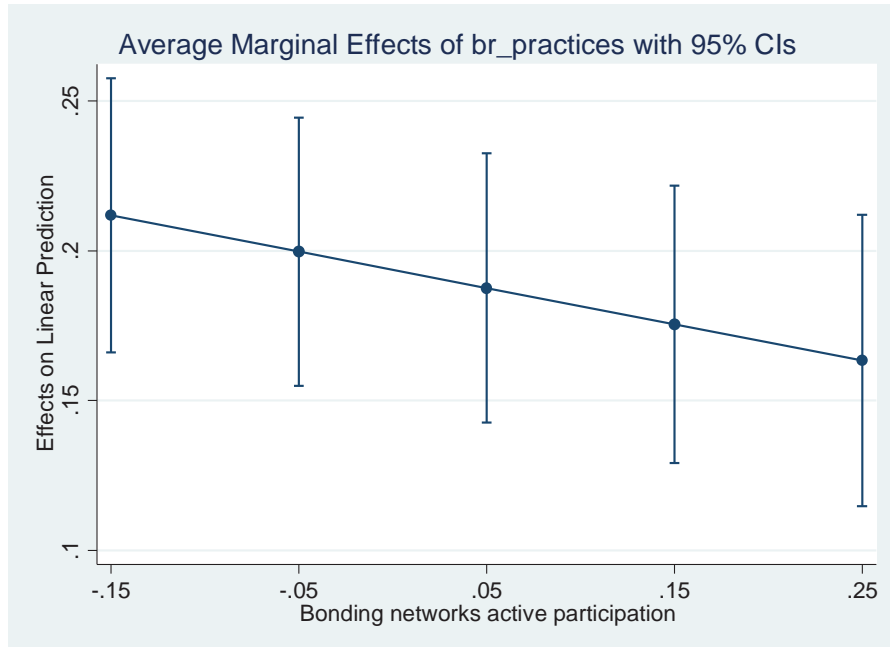
We also check the inverse relationship by plotting the marginal effects of bridging social capital by different levels (from the 10th to the 90th percentile) of bonding social capital in Figure 4. Once more, there is a negative slope, but the marginal effect of bridging remains positive at all levels of bonding social capital. Bridging social capital is associated with economic growth regardless of the level of bonding social capital in the region. There are also no significant differences between the effects of bridging social capital at the 10th and 90th percentiles of bonding social capital. Therefore, we do not find support for H2 and theoretical propositions (e.g. Storper, 2013) that the two types of social capital complement nor substitute each other. These findings also supported by the high positive correlation between bonding and bridging social capital, which suggest the need to investigate whether bonding social capital contributes to bridging social capital.

Figure 5: Marginal effects of bonding social capital by level of human capital
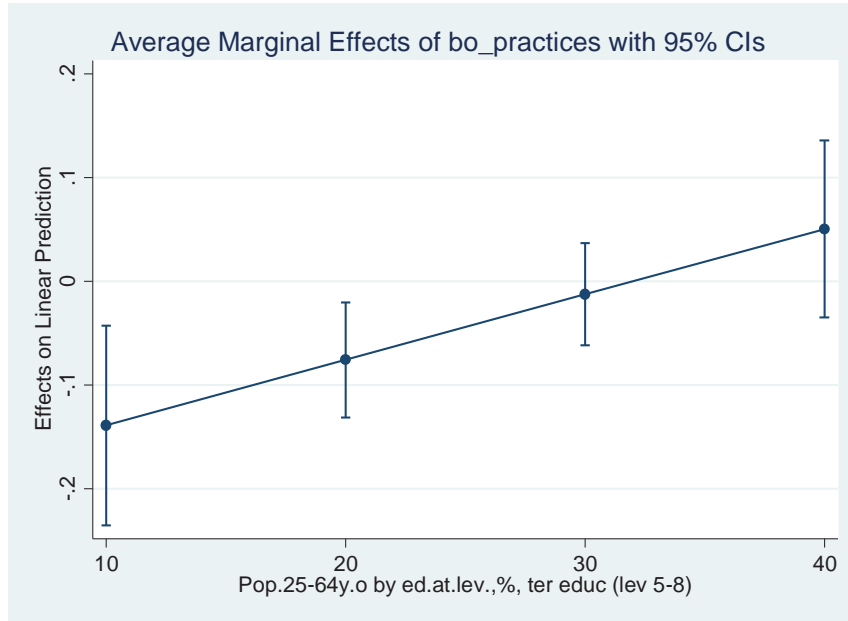
Figure 5 shows that an increase in human capital reduces the negative effect of bonding social capital. The effects of bonding social capital turn insignificant when the share of the working-age population with tertiary education increases above 25 percent. This is slightly above the median level of human capital in European regions (55th percentile). The marginal effects of bonding social capital are also significantly lower in regions where 10 percent of the working-age population have tertiary education than in regions where 40 percent have tertiary education. We thus find support for H3a that human capital moderates bonding social capital, reducing its adverse effects on economic growth. These findings confirm theoretical propositions that human capital directly (Dinda, 2014) and indirectly (Akçomak & Ter Weel, 2009; Fukuyama, 1995; Tabellini, 2010) reduces the negative externalities of bonding social capital. Regions with high levels of human capital can generate and absorb more knowledge (Andersson &

Johansson, 2010; Andersson & Karlsson, 2007; Smith & Thomas, 2017) which reduces the adverse effects of bonding social capital.

Figure 6 shows the marginal effects of bridging social capital at different levels of human capital in the region. The effect of bridging social capital decreases as the level of human capital increases, from 0.33 in regions where 10 percent of the working-age population have tertiary education to 0.04 (ns) in regions where 40 percent have tertiary education. There are statistically significant differences between the marginal effects of bridging social capital at low and high levels of human capital. The effect of bridging social capital turns insignificant when the tertiary education share increases above 37 percent (around the 91st percentile of the variable). Hence, we find that human capital and bridging social capital are to some extent substitutes: as the human capital endowment increases, there is less need for bridging social capital. However, bridging social capital has a significant positive effect in most regions in Europe, with a few very highly educated regions representing the exception. Hence, we find support for H3b that human capital moderates the effects of bridging social capital. The findings suggest that bridging social capital is more important for regions with low levels of human capital than for high-skilled regions. It facilitates collaboration and access to knowledge outside the region, which is particularly important if the region's internal knowledge capacity is lower (Andersson & Johansson, 2010; Andersson & Karlsson, 2007; Mayer & Baumgartner, 2014).

Figure 6: Marginal effects of bridging social capital by level of human capital
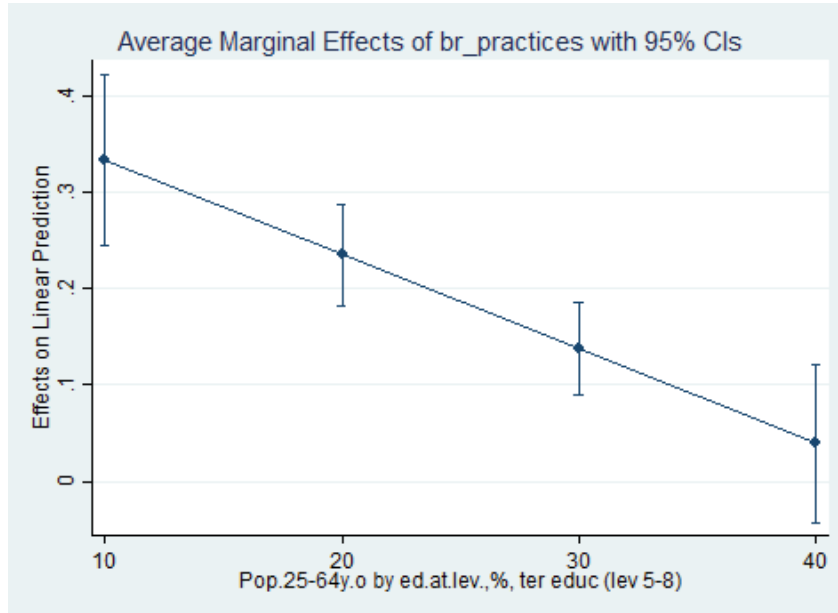
4.5 Robustness tests

We assess the robustness of the results in Table 7. Regression 1 repeats the results of the fixed-effects model in Table 4. First, in regression 2, we use the share of employment in natural resources instead of manufacturing as a control variable. The results are very similar to the results in regression 1, except that bonding social capital is only significant at the 90 percent level. Second, in regression 3, we use the membership of voluntary associations instead of active participation. The results retain the same signs of coefficients and adjusted R squared but the estimated coefficients are higher and the significance level stronger. Third, in regression 4, we omit regions in the Nordic countries, which traditionally have high levels of social capital due to widespread, but often passive, membership of trade unions. Sweden also represents an anomaly relative to Denmark and Finland in terms of its low levels of bonding social capital, especially in Central and Northern Sweden. The results retain the same signs of coefficients,

and adjusted R squared but a lower significance for bonding social capital at 10 % compared to

1 %.

Table 7: Robustness tests

Variables	1	2	3	4
Bonding social capital	-0.048**	-0.036*		-0.047*
	(0.023)	(0.022)		(0.024)
Bridging social capital	0.179***	0.154***		0.182***
	(0.023)	(0.022)		(0.024)
Human capital	0.005***	0.003**	0.004***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
R&D	0.006*	0.005	0.005	0.011**
	(0.003)	(0.003)	(0.003)	(0.005)
Employment in manufacturing	0.011***		0.011***	0.014***
	(0.002)		(0.002)	(0.002)
Population density	-0.212***	-0.182***	-0.194***	-0.218***
	(0.046)	(0.045)	(0.047)	(0.049)
Road accessibility	0.190***	0.143***	0.180***	0.201***
	(0.043)	(0.042)	(0.043)	(0.046)
Employment in natural resources		-0.019***		
		(0.001)		
Bonding social capital networks membership			-0.121***	
			(0.021)	
Bridging social capital networks membership			0.193***	
			(0.024)	
Time FE	Yes	Yes	Yes	Yes
Observations	1,520	1,520	1,520	1,384
R-squared	0.657	0.682	0.654	0.645
Number of regions	190	190	190	173
Adjusted R-squared	0.604	0.633	0.600	0.590
F test	179.8	201.3	177.3	155.5

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Finally, in Table 8, we lag the explanatory variables and controls in the regression equations in

Table 7 such that they explain the level of GDP per capita in the next period (two years later).

The results are consistent with those reported in Table 7. However, bonding social capital is no

longer significant, although the coefficient retains the same sign. When measured in the form

of membership, bonding social capital remains negative and significant. Overall, the results of

the regressions in Table 7 and Table 8 show that the findings are robust to alternative

specifications. However, we do not make a causal claim in this paper but offer a descriptive understanding of the phenomenon.

Table 8: Robustness tests with lagged variables

Variables	1	2	3	4
Bonding social capital	-0.038	-0.017		-0.038
	(0.026)	(0.025)		(0.028)
Bridging social capital	0.194***	0.158***		0.197***
	(0.026)	(0.025)		(0.027)
Human capital	0.007***	0.005***	0.006***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)
Research and development	0.006*	0.006*	0.006*	0.012***
	(0.003)	(0.003)	(0.003)	(0.004)
Employment in manufacturing	0.009***		0.009***	0.011***
	(0.002)		(0.002)	(0.002)
Population density	-0.228***	-0.216***	-0.213***	-0.233***
	(0.045)	(0.044)	(0.046)	(0.047)
Road accessibility	-0.008	-0.055	-0.008	-0.011
	(0.047)	(0.046)	(0.048)	(0.050)
Employment in natural resources		-0.016***		
		(0.002)		
Bonding social capital networks membership			-0.117***	
			(0.024)	
Bridging social capital networks membership			0.206***	
			(0.027)	
Time FE	Yes	Yes	Yes	Yes
Observations	1,330	1,330	1,330	1,211
R-squared	0.573	0.596	0.567	0.563
Number of region_code	190	190	190	173
Adjusted R-squared	0.497	0.523	0.489	0.484
F test	116.5	127.6	113.3	101.6

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4. Conclusion

Previous research (e.g. Beugelsdijk & Smulders, 2009) on the link between bonding and bridging social capital and economic growth has generally remained inconclusive (Westlund & Adam, 2010), in particular when it comes to the effects of bonding social capital. Furthermore, these studies have neglected the interaction between bonding and bridging social capital, and between social capital and human capital. The main contribution of this paper is to address this gap. Accordingly, we extend existing knowledge on bonding and bridging social capital by examining the interaction between them, as well as by examining how their effects depend on the level of human capital in the region.

The analysis has three main findings. First, we confirm that bonding social capital has a negative and significant connection with economic growth when controlling for bridging social capital, while the connection of bridging social capital is positive and significant. Second, contrary to the dominant theoretical assumptions (Storper, 2013), we do not find evidence that bonding and bridging social capital complement each other, nor that they are substitutes. Third, we find that while human capital has a moderating effect that reduces the negative effect of bonding social capital, it is to some extent a substitute for bridging social capital. Hence, bridging social capital is more important for growth in regions with deficiencies in human capital endowment.

The main policy implication stemming from the analysis is, first, that not all types of social capital are the same. Policy-makers need to focus mainly on promoting bridging social capital with the aim of bringing together heterogeneous groups as a potential channel to achieve higher levels of development. Second, building bridging social capital can be a particularly effective strategy for promoting growth in low-skilled regions. Bridging social capital allows for more effective knowledge exchange and collaborative problem-solving that can, to some extent, compensate for lower levels of formal education. These traits are even more important when education levels are generally low. However, it must be underlined that the marginal effects of bridging social capital remain positive in all but the most high-skilled regions of Europe. Regions with high levels of human capital can therefore also benefit from the promotion of bridging social capital. At the same time, investments in human capital is an alternative approach that policy makers can use to mitigate the negative effects of excessive bonding social capital and promote economic growth and development in less developed regions.

This study is, however, not without limitations. First, we focus only on EU regions and this limits the generalisability of the findings. Future studies should consider including more regions from other parts of the world. This will potentially improve the explanatory power of social

capital and the generalisability of the findings. Second, the dependent variable is limited to economic growth. There is therefore a need to consider other socio-economic outcomes alongside economic growth. It is possible that social capital may have different effects on other socio-economic outcomes (Hauser, Tappeiner & Walde, 2007; Hoyman et al., 2016; Maskell, 2000).

Furthermore, the study focused on understanding the differences and interactions between bonding and bridging social capital and how they affect economic development. The study did not examine their structural relationships, whether bonding social capital is a necessary condition for bridging social capital, and if it has an indirect association with economic development. However, the study finds high positive correlation between bonding and bridging social capital which cautions against a simplistic view of their characteristics and how they affect economic development. Therefore, there is a need for future studies to examine the structural relationship between bonding and bridging social capital, and how this relates to economic performance. The same applies to the two types of social capital and human capital.

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Appendix 1: Overview of variables

Variable	Definition	Constituent parts/meaning	Source
Dependent variable			
GDP per capita	Natural Log of GDP per capita	GDP at current market prices, PPS per inhabitant	Eurostat
Explanatory variables			
Bonding social capital	Participation in voluntary association that encourage relationships between similar or familiar people, membership in the same networks is used for robustness check. These networks are also termed Olsonian groups.	• Labour unions • Professional organisations • Local political action groups • Political parties •	EVS
Bridging social capital	Participation in voluntary association that encourage relationships between dissimilar or unfamiliar people, termed bridging networks, membership in the same networks is used for robustness check. These networks are also termed Putnam groups	• Social welfare organisation • Cultural activities • Youth • Sports clubs • Organisation for health • Peace movement • Environment • human rights • Women's organisation • Religious organisations	EVS
Control variables			
Human capital	Human capital measured using education as a proxy	Percentage of population over 25 with a tertiary qualification	Eurostat
Employment in manufacturing	Share of employment in manufacturing as a percentage of total employment, share of employment in natural resources is used as an alternative control in robustness test.	Percentage of employment in the manufacturing sector	Eurostat
Research and development (R&D)	Research and development	R&D expenditure as a percentage of GDP	Eurostat
Population density	Natural Log of pop density	Population density per 1000 inhabitants per square metres	Eurostat
Road accessibility	Natural log of road accessibility	Road access per 1000 inhabitants	Eurostat

Appendix 2: VIF for variables

VARIABLES	VIF	1/VIF
Road accessibility	2.51	0.40
Population density	2.38	0.41
Bridging social capital	1.95	0.51
Bonding social capital	1.85	0.54
Human capital	1.60	0.62
Employment in manufacturing	1.41	0.71
Research and development (R&D)	1.38	0.73
Mean VIF	1.87	

Part2-Papers III

Trust as a catalyst for regional growth in a decentralised Europe

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Abstract

The interplay between formal and informal institutions remains neglected in the context of regions and economic growth. There are two but disparate strands of literature, one examines the role of informal institutions such as trust. The other strand looks at formal institutions such as the quality of regional governments and their degree of decentralisation or autonomy. However, the two strands of literature remain isolated from each other. The result is that we do not know whether informal and formal institutions complement or substitute each other. Specifically, we do not know how differences in trust affect the economic returns of the quality of governments and their autonomy. Addressing this gap is essential for understanding the conditions necessary for the success of decentralisation reforms and regional development. Accordingly, we do so in a panel regression analysis of 208 regions in 21 EU countries. The findings show that both formal and informal institutions matter, and more specifically, which institutions and how they matter. We find that trust substitutes the quality of the regional government but does not affect the economic impact of the degree of decentralisation. Broadly, the findings point to the need to reconsider the policy debate not only on whether it is formal or informal institutions that matter for economic growth but also pay attention to their interaction. Specifically, the findings show that either improving the quality of regional governments or promoting trust are potential policy tool to realise the returns of decentralisation.

Key words: trust, quality of regional government, decentralisation, economic growth, regions, EU

1. Introduction

Understanding and explaining regional economic growth, "requires taking into account the role of both formal society-wide institutions and local and sometimes informal institutions" (Farole, Rodríguez-Pose, & Storper, 2011, p. 58). Currently, there are two, but disparate strands of literature on formal and informal institutions and regional economic growth (Rodríguez-Pose, 2020). The first strand of literature addresses the role of informal institutions such as trust (Beugelsdijk & Van Schaik, 2005; Tabellini, 2010). Broadly, trust is an expectation that the other person will act as expected (Hardin, 2002). Arguably, it is the trust that we give to unfamiliar people that matters for economic organisation and economic growth (Fukuyama, 1995; Putnam, Leonardi, & Nanetti, 1993; Tabellini, 2010). It works through mechanisms that include facilitating human interaction and information sharing as well as reducing the cost of enforcing contracts and monitoring others (Beugelsdijk & Van Schaik, 2005; Bjørnskov, 2010, 2012; Farole et al., 2011; Rodríguez-Pose & Storper, 2006; Schneider, Plümper, & Baumann, 2000; Whiteley, 2000).

The second strand of literature (e.g. Crescenzi, Di Cataldo, & Rodríguez-Pose, 2016; Muringani, Fitjar, & Rodríguez-Pose, 2019; Rodríguez-Pose & Garcilazo, 2015; Rodríguez-Pose & Ketterer, 2019) examines the effect of formal institutions such as the degree of decentralisation or regional autonomy and the quality of regional government on economic growth. The degree of decentralisation refers to the power or authority of regional governments to influence national policy (shared rule) and to form as well as implement their policies (self-rule) (Hooghe et al., 2016; Hooghe, Marks, & Schakel, 2010; Schakel, 2008, 2009, 2015). Specifically, the degree of self-rule or regional autonomy allows both top-down and bottom-up processes of policymaking and inclusive local politics which create a conducive environment for economic growth (Rodríguez-Pose, 1998; Rodríguez-Pose & Tselios, 2019; Rodríguez-Pose

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& Storper, 2006; Trigilia, 2001; Trigilia & Burroni, 2009). At the same time, regional governments differ in their quality of the extent to which public goods are delivered impartially, efficiently and in a non-corrupt manner (Charron, Dijkstra, & Lapuente, 2010, 2014; Putnam et al., 1993; Treisman, 2002). Empirical studies (e.g. Crescenzi et al., 2016; Muringani et al., 2019; Rodríguez-Pose & Di Cataldo, 2015; Rodríguez-Pose & Garcilazo, 2015) show that these difference in the quality of government also explain economic differences across regions.

However, a combination of these two strands of literature has not been considered (Alesina & Giuliano, 2015; Farole et al., 2011; Rodríguez-Pose, 2020; Rodríguez-Pose & Storper, 2006). Thus, while informal institutions such as trust and formal institutions such as the quality of regional government and its degree of decentralisation or autonomy co-exist and jointly affect regional economic growth in the real world, their interaction remains unexplored. As such, empirical studies on the economic impact of trust in regions are not in short supply (e.g. Akçomak & Ter Weel, 2009; Beugelsdijk & Van Schaik, 2005; Kaasa, 2016; Neira, Vázquez, & Portela, 2009; Schneider et al., 2000; Tabellini, 2010). However, these studies have failed to examine whether differences in trust affect the returns of other factors such as the quality of regional government and its degree of decentralisation or autonomy on economic growth. As a result, it is not known whether trust is a complement or substitute of the other factors. Therefore, this paper attempts to fill this gap by addressing the following research question: *to what extent do differences in trust affect the economic returns of the quality of regional government and of decentralisation?*

The paper addresses the above question by conducting a panel regression analysis of 208 intermediate subnational regions in 21 European Union (EU) countries. Broadly, the findings show that both formal and informal institutions matter, and more specifically, which institutions and how they matter. We find that trust substitutes the quality of the regional government but does not affect the economic impact of the degree of decentralisation. Thus, either improving

the quality of regional governments or promoting trust leads to economic growth. The findings point to the need to reconsider the policy debate on whether it is formal or informal institutions that matter for economic growth but also pay attention to their interaction. Specifically, the findings suggest in regions will low economic performance policy makers have the flexibility for using interventions aimed at either improving the quality of regional governments or promoting trust are potential policy tool to stimulate economic development.

The rest of the paper follows this structure: Section 2 examines the literature and develops the hypotheses. Section 3 describes the data and the model. The results and discussion follow in Section 4, and section 5 concludes the paper.

2. Trust, decentralisation, quality of government and regional economic growth

This paper adopts the conceptual framework of Rodríguez-Pose and Storper (2006) to consider regional institutions as community and society referring to informal and formal institutions, respectively. Formal institutions are rules that are written, mostly codified and enforceable through official channels whereas informal institutions refer to habits, customs and are not enforceable through official channels (North, 1990; Rodríguez-Pose, 2013). There are numerous informal institutions and we focus on trust (e.g. Charron & Rothstein, 2018; Tabellini, 2010) as it is the most frequently studied informal institution and is widely believed to be important for regional economic growth. Again, there are numerous formal institutions which could matter. We focus on the quality of regional government and its degree of decentralisation or regional autonomy as they are among the most widely studied formal institutions and the first has been shown to be important for regional growth (e.g. Charron et al., 2010; Muringani et al., 2019). The interest in this paper is to understand and explain how these regional institutions affect economic growth. The central argument is that both informal institutions and formal institutions individually and jointly matter for regional economic growth, such that one complements or substitutes the effect of the other's performance (Farole

et al., 2011; Keating & Loughlin, 1997; Rodríguez-Pose & Storper, 2006). However, there is a lack of empirical studies on their interaction.

2.1 Trust and economic growth

Trust as an informal institution or a feature of the social structure can constrain and facilitate human interaction and exchange (Charron & Rothstein, 2018; Nelson & Nelson, 2002; North, 1990; Putnam et al., 1993). By its nature, trust allows communities or societies to achieve collective action by encouraging active participation and increasing the interaction among otherwise dissimilar people (Farole et al., 2011; Fukuyama, 1995; Putnam et al., 1993; Uslaner, 2008). It mitigates information asymmetry between parties because, in the absence of information and repeated interaction about others, people still trust (Luhmann, 2018). It also reduces transaction costs by reducing opportunism among actors as well as enforcement costs among them (Whiteley, 2000). Even in the presence of well-functioning third-party enforcement, trust is still necessary for complex transactions (Beugelsdijk & Van Schaik, 2005). According to Fukuyama (1995), trust facilitates the formation of economic organisations. It also facilitates trade, innovation and entrepreneurship by enabling information sharing, ease of interaction and cooperation (Beugelsdijk & Van Schaik, 2005; Feldman, 2014; Reiersen, 2019; Shearmur, 2011). Trust creates tolerance that attracts creative talent to regions (Florida, 2002; Florida, Mellander, & Stolarick, 2008; Westlund & Calidoni, 2010). Overall, trust creates a conducive environment that promotes economic growth (Rodríguez-Pose & Storper, 2006).

Both trust and economic activities are spatially embedded, and in the case of the latter, this makes the region a fundamental organising unit of production in the globalising economy (Amin, 1999; Keating & Loughlin, 1997; Pike, Rodríguez-Pose, & Tomaney, 2017; Storper, 1997). Storper (1997, p. 65) argues "[…] The region […] (is) a place where technological variety is created and then limited, where the pathway is traced out." Arguably, trust facilitates

this variety by promoting diversity of ideas and interaction of dissimilar people. It is also a relational region-specific asset which defines the character of a place and differs from one region to another (Bathelt & Glückler, 2011; Feldman, 2014; Storper, 1997).

Empirical studies by Tabellini (2010) on the original EU-15 show that low trust regions have less income per capita and economic growth compared to high trust regions. At the same time, trust is relatively stable but can change, albeit slowly, therefore, its consequences are likely to persist over time (Fukuyama, 1995; Rodríguez-Pose, 2020; Uslaner, 2008). The overall process through which this happens is complex and path-dependent with increasing returns or cumulative causation such that regions that are doing well will often continue to do so in the future, creating a virtuous cycle of development or, conversely, a vicious cycle of under-development (Boschma & Frenken, 2018; Pike et al., 2017; Storper, 1997, 2013).

However, empirical studies on trust and regional economic growth remain inconclusive showing positive and significant effects (Tabellini, 2010), negative and significant effects (Schneider et al., 2000) or no effect (Akçomak & Ter Weel, 2009; Beugelsdijk & Van Schaik, 2005; Kaasa, 2016; Neira et al., 2009). There are several explanations for these inconclusive results at the regional level and their contradiction at the national level (Peiró-Palomino, 2016). One of them is the availability of data and the use of relatively smaller samples (c.f Beugelsdijk & Van Schaik, 2005). The recent improvements in data availability make it possible to reconsider these findings. Accordingly, we hypothesise the following:

H1: Trust has a positive effect on economic growth.

2.2. Trust, decentralisation and economic growth

Earlier in the paper, the degree of decentralisation has been defined as the extent to which a region has the authority to do two things: first, to influence national policy (shared rule) and second, to define and implement its policies (self-rule) (Hooghe et al., 2016; Hooghe et al.,

2010; Schakel, 2008, 2009, 2015). Arguably, self-rule is the most critical aspect of decentralisation in that it empowers regions to define and implement their policies (Hooghe et al., 2016). In theory, it produces economic dividends at least through two mechanisms, first, bringing the government to the people enables preference matching resulting in responsive policies that stimulate economic growth (Muringani et al., 2019; Rodriguez-Pose & Ezcurra, 2010; Rodriguez-Pose & Gill, 2003; Treisman, 2002, 2007). Second, it expands the capacity or capabilities of regions to form and implement their economic policies (Rodríguez-Pose, 1998; Rodríguez-Pose & Tselios, 2019; Trigilia, 2001; Trigilia & Burroni, 2009). However, the returns of decentralisation remain debatable (e.g. Rodríguez-Pose & Gill, 2005; Schakel, 2009; Treisman, 2002, 2007) and empirical evidence on the same is inconclusive with some scholars finding a direct association between decentralisation and economic growth while others do not find such a relationship.

According to Kuhlmann and Wayenberg (2016), there is need to move the debate on the economic dividends of decentralisation forward and consider the conditions under which it takes place or thrives. In the same vein, Rodríguez-Pose and Gill (2005), and Calamai (2009) argue that the features of localities maintain and foster the (dis)advantages of decentralisation. Although the seminal studies by Putnam et al. (1993) and follow up studies by Helliwell and Putnam (1995) and Knack (1999) suggest that trust plays a role in mediating the returns of decentralisation, this is rather implicit or somewhat anecdotal. Keating (2007) argued that trust determines the success or failure of decentralisation reforms. However, it seems the interaction between trust and decentralisation and its association with economic growth is at best assumed and at worst, neglected.

Arguably, the broader understanding of formal and informal institutions (e.g. Farole et al., 2011; North, 1990; Rodríguez-Pose & Storper, 2006) allows us to explicate the relationship between trust and the economic returns of decentralisation. First, North (1990) argues that

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formal institutions are embedded within the broader informal institutions such as trust. Second, Rodríguez-Pose and Storper (2006) and Farole et al. (2011) argue that formal and informal institutions co-exist and interact in a dynamic process of adjustment in which one increases or decreases the performance of the other. These processes explain the success of the German Länder and the Third Italy, and the problems of the Mezzogiorno and other peripheral regions of Europe (Rodríguez-Pose, 1998; Streeck, 1991; Trigilia, 2001).

Existing empirical studies as alluded earlier have not examined the interaction between decentralisation and trust. Although Torrisi, Pike, Tomaney, and Tselios (2015) build on the conceptual model by Calamai (2009) to consider that social conditions (which includes trust) interacts with decentralisation or mediates its returns, they do not examine this relationship specifically. Yet the features of a locality (Calamai, 2009; Rodríguez-Pose & Gill, 2005), such as trust (Keating, 2007), maintain and foster the potential returns of decentralisation. In the same vein, Kuhlmann and Wayenberg (2016) argue that the question is not whether decentralisation matters for economic growth but rather under what local conditions does it matter. Therefore, we argue that formal and informal institutions (e.g. Farole et al., 2011; North, 1990; Rodríguez-Pose & Storper, 2006), specifically decentralisation and trust interact with each other and hypothesise the following:

H2: Trust mediates the impact of decentralisation on economic growth.

2.3 Trust, the quality of regional government, and economic growth

The quality of regional government refers to the extent to which it deliver public goods in an impartial, efficient and non-corrupt manner ((Charron et al., 2010, 2014; Rothstein, Charron, & Lapuente, 2013). Although empirical studies agree that the quality of government varies across regions with corresponding economic consequences, these studies have two groups. The first group include single country studies such as seminal study by Putnam et al. (1993) and follow

up studies (Helliwell & Putnam, 1995; Knack, 1999) which explicitly attribute the differences in the quality of regional governments and their economic performance to social capital dimensions such as trust. According to them, subnational governments work, or their quality and economic performance is better, when trust is high than when it is low. However, despite this explicit link between trust and quality of regional government, these studies did not examine their interaction and its association with economic growth.

The second group are the subsequent empirical cross-country studies (e.g. Crescenzi et al., 2016; Muringani et al., 2019; Rodríguez-Pose & Di Cataldo, 2015; Rodríguez-Pose & Garcilazo, 2015) that examine the quality of regional governments and economic growth. These studies find an association between the quality of regional government and economic growth. They argue that the quality of regional government affects economic growth through mechanisms that include reducing opportunism and rent-seeking behaviour while promoting co-operation and efficient allocation of resources. Although these studies establish that the quality of government matters for economic growth, they do not examine the role of trust. Equally, the empirical studies on trust and economic growth (e.g. Tabellini, 2010) do not include the quality of regional governments.

However, at the national level, Ahlerup, Olsson, and Yanagizawa (2009) and James (2015) examined the interaction between trust and the quality of government and found a substitution effect between them. Thus, when one is low, and the other is high, there is a significant marginal effect on economic growth and no effect when both are high. Therefore, an improvement in one of them when both are low leads to economic growth. Arguably, the regional context is important because "these institutional arrangements work better at both the local and the regional scales, as the national scale can be too distant, remote and detached" (Rodríguez-Pose, 2013, p. 1037). Accordingly, we hypothesise the following:

H3: Trust substitutes for the impact of government quality on economic growth.

3. Variables and data

3.1 Overview of the variables and data

The paper uses a panel data set for eight waves from 2002 to 2016 on the 208 NUTS 1 and 2 regions in 21 EU countries[1]. In this paper, a region is an administrative or political jurisdiction made of an intermediate level government below the nation-state and above the lowest level with an elected regional assembly (Hooghe et al., 2016; Hooghe et al., 2010). In the EU, the intermediate level of government can be found either at NUTS 1 in countries such as Belgium, Germany and three regions in the United Kingdom (UK) and NUTS level 2 in most other countries.

The data set is compiled from several databases as discussed in the foregoing. The dependent variable is economic growth using the level of GDP per capita from the European statistical (Eurostat) databases as a proxy. It is log-transformed to avoid skewness. The explanatory variables are trust, decentralisation and quality of government. The trust variables are taken from the European social survey (ESS), a biennial survey done since the year 2002. Trust is an aggregate dimension of individual responses to three trust-related questions on a scale of 1 to 10: First, "would you say that most people can be trusted or that you can't be too careful in dealing with people?" (*trust in people*). Second, "do you think that most people would try to take advantage of you if they got the chance, or would they try to be fair?" (*fairness in people*). Third, "would you say that most of the time people try to be helpful or that they are mostly

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[1] Romania and overseas territories for Spain, Portugal and France are excluded due to insufficient data. The same applies to Aland in Finland, two regions in Italy, Valle d'Aosta, NUTS2 Code, ITC2 and Molise, NUTS2 code, ITF2, and countries with only one NUTS level, such as Estonia.

looking out for themselves? (*helpfulness in people*). The factor analysis in Appendix 1 shows that the trust variables are explained by a single factor. Also, a Cronbach alpha test of 0.76 ascertains their internal consistency.

We therefore combine the three questions into one composite factor at the individual and regional level. We first normalise the scales for each variable at the individual level using standardisation to have a mean of 0 and a standard deviation of 1. It is the most appropriate approach for comparability since the individual indicators are at different scales. Second, we proceed to create a composite indicator for each individuals' level of trust using weighted averages. Third, we calculate the mean level of trust across all individual respondents in each region to create regional level measures.

The quality of government measure comes from the European Quality of Government Index (EQI) (Charron et al., 2010, 2014; Charron & Rothstein, 2018). It is a composite index that measures citizens' perception of how well their regional government performs its function, along four dimensions: (i) control of corruption, (ii) the rule of law (iii) government effectiveness, and (iv) voice and accountability (Charron et al., 2010, 2014). Accordingly, we used the metadata (Charron et al., 2010; Charron, Dijkstra, & Lapuente, 2015; Charron, Lapuente, & Annoni, 2019) from three consecutive surveys, conducted in 2010, 2013, and 2017.

Instead of using the statistical regions of the QoG itself, we estimate the QoG of administrative regions following the definition of regions outlined above. We compile the data set following the same process as mentioned earlier on trust variables. The result is a data set with three waves for 2010, 2013, and 2017. Overall, we follow the same approach used by Rothstein et al. (2013); Rodríguez-Pose and Di Cataldo (2015) and Muringani et al. (2019) to create the quality

of government index. Accordingly, we extend this data set with three waves is extended into eight waves from 2002 to 2016 using the Worldwide Governance Indicator (WGI)[2].

The degree of decentralisation or regional autonomy is from the Regional Authority Index (RAI) (Hooghe et al., 2016; Hooghe et al., 2010; Schakel, 2008). We focus on the degree of self-rule, which is the authority exercised by the subnational government in its territory, i.e. a measure of its autonomy. For a detailed description of the individual measures, see Hooghe et al. (2016, pp. 3-30).

The control variables are from the Eurostat database. They include research and development expenditure (R&D) as a percentage of GDP, human capital measured as a percentage of 25- to 64-year-olds with tertiary education and employment in manufacturing as a percentage of total employment. Other control variables are population density and road accessibility per 1000 inhabitants, which are log-transformed to avoid skewness. Table 1 shows the descriptive statistics.

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[2] The WGI survey started in 1996 and was conducted every two years until 2002 and every year thereafter. Rothstein et al (2013), Rodríguez-Pose and Di Cataldo (2015) and Muringani et al (2019 used a two-year lag from the WGI to create a corresponding panel for extrapolating the EQI survey indicators. The calculation takes this approach: $QoG_{r,c} = WGI_c + (Rqog_{r,c} - \overline{Rqog_c})$. $QoG_{r,c}$ is the final QoG index for region r in country c. It is obtained as the distance from the regional QoG country mean ($\overline{Rqog_c}$) of the regional score ($Rqog_{r,c}$), added to WGI score for country c (WGI_c).

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Table 1 Descriptive statistics

VARIABLES	N	mean	Standard deviation	minimum	maximum
Trust	1,664	-0.0682	0.402	-2.530	1.840
Decentralisation	1,664	10.42	3.461	1	15
Quality of government	1,664	0.441	1.595	-5.160	11.81
R&D	1,664	1.433	1.192	-5.384	17.47
Human capital	1,664	24.91	8.989	6.800	57.10
Employment in manufacturing	1,664	16.43	6.681	2.900	39.40
Population density	1,664	4.993	1.160	1.194	8.910
Road accessibility	1,664	14.54	0.820	11.62	16.00
ln_GDP	1,664	10.02	0.391	8.497	11.06

The correlations shown in Table 2 between most of the variables are low. However, population density and road accessibility have a coefficient of 0.731. We check for multicollinearity using the variance inflation factor (VIF) as shown in Appendix 2, and the scores within the ranges 1.23 to 2.85. These ranges are acceptable as they are "lower than the lowest commonly suggested limit: 5 (although limits such as 8 or 10 are also often used)" (Kaasa, 2016, p. 18).

Table 2: Pairwise correlation

Variables	Trust	decentralisation	Quality of government	R&D	Human capital	Employment in manufacturing	Population density	Road accessiblity
Trust	1.000							
Decentralisation	0.230***	1.000						
Quality of government	0.468***	0.093***	1.000					
R&D	0.414***	0.195***	0.289***	1.000				
Human capital	0.443***	0.036	0.263***	0.452***	1.000			
Employment in manufacturing	-0.139***	-0.063***	-0.167***	-0.136***	-0.455***	1.000		
Population density	0.118***	0.163***	0.034	0.222***	0.313***	-0.201***	1.000	
Road accessiblity	0.245***	0.327***	0.106***	0.293***	0.259***	0.045*	0.731***	1.000

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

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3.2 Geography of social capital and quality of government

The maps in Figure 1 and 2 show the distribution of generalised trust and quality of government, respectively, in 208 EU regions for the year 2016.
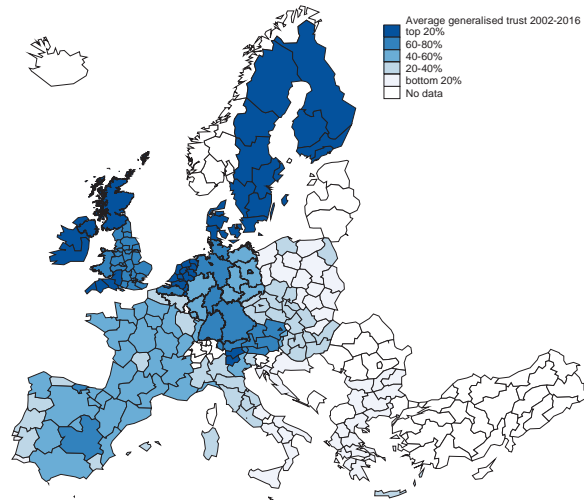
Figure 1: Trust for year 2002- 2016, ESS data (author's own elaboration)
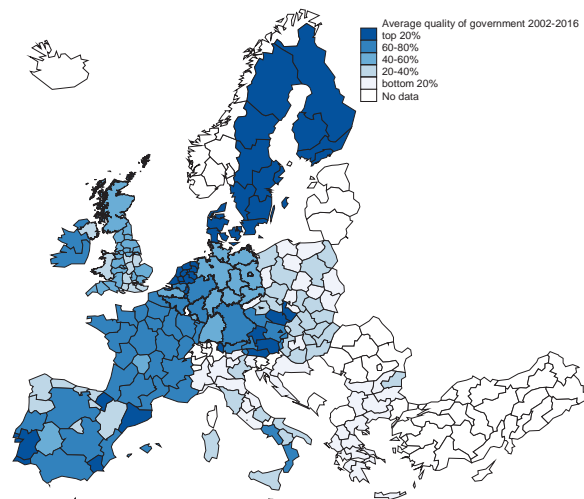
Figure 2: Quality of government for year 2002- 2016, ESS data (author's own elaboration).

The maps show a traditional trend where trust and the quality of regional governments are high in the Nordic countries, also termed 'Nordic exceptionalism' (Andreasson 2017; Seifert 2018). However, Western Europe is not too far behind. At the same time, according to Charron, Lapuente and Annoni (2019), there are improvements across European regions with the traditional dichotomies of North-South divide and West-East starting to be blurred.

4. Empirical model

To test the hypotheses, a fixed-effects panel regression model is employed. For the test of H1, the model takes the following form:

$$LnGDPpc_{r,t} = \alpha + \beta_1 Trust_{r,t} + \beta_2 Quality\ of\ government\ _{r,t} + \beta_3 Decentralisation_{r,t} + \overline{\chi}_{r,t} +$$

$$\mu_t + \varepsilon_{r,t} \tag{1}$$

To test for H2, the model in 1 is modified to add an interaction term between trust and the degree of decentralisation:

$$LnGDPpc_{r,t} = \alpha + \beta_1 Trust_{r,t} + \beta_2 Quality\ of\ gov\ _{r,t} + \beta_3 Decentralisation_{r,t} + \beta_4 Trust_{r,t} *$$

$$Decentralisation_{r,t}\ + \overline{\chi}_{r,t} + \mu_t\ +\ \varepsilon_{r,t} \tag{3}$$

To the test of H3, we add an interaction term between trust and quality of government:

$$LnGDPpc_{r,t} = \alpha + \beta_1 Trust_{r,t} + \beta_2 Quality\ of\ government\ _{r,t} + \beta_3 Decentralisation_{r,t} +$$

$$\beta_4 Trust_{r,t} * Quality\ of\ government_{r,t}\ + \overline{\chi}_{r,t} + \mu_t\ +\ \varepsilon_{r,t} \tag{2}$$

$LnGDPpc_{r,t}$ is the log annual GDP per capita in region r at time t. $\overline{\chi}_{r,t}$ denotes a vector of control variables. μ_t captures time-specific fixed effects; and $\varepsilon_{r,t}$ denotes the error term.

5. Results and discussion

We estimate our empirical model and test for H1 using stepwise multiple regression, as shown in Table 3. In Model 1, we introduce controls, and the results give us the expected signs. We introduce trust in Model 2, and it has a positive and significant association with economic growth. In Model 3, we introduce decentralisation which does not show an association with economic growth. In Model 4, we introduce the quality of government and find it to have a positive and significant association with economic growth. In Model 5, we introduce all factors. We find that trust has a positive and significant effect on regional economic growth. The results are consistent with Tabellini (2010) and confirm theoretical propositions that trust has positive consequences for regional economic growth. We also find consistent with previous research (e.g. Crescenzi et al., 2016; Muringani et al., 2019; Rodríguez-Pose & Di Cataldo, 2015; Rodríguez-Pose & Garcilazo, 2015) that the quality of government is positively and significantly associated with economic growth. Further, consistent with Muringani et al. (2019) and Uttermark (2020) we find that decentralisation does not have an association with regional economic growth. Overall, while previous studies have looked at formal (e.g. Crescenzi et al., 2016; Muringani et al., 2019; Rodríguez-Pose & Di Cataldo, 2015; Rodríguez-Pose & Garcilazo, 2015; Rodríguez-Pose & Ketterer, 2019) and informal institutions (e.g. Tabellini, 2010) separately in two strands of literature, these findings show that both as well as their interactions matter for regional economic growth.

Table 3: Main effects

Variables	1	2	3	4	5
Trust		0.039***			0.041***
		(0.012)			(0.012)
Decentralisation			0.002		0.002
			(0.004)		(0.004)
Quality of government				0.005***	0.006***
				(0.002)	(0.002)
Research and development (R&D)	0.007*	0.007**	0.007*	0.006*	0.007*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Human capital	0.004***	0.003***	0.004***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	0.010***	0.010***	0.010***	0.010***	0.010***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Population density (Natural log)	-0.246***	-0.243***	-0.245***	-0.233***	-0.228***
	(0.046)	(0.046)	(0.046)	(0.046)	(0.046)
Road accessibility (Natural log)	0.181***	0.183***	0.181***	0.184***	0.185***
	(0.042)	(0.042)	(0.042)	(0.042)	(0.042)
Time FE	Yes	Yes	Yes	Yes	Yes
Observations	1,664	1,664	1,664	1,664	1,664
R-squared	0.627	0.630	0.627	0.629	0.632
Number of regions	208	208	208	208	208
Adjusted R-squared	0.570	0.573	0.570	0.572	0.575
F test	202	188.8	186.4	188.1	165.1

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The above findings withstanding, Alesina and Giuliano (2015); Farole et al. (2011); Rodríguez-Pose (2020); Rodríguez-Pose and Storper (2006); Storper (2005) argue that there is need to examine and understand the interaction between formal and informal institutions. We proceed to examine this relationship in Table 4. Specifically, we look at the effect of the interaction between trust and decentralisation on regional economic growth as well as trust and the quality of government on economic growth.

Table 4 shows the interaction effects. Model 1 examines the effect of the interaction between trust and decentralisation on economic growth. The results show the interaction effect is negative and significant. These results suggest that trust mediates the economic returns of decentralisation. However, we cannot conclude based on these results and the significance test. There is a need to plot the marginal effects (Brambor, Clark, & Golder, 2006; Kingsley, Noordewier, & Bergh, 2017; Preacher, Curran, & Bauer, 2006).

Figure 1 shows the results of the plot the marginal effects of the margin effects of decentralisation on economic growth at different levels (from the 10th to the 90th percentile) of trust. The plot of the marginal effects in Figure 1 show what the results in Table 1 Model 1 mean for the effect of the interaction between trust and decentralisation. Although the slope is negative, the findings show that decentralisation has a non-significant impact on growth regardless of the level of trust in the region. Hence, there is no substitution and we find no support for H2. However, there is need for caution on these findings as they do not suggest that decentralisation does not matter as its interaction with other factors can be complex. Calamai (2009) and Torrisi et al. (2015) suggest that decentralisation works through other factors such as social capital to affect the quality of institution which in turn affect the returns of decentralisation. This is confirmed by Muringani et al. (2019) and Rodríguez-Pose and Ketterer (2019) who show that the quality of government mediates the returns of decentralisation.

In Model 2, we examine the effect of the interaction between trust and the quality of government on economic growth. The results in Model 2 show a negative and significant result on the interaction terms and the simple effects or conditioning effect are positive and significant. Similarly, we proceed to plot the marginal effects in Fig 2.

Table 4: Interactions

Variables	1	2
Trust	0.109***	0.025**
	(0.032)	(0.012)
decentralisation	0.005	0.004
	(0.004)	(0.004)
Trust*Decentralisation	-0.007**	
	(0.003)	
qog_index	0.005***	0.008***
	(0.002)	(0.002)
Trust*QoG		-0.026***
		(0.004)
Research and development	0.007**	0.007**
	(0.003)	(0.003)
Human capital	0.003***	0.003***
	(0.001)	(0.001)
Employment in manufacturing	0.010***	0.010***
	(0.001)	(0.001)
Population density (natural log)	-0.232***	-0.276***
	(0.046)	(0.046)
Road accessibility (natural log)	0.189***	0.165***
	(0.042)	(0.041)
Time FE	Yes	Yes
Observations	1,664	1,664
R-squared	0.633	0.645
Number of regions	208	208
Adjusted R-squared	0.577	0.590
F test	155.5	163.7

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$
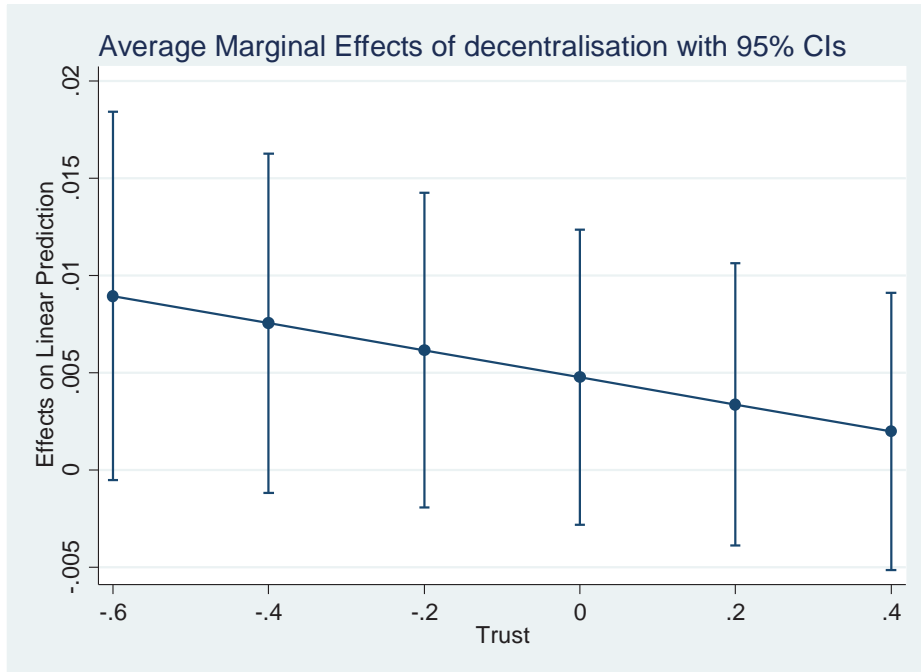
Fig 1: Marginal effects of decentralisation by level of trust

Figure 2 shows the marginal effects of the quality of government by different levels (from the 10th to the 90th percentile) of trust. There is a negative slope, indicating a substitution effect. The marginal effect of quality of government becomes insignificant at very high levels of trust (above 0.2). Thus, when trust is low an increase of quality of government results an increase in economic growth but the same is not true when the trust is at a medium or high level. We substantively establish and conclude that there is a substitution effect between trust and the quality of government, we find support for H3. These findings at the regional level are the same as previous findings (e.g. Ahlerup et al., 2009; James, 2015) at the national level.
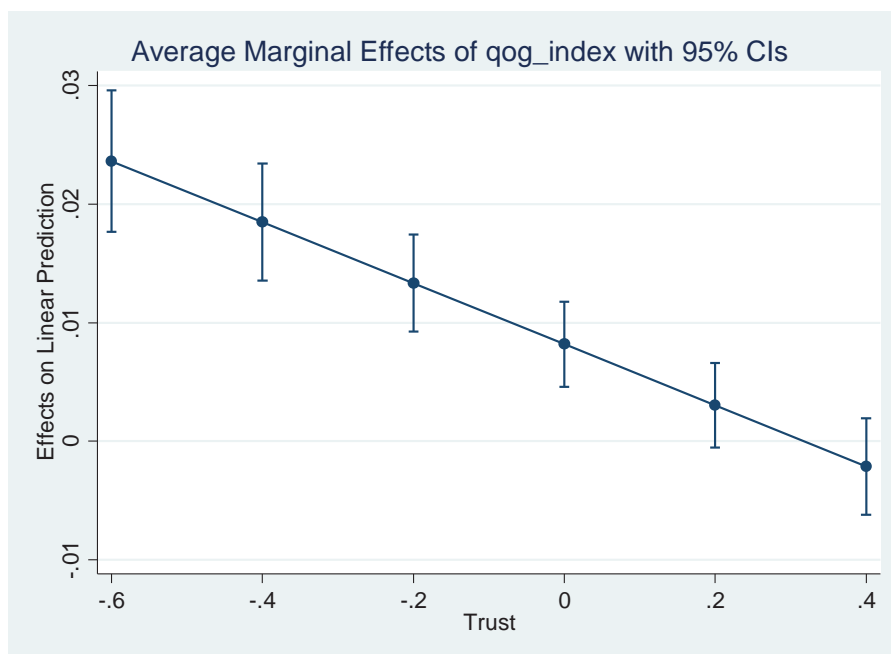
Figure 2: Marginal effects of generalised trust by level of quality of government

6. Robustness test

We test to see if our results, as shown in Table 5 in Model 1, are robust controlling for endogeniety using approaches like other scholars (e.g. Beugelsdijk & Van Schaik, 2005; Crescenzi & Gagliardi, 2015). Specifically, we address the problem of endogeneity to be sure it is not the previous economic growth but trust and the quality of government that leads to economic growth. First, we consider a lag of GDP per capita in 2000 in Model 2. The results are robust controlling for previous GDP and show that the previous GDP does not influence the explanatory variables.

Table 5: Robustness check

Variables	1	2
Lag of GDP2000		0.004
		(0.003)
Trust	0.041***	0.041***
	(0.012)	(0.012)
Decentralisation	0.002	0.002
	(0.004)	(0.004)
Quality of government	0.006***	0.006***
	(0.002)	(0.002)
Research and development (R&D)	0.007*	0.007*
	(0.003)	(0.003)
Human capital	0.003***	0.003***
	(0.001)	(0.001)
Employment in manufacturing	0.010***	0.010***
	(0.001)	(0.001)
Population density (natural log)	-0.228***	-0.225***
	(0.046)	(0.046)
Road access (natural log)	0.185***	0.181***
	(0.042)	(0.042)
Time FE	Yes	Yes
Observations	1,664	1,663
R-squared	0.632	0.632
Number of regions	208	208
Adjusted R-squared	0.575	0.575
F test	165.1	154.5

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

7. Conclusion

This paper argued that explaining regional economic growth requires considering both formal and informal institutions (Farole et al., 2011; Rodríguez-Pose, 2020; Storper, 2005). However, existing empirical studies on these two aspects remain isolated, and as a result, the interaction between them remains unexplored. As such, while existing empirical studies show the importance of trust for regional economic growth (e.g. Tabellini, 2010), they have failed to show how it mediates the returns of other factors such as the quality of regional government and its degree of decentralisation or autonomy on the same. Our contribution is that we bring these isolated studies together to address this gap in the literature.

Accordingly, our findings confirm that both trust (Tabellini, 2010) and the quality of government (e.g. Crescenzi et al., 2016; Muringani et al., 2019; Rodríguez-Pose & Di Cataldo, 2015; Rodríguez-Pose & Garcilazo, 2015) matter for regional economic growth. Broadly, these findings suggest that it is not whether formal or informal institutions matter but which institutions and how they matter as well as their interaction (Alesina & Giuliano, 2015; Farole et al., 2011; Rodríguez-Pose, 2013; Storper, 2005). Specifically, the contribution we make is to show that the interaction between trust and the quality of government has a substitution effect. These findings at the regional level are consistent with Ahlerup et al. (2009) and James (2015) who show the same at the national level. However, decentralisation has no association with economic growth regardless of the level of trust.

The policy implications of these findings are three-fold; first, there is a need to reconsider the policy debate on the primacy of formal vis-à-vis informal institutions for economic growth to consider interaction and giving them equal attention(Rodríguez-Pose, 2010). Second, these findings are relevant in the context of regional development (e.g. Pike et al., 2017) and debates on devolution (e.g. Schakel, 2015; Treisman, 2007). Specifically, they suggest that policy makers have the flexibility to either generate trust or improve the quality of regional government to realise regional development. While neither is easy, this is possible to achieve through bottom up processes involving civil society and top down responsive policies respectively. Third, the explanatory power of trust and quality of government given their social and spatial embeddedness cautions against the tradition of best practices but demands place-based policies (e.g. Barca, 2009; Barca, McCann, & Rodríguez-Pose, 2012) tailored to the unique needs of regions.

However, this study is not without limitations. First, we caution that our findings only give a descriptive analysis and do not make causal claims. There are two reasons for this; one is that the primary interest is not whether trust and the quality of government explain economic

differences across regions but rather how their interact matters. The other reason is that this paper does not use instrumental variables. Second, although we do not find an interaction effect between trust and the degree of decentralisation, related empirical studies (e.g. Muringani et al., 2019) show that the latter works indirectly through the quality of government. Future studies could also consider a three-way interaction among the three. Third, the scope of the paper is limited to the context of the EU, an examination of specific informal and formal institutions as well as economic growth a measure of development. Therefore, future studies should consider regions in other parts of the world, other types of formal and informal institutions as well as other measures of development such as wellbeing and human development.

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Appendix 1: Factor analysis and Cronbach's alpha test of Trust

Factor analysis

Factor	Eigenvalue	Proportion	Cumulative
Factor 1	1.40	1.30	1.30
Factor 2	-0.14	-0.13	1.17
Factor 3	-0.19	-0.17	1.00
N	31959		

Factor analysis

Cronbach's alpha

Variable	Factor	Uniqueness
Trusting in people	0.6988	0.5117
Fairness in people	0.7100	0.4959
Helpfulness in people	0.6407	0.5895

Blank represents factor loading <.1

Appendix 2: VIF and tolerance levels for variables

VARIABLES	VIF	1/VIF
Road accessibility	2.85	0.350781
Population density	2.57	0.389193
Human capital	1.87	0.533701
Trust	1.66	0.603571
Employment in manufacturing	1.50	0.667819
R&D	1.43	0.698446
Quality of government	1.32	0.755685
decentralisation	1.23	0.815354
Mean VIF	1.80	

Part2-Papers IV

The consequences of political trust and its antecedents across regions in the EU.

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Abstract

The literature on regional development has long been interested in how soft factors such as trust influence economic outcomes. Political trust has recently emerged as a dimension of trust which is particularly important in this regard. Political trust is a function of the general level of social trust in society, but also of the quality of the political institutions to be trusted. Hence, it also relates to recent studies showing the importance of regional quality of government for economic development. We study the relationship between social trust, quality of government, political trust and economic development using a structural equation model (SEM) on pooled data from 208 regions in the European Union (EU). We find that political trust is positively associated with economic growth in EU regions. Political trust is in turn shaped by both social trust and the quality of government, which are therefore both directly and indirectly associated with economic growth. These findings highlight the importance of political trust as a mechanism through which both formal and informal institutions influence regional development.

Key words: Political trust, social trust, quality of government, economic growth, regions, EU

1. Introduction

There is a growing interest in the role of institutions as drivers or inhibitors of regional economic growth (Rodríguez-Pose, 2013). Various studies have examined how formal as well as informal institutions fundamentally shape the development of territories. While any number of institutions and constellations thereof can conceivably influence development, empirical studies have in particular concentrated on two types of institutions: On the formal side, the quality of regional government has been shown to affect economic growth (Charron et al., 2014; Muringani et al. 2019), innovation (Rodríguez-Pose and Di Cataldo, 2015), diversification (Cortinovis et al. 2017), and the effects of cohesion policy (Rodríguez-Pose and Garcilazo, 2015). On the informal side, interest has concentrated on how trust and the social capital which it generates (Putnam, 1993) support knowledge exchange (Malecki, 2012), collaboration (Murphy, 2006), innovation (Cooke et al. 1998) and growth (Beugelsdijk et al. 2004; Tabellini, 2010; Forte et al. 2015).

Recent studies have further tried to unpack these dimensions, looking among other things at different types of trust. Political trust is one such dimension, referring to trust in politicians and the political system (Hooghe, 2011; Hooghe, Marien, & Oser, 2017; Levi & Stoker, 2000; Warren, 2006). This raises interesting questions, as political trust is likely to be a function of both the formal and informal institutions in the region. In societies with a high level of social trust in general, this trust is likely also to extend to politicians. However, the formal institutions also matter: A government of high quality which proves itself to be trustworthy will surely also instil political trust in its citizens.

Hence, it is no surprise that studies have found that political trust matters for regional economic growth (e.g. Kaasa, 2016). The mechanisms through which political trust affects regional economic growth involves two interdependent features (Rodríguez-Pose & Storper, 2006; Trigilia, 2001; Trigilia & Burroni, 2009): Top-down, political trust provides the basis for the

legitimacy of government and acceptance for most of its actions, such as compliance with the law, economic policies and third-party enforcement (Bjørnskov, 2012; Hetherington & Rudolph, 2008; Marien & Hooghe, 2011). Bottom-up, political trust encourages conventional political participation which also support other forms of cooperative behaviours (Hooghe & Marien, 2013; Newton & Ramón, 2007; Rodríguez-Pose & Storper, 2006). Together, these two processes create a congenial organisational ecology or social contract at the regional level in which the government and other economic agents play their part, facilitating economic activities and consequently economic growth (Boschma, 2005; Farole, Rodríguez-Pose, & Storper, 2011; Pike, Rodríguez-Pose, & Tomaney, 2017; Rodríguez-Pose, 1998; Rodríguez-Pose, 2020; Rodríguez-Pose & Storper, 2006; Tomaney, 2014; Trigilia, 2001; Trigilia & Burroni, 2009).

However, few empirical studies have so far looked specifically at how political trust can explain economic consequences at the regional level. A notable exception is Kaasa (2016), who shows that political trust is positively related to productivity. While this study compares the effect of political trust on productivity to those of social trust and quality of government, it however overlooks the structural relationship between these variables. Considering that both social trust and quality of government will be important for the formation of political trust, we address this gap and examine how the three variables jointly affect economic growth.

We estimate a structural equation model (SEM) for this relationship using pooled data of 208 regions in 21 EU countries covering eight waves of the European Social Survey from 2002 to 2016. We find that political trust is positively associated with economic growth. In turn, social trust and quality of government are positively associated with political trust. As such, they shape economic growth both directly and indirectly through political trust. Overall, these findings point to the complex and interdependent relationship between different types of formal and informal institutions influencing economic growth. Specifically, they confirm the importance

of political trust for economic outcomes and show that it partly works as a mechanism for social trust and quality of government to affect economic growth.

The rest of the paper follows this structure: In Section 2, we examine the literature and develop the hypotheses. Section 3 gives an overview of the data and present the empirical approach. In Section 4, we discuss the results. Section 5 concludes.

2. Theoretical framework

The paper takes a macro-level approach to understand and explain the relationship between political trust, social trust, quality of government and economic growth at the regional level, as illustrated in Figure 1. First, we build on Kaasa (2016) and expect a relationship between political trust and economic growth. Second, we considers theoretical (e.g. Bjørnskov, 2012) and empirical studies (e.g. Tabellini, 2010) that there is a positive and direct association between social trust and economic growth. Third, we build on various studies which find a positive association between the quality of government and economic growth (Crescenzi, Di Cataldo, and Rodríguez-Pose (2016); Rodríguez-Pose and Di Cataldo (2015); Muringani, Fitjar, and Rodríguez-Pose (2019); Rodríguez-Pose and Ketterer (2019). Fourth, we expect social trust (e.g.Keele, 2007; Newton & Zmerli, 2011) and the quality of government (Newton, Stolle, & Zmerli, 2018) to have a positive and direct association with political trust.

4
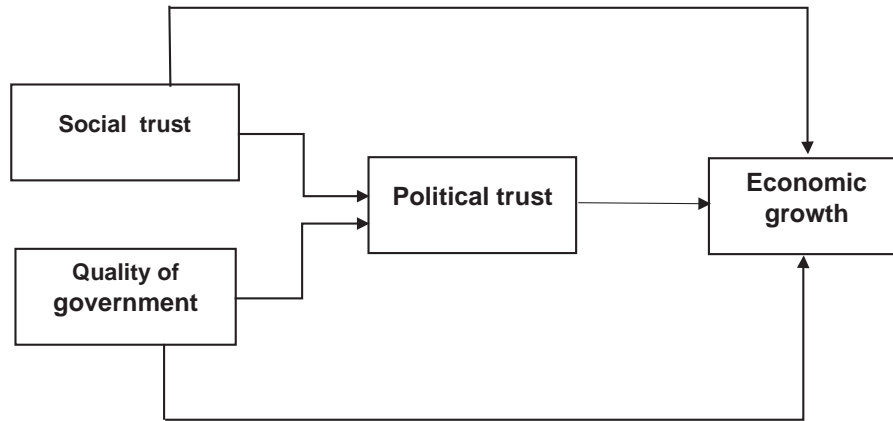
Figure 1: Relationship between political trust, social trust, the quality of government and economic growth

2.1 Political trust and economic growth

Political trust (e.g.Christensen & Lægreid, 2005; Hooghe, 2011; Newton et al., 2018) has been defined earlier as the overall evaluation of the political system. This paper considers it to comprise of both a rational (Hardin, 2002; Van der Meer, 2017) and a normative component (Hooghe et al., 2017; Warren, 2006) with each one of them individually a necessary but not sufficient condition for political trust. This understanding of political trust builds on earlier arguments by e.g. Levi and Stoker (2000) that political trust includes a commitment based on both moral values or normative expectations and on the competence of the object of trust to demonstrate its trustworthiness. While both dimensions are important, Hooghe (2011) argues that normative expectations matter more since citizens often do not have enough information about the political actors or the political system. In the same vein, Hooghe et al (2017) argue that this explains why overall political trust remains relatively stable despite changes in the rational components comprising the citizens' evaluation of government experience.

We consider political trust to be a uni-dimensional construct that covers both trust in politicians and in political institutions. While some authors have conceptualised these as distinct dimensions (e.g. Rothstein & Stolle, 2008), Christensen and Lægreid (2005) and (Hooghe, 2011) provide empirical support that the individual indicators of political trust are all explained by one underlying variable.

Hitherto, the study of political trust has mainly be conducted at the national level, and empirical studies at the regional level remain scant, with some exceptions (e.g.Kaasa, 2016). However, the region often provides the context in which political trust affects economic growth (e.g. Pike et al., 2017; Rodríguez-Pose, 1998; Trigilia, 2001; Trigilia & Burroni, 2009). This is increasingly so in the context of decentralisation, with growing authority for regional governments (Hooghe et al., 2016). This also empowers citizens by expanding the opportunity space for inclusive political participation which is also conducive to political trust (Putnam, Leonardi, & Nanetti, 1993; Rodríguez-Pose & Di Cataldo, 2015). Thus, the manifestation of political trust through acceptance of government policies and inclusive participation in politics often takes place at the regional level (Rodríguez-Pose, 1998; Rodríguez-Pose & Storper, 2006).

While literature in regional studies has increasingly examined the importance of political conditions for economic growth, in particular in the context of decentralisation, these studies seldom analyse the role of political trust (e.g.Putnam et al., 1993; Rodríguez-Pose & Di Cataldo, 2015). Building on recent studies of the effects of political trust on productivity (e.g. Kaasa, 2016), we expect political trust to be positively associated with economic growth and hypothesise the following:

H1: Political trust has a positive association with economic growth.

2.2 Social trust, political trust and economic growth

Social trust refers to the trust we give to other people not familiar to us. It is normative and relatively stable (Fukuyama, 1995; Newton & Zmerli, 2011; Tabellini, 2010; Uslaner, 2008). A general sense of trust in society influences economic growth by solving collective action problems, reducing transaction costs and opportunistic behaviour. This frees resources from enforcement towards productive purposes, and facilitates information sharing (Beugelsdijk & Van Schaik, 2005; Bjørnskov, 2012; Fukuyama, 1995; Whiteley, 2000). Trust also promotes tolerance which signals and attracts human capital to a region (Florida, 2002). Overall, social trust facilitates economic activities which promote economic growth (Beugelsdijk & Van Schaik, 2005; Feldman, 2014; Shearmur, 2011; Stam & Bosma, 2014).

Despite the perceived positive economic consequences of trust (Bjørnskov, 2012), empirical findings remain largely inconclusive. Studies vary from showing a negative and significant association (Schneider, Plümper, & Baumann, 2000) through a negative coefficient and no association (e.g. Akçomak & Ter Weel, 2009; Beugelsdijk & Van Schaik, 2005; Neira, Vázquez, & Portela, 2009) to a positive and significant association (Tabellini, 2010). Overall, we nonetheless hypothesise the following based on the theoretical arguments outlines above:

   H2a: Social trust has a positive association with economic growth.

Second, we consider the relationship between social trust and political trust. Building on the theoretical arguments (Warren, 2006) on the relational component of political trust, we consider political trust to build on social trust. In societies with a high general sense of trust, the same trust is also often extended to people in government and the political system. Empirical studies (e.g. Newton et al., 2018; Newton & Zmerli, 2011) find a high correlation between social trust and political trust, concluding that social trust is a necessary but not sufficient condition for political trust. A related study by Keele (2007) found that social trust is an antecedent of

political trust. Although these studies were conducted at a national level, we expect the same relationship to work at the regional level, as social trust arises out of local interactions (Newton & Ramón, 2007; Putnam et al., 1993). Accordingly, we hypothesise that:

H2b: Social trust has a positive association with political trust.

2.3 Quality of government, political trust and economic growth

Quality of government refers to the extent to which governments deliver public goods in an efficient, impartial and non-corrupt manner (Charron, Dijkstra, & Lapuente, 2010, 2014; Muringani et al., 2019; Rodríguez-Pose & Di Cataldo, 2015). The quality of government differs across regions, which affects their ability to deliver public goods (Putnam et al. (1993); Treisman (2002). High quality of regional government reduces opportunism and rent-seeking behaviour and simultaneously promotes co-operative behaviours and efficiency. Several empirical studies (e.g. Crescenzi et al., 2016; Muringani et al., 2019; Rodríguez-Pose & Di Cataldo, 2015; Rodríguez-Pose & Garcilazo, 2015; Rodríguez-Pose & Ketterer, 2019) have found a positive association between the quality of regional government and economic growth. Building on this, we hypothesise the following:

H3a: Quality of government has a positive association with economic growth.

Empirical research on the relationship between political trust and the quality of government remains scarce. According to Khan (2016), the link between the two is not clear, rarely explored and often assumed. At the national level, Khan (2016) finds that the quality of government influences the level of political trust. At the regional level, Kaasa (2016) finds a high correlation between the quality of government and political trust but does not explain it. Overall, we would expect political trust also to involve a rational component. If the government does not prove itself to be trustworthy, citizens' trust in politicians and in the political system can wane even in a high-trust society. Accordingly, we hypothesise the following:

H3b: Quality of government has a positive association with political trust.

3. Variables and data

The paper uses a pooled data set for eight waves of the European Social Survey from 2002 to 2016 for 208 NUTS 1 and 2 regions in 21 EU countries[1]. This is complemented with data from the European Quality of Government Index (EQI) surveys and the European Statistical Office (Eurostat). As the aim is to study political trust and quality of government at the regional level, we define regions as meso-level administrative units in the political system. Depending on the country, the meso-level unit can be found at either the first or the second level of the Nomenclature of Territorial Units for Statistics (NUTS) which is a hierarchical classification of regions used by the Eurostat (European Commission, 2012). We rely on Hooghe et al. (2016; 2010) to inform the choice of regions at either NUTS 1 or NUTS 2 level in each country. In some countries, there are several regional levels of government. In this instance, we adopt the same approach as in Muringani et al. (2019) to use the most powerful level according to Hooghe et al's (2016) regional authority index. The variables for the panel data set are compiled from four independent data sets as shown in appendix 1 and explained in the subsequent sections.

The dependent variable is economic growth, for which we use Eurostat data on the level of GDP per capita as a proxy. It is log-transformed to avoid skewness. The explanatory variables are political trust, social trust and quality of government. Both political trust and social trust are taken from the eight waves of ESS, a biennial survey which has run since 2002. Political trust is an aggregate dimension built from individual responses to trust in a range of political institutions (the United Nations, European Parliament, the national parliament, politicians,

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1 Romania and overseas territories for Spain, Portugal and France are excluded due to insufficient data. The same applies to Åland in Finland and two regions in Italy (Valle d'Aosta and Molise). Countries with only one NUTS level such as Estonia are also excluded.

political parties, the legal system and the police): 'please tell me on a score of 0 to 10 how much you personally trust each of the institutions I read out. 0 means you do not trust an institution at all, and 10 means you have complete trust'.

Social trust is an aggregate dimension of individual responses to three trust-related questions scale of 1 to 10: First, "would you say that most people can be trusted or that you can't be too careful in dealing with people?" (*trust in people*). Second, "do you think that most people would try to take advantage of you if they got the chance, or would they try to be fair?" (*fairness in people*). Third, "would you say that most of the time people try to be helpful or that they are mostly looking out for themselves? (*helpfulness in people*).

We use factor analysis, as shown in Appendix 2. It shows that the trust indicators are explained by two factors, corresponding to the distinction above between social trust and political trust. A Cronbach alpha coefficient of 0.8772, a significant Bartlett test of sphericity and the KMO test with an overall score of 0.857 confirm their adequacy. Instead of using the factor scores, we combine the indicators into measures of political trust and social trust using weighted averages. In a further step, we aggregate individual responses to regional measures by calculating the average score of respondents on each dimension by their region of residence.

The quality of government is a composite index that measures citizens' perception of how well their regional government performs. This is measured along four dimensions: (i) control of corruption, (ii) rule of law (iii) government effectiveness, and (iv) voice and accountability (Charron et al., 2010, 2014). We use the metadata (Charron et al., 2010; Charron, Dijkstra, & Lapuente, 2015; Charron, Lapuente, & Annoni, 2019) from the three European Quality of Government Index (EQI) surveys conducted in 2010, 2013, and 2017. We follow the approach by Rothstein, Charron, and Lapuente (2013), Rodríguez-Pose and Di Cataldo (2015) and

Muringani et al. (2019) to extend the data set from three into eight waves from 2002 to 2016 using the Worldwide Governance Indicators (WGI)[2] at the national level as a trend line.

The control variables are regional indicators from the Eurostat database. These include research and development expenditure ($R\&D$) as a percentage of GDP, human capital, employment in manufacturing, the natural log of population density and the natural log of road accessibility using kilometres of roads per 1000 inhabitants. Table 1 shows the descriptive statistics for all independent and control variables.

Table 1 Descriptive statistics

Variables	N	Mean	SD	Min	Max
Quality of government	1,664	0.441	1.595	-5.160	11.81
Social trust	1,664	-0.0682	0.402	-2.530	1.840
Political trust	1,664	-0.0894	0.417	-3.816	1.124
Research and development	1,664	1.433	1.192	-5.384	17.47
Human capital	1,664	24.91	8.989	6.800	57.10
Employment in manufacturing	1,664	16.43	6.681	2.900	39.40
Population density	1,664	4.993	1.160	1.194	8.910
Road accessiblity	1,664	14.54	0.820	11.62	16.00

Table 2 shows the correlation matrix. Most of the variables are positively correlated at a moderate level. However, the correlation between social trust and political trust is relatively high at 0.68. We check for multicollinearity using variance inflation factors (VIF). The values are well within acceptable limits (appendix 2) with 2.61 as the highest value.

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[2] The WGI survey started in 1996 and was conducted every two years until 2002 and every year thereafter. Rothstein et al (2013), Rodríguez-Pose and Di Cataldo (2015) and Muringani et al (2019) used a two-year lag from the WGI to create a corresponding panel for extrapolating the EQI survey indicators. The calculation takes this approach: $QoG_{r,c} = WGI_c + (Rqog_{r,c} - \overline{Rqog_c})$. $QoG_{r,c}$ is the final QoG index for region r in country c. It is obtained as the distance from the regional QoG country mean ($\overline{Rqog_c}$) of the regional score ($Rqog_{r,c}$), added to WGI score for country c (WGI_c).

Table 2: Pairwise correlation

Variables	1	2	3	4	5	6	7	8	9
ln_GDP	1.000								
Quality of government	0.344***	1.000							
Social trust	0.541***	0.468***	1.000						
Political trust	0.433***	0.481***	0.680***	1.000					
Research and development	0.500***	0.289***	0.414***	0.341***	1.000				
Human capital	0.557***	0.263***	0.443***	0.317***	0.452***	1.000			
Employment in manufacturing	-0.335***	-0.167***	-0.139***	-0.119***	-0.136***	-0.455***	1.000		
Population density (natural log)	0.409***	0.034	0.118***	0.132***	0.222***	0.313***	-0.201***	1.000	
Road accessibility (natural log)	0.461***	0.106***	0.245***	0.188***	0.293***	0.259***	0.045*	0.731***	1.000

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.10

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3.1 Empirical model

In order to study the relationship between the variables, we employ a structural equation model (SEM). Unlike a regression analysis, SEM makes it possible to examine the structural relationship between variables (Alesina & Giuliano, 2015). It accounts for the variances and covariances among the disturbance terms in multiple equations (Sabatini, 2008, 2009). We focus on the structural model and do not include measurement models, as the variables are either observed precisely (economic growth and control variables) or calculated at the regional level based on individual level data from other data sets (explanatory variables). As the scale development and validation of the explanatory variables of interest has been conducted by previous studies on social trust and political trust (e.g.Jowell, Roberts, Fitzgerald, & Eva, 2007) and the EQI (e.g. Rothstein et al., 2013), we do not consider the measurement models an important contribution of this paper. Rather, we want to focus on the structural relationship between the four main variables.

Two equations represent the SEM model:

$$Economic\ growth_i = \alpha + \beta_1\ General\ trust_i + \beta_2\ Quality\ of\ government_i \ +$$
$$\beta_3\ Political\ trust_i + Controls_i + e_1 \tag{1}$$

$$Political\ trust_i = \alpha + \beta_4\ General\ trust_i + \beta_5 Quality\ of\ government_{i,} + e_2 \tag{2}$$

The first equation examines the relationship between economic growth and political trust (H1), social trust (H2a), and quality of government (H3a). The second equation examines the relationship between political trust and each of social trust (H2b) and quality of government (H3b). We examine mediation effects of social trust and quality of government on economic growth using a user written STATA command by Mehmetoglu (2018). Economic growth and political trust are endogenous variables, meaning they are caused by other variables. Social

trust, quality of government and the controls are exogenous variables which are not caused but cause other variables. β_1 to β_5 are the coefficients, e_1 and e_2 are the disturbance terms.

4. Results

Figure 2 shows the structural relationships using a path diagram drawn using the SEM builder in Stata 14.0. This is followed by the SEM analysis in Table 3 showing standardised coefficients and the mediation analysis. Figure 2 shows support for a direct and positive association between political trust (H1), generalised trust (H2a), the quality of government (H3a) on one side and economic growth on the other side. It also shows support for a direct and positive association between generalised trust (H2b) and the quality of government (H3b) on one side and political trust on the other side.

We assess the model fit based on the criteria advised in Mehmetoglu and Jakobsen (2017). The chi-square has a p-value < 0.05 which suggest a poor model fit. However, the other criteria suggest a good model fit (SRMR < 0.1, RMSEA values < 0.10, CFI values >0.90 TLI values >0.90) (Acock, 2013; Mehmetoglu & Jakobsen, 2017). We also consider that the chi-square statistic is affected by sample size, while the RMSEA is the least affected and makes a good measure close to fit (Van Damme, Pauwels, & Svensson, 2015). Therefore, we consider on the balance of evidence that the model has a good fit. We proceed to analyse the structural model and substantiate the hypothesised relationships as shown in the path diagram. We also estimate the indirect relationships between social trust and economic growth and between quality of government and economic growth.
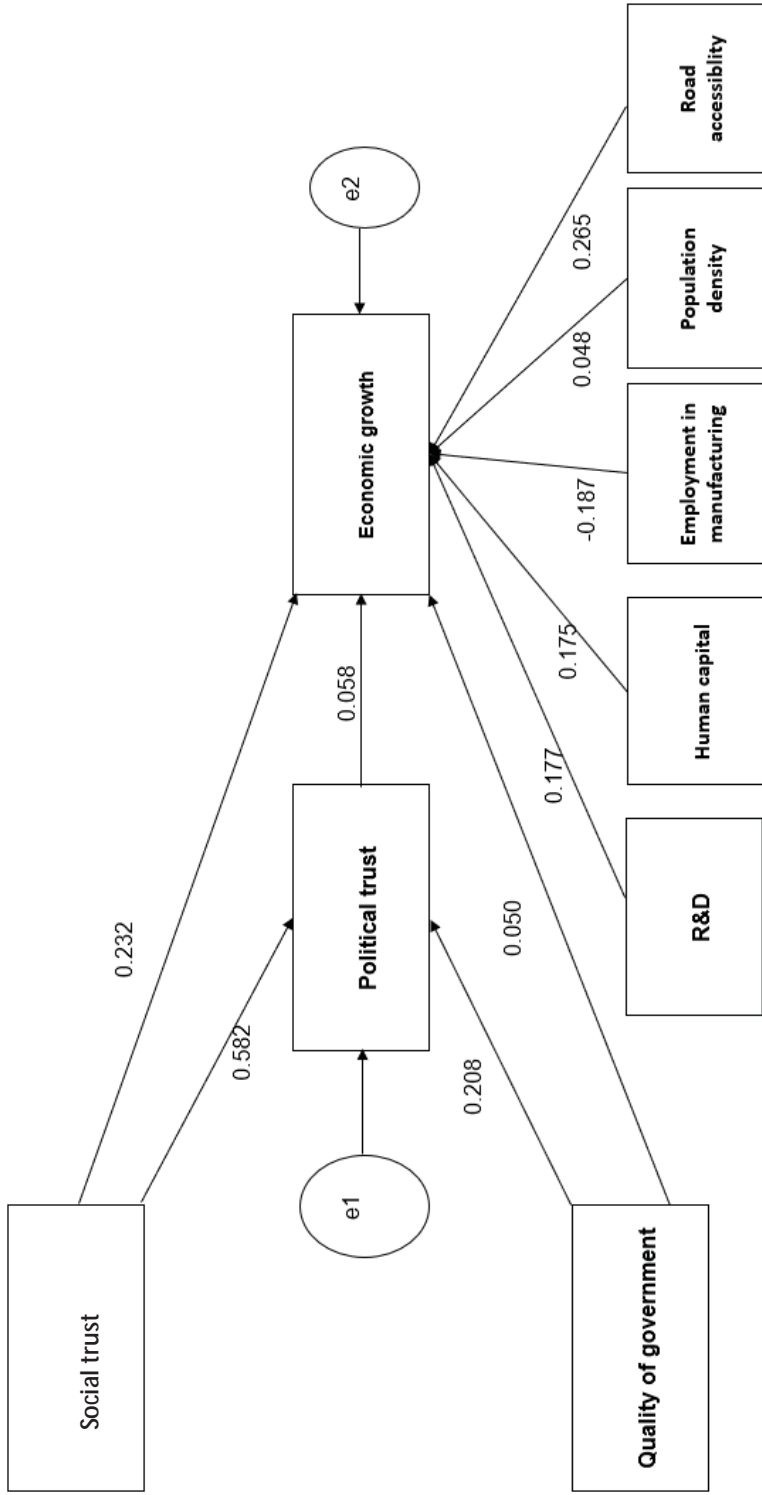
Figure 2: Path diagram showing relationship between variables

The results shown in Figure 2 suggest an indirect effect of social trust and quality of government on economic growth through political trust. However, this cannot be adequately substantiated in a path diagram. Therefore, we do a SEM analysis to establish whether there is an indirect effect. Accordingly, Table 3 shows both the direct and indirect effects of these variables.

Table 3: Structural model using pooled data showing standardised coefficients

Variables	Direct effect on Economic growth	Indirect effect on economic growth	Direct effect on political trust
Political trust	0.058*** (0.023)		
Social trust	0.232*** (0.024)	0.033*** (0.013)	0.582*** (0.016)
Quality of government	0.050*** (0.019)	0.003*** (0.001)	0.208*** (0.019)
Research and development	0.177*** (0.019)		
Human capital	0.175*** (0.022)		
Employment in manufacturing	-0.187*** (0.019)		
Population density	0.048** (0.026)		
Road accessibility	0.265*** (0.026)		
Constant	20.528*** (0.536)		-0.174*** (0.019)
R-squared	0.56		0.50

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.10

The results in Table 3 support all five hypotheses. Overall, the model explains 56 per cent of the variation in economic growth across EU regions. First, there is support for H1, as political trust has a strong and positive influence on economic growth. Second, the results show that there is also a strong direct positive relationship between social trust and economic growth (H2a), and between quality of government and economic growth (H3a). The coefficient is

strongest for social trust, while the effects of political trust and quality of government are comparable. Hence, unlike Kaasa (2016), we do not find that political trust is a better predictor of economic growth than social trust and quality of government. Rather, all three variables have significant independent effects on economic growth, with the strongest effect coming from social trust.

Third, there is a strong direct positive relationship between social trust and political trust (H2b), and between quality of government and political trust (H3b). Combined, social trust and quality of government explain about 50 per cent of the variance in political trust. These findings suggest consistent with the related studies that social trust (Keele, 2007; Newton et al., 2018; Newton & Zmerli, 2011) and the quality of government (Khan, 2016; Newton et al., 2018) are antecedents of the political trust. Again, the effect of social trust is stronger than that of quality of government. However, the latter also has a strong and positive effect, indicating that political trust is not simply an extension of the general level of trust in society, but also involves an assessment of the trustworthiness of the government.

Fourth, the results in Table 3 suggest but do not substantively establish that political trust mediates the relationship between social trust and economic growth, and between quality of government and economic growth. Therefore, we test for mediation effects using the user written Medsem command by Mehmetoglu (2018). It builds on Iacobucci, Saldanha, and Deng (2007), Zhao, Lynch , and Chen (2010) and Kenny (2016). Appendix 3 shows the results. Political trust partially mediates the economic returns of both social trust and quality of government. Overall, 13 % of the effect of social trust on economic growth is mediated by political trust, and 20 % of the effect of quality of government on economic growth is mediated by political trust. Overall, these findings show that the relationship between social trust, quality

of government and political trust is complex and interdependent, as the variables both individually and jointly affect economic growth.

We further conduct a robustness test to see if the composition of the sample affects the results. We compare the sample with all regions against two samples divided into two groups: Regions with GDP per capita above the 75th percentile and regions below the 25th percentile. Like the overall model in Table 3, we do not do a configural invariance test since our analysis only focuses on the structural model. Likewise, we assume that the variables have been measured without errors and are equivalent across different groups of regions based on previous studies on social trust and political trust from the ESS (e.g.Jowell et al., 2007) and the EQI (e.g. Rothstein et al., 2013).

The results in Table 4 show a good model fit for all the models (SRMR < 0.1, RMSEA values < 0.10, CFI values > 0.90, TLI values > 0.90). Therefore, we proceed to analyse the structural models in Table 5. The association between each of social trust and quality of government with political trust is positive and the same across the three models. However, in high-income regions above the 75th percentile, political trust has a positive association with economic growth, but this is not the same for social trust and the quality of government. The opposite is true for low-income regions where there is a positive association between each of social trust and the quality of government, and economic growth. Political trust has no association with economic growth.

Table 4: Comparison of model fit indices

Model(s)	X2	CFI	TLI	RMSEA	S.R.M. R
All regions	19.896(p-value: 0.0013)	0.994	0.982	0.042	0.011
>25 pc. tile	33.961(p-value: 0.0000)	0.975	0.924	0.073	0.021
<75 pc. tile	20.166(p-value: 0.0012)	0.991	0.974	0.048	0.014

Table 5: Comparison of overall, high income and low-income groups

	Direct effect on economic growth			Indirect effect on economic growth			Direct effect on political trust		
	Overall	High-income	Low-income	Overall	High-income	Low-income	Overall	High-income	Low-income
Political trust	0.058*** (0.023)	0.177*** (0.036)	0.014 (0.028)						
Social trust	0.232*** (0.242)	0.035 (0.036)	0.28*** (0.030)	0.033*** (0.013)	0.075*** (0.016)	0.007 (0.014)	0.580*** (0.016)	0.596*** (0.019)	0.586*** (0.018)
Quality of government	0.050*** (0.019)	-0.012 (0.029)	0.099*** (0.024)	0.003*** (0.001)	0.005*** (0.001)	0.0006 (0.001)	0.208*** (0.019)	0.190*** (0.023)	0.205*** (0.022)
R&D	0.177*** (0. 019)	0.132*** (0.036)	0.146*** (0.022)						
Human capital	0.175*** (0.022)	0.181*** (0.031)	0.149*** (0.027)						
Employment in manufacturing	-0.187*** (0.019)	0.003 (0.031)	-0.238*** (0.022)						
Population density	0.048** (0.026)	0.355*** (0.041)	-0.079*** (0.030)						
Road accessiblity	0.265*** (0.026)	0.0212 (0.040)	0.281*** (0.031)						
R-squared	0.55	0.28	0.48				0.49	0.48	0.49
N	208	185	164				208	185	164

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.10

5. Conclusion

This paper has examined how political trust, social trust and the quality of government affect economic growth at the regional level. Overall, the findings show that there is a complex and interdependent relationship between these three variables which jointly affect economic growth. Specifically, the findings show a direct and positive association between economic growth and each of the following: political trust, social trust and quality of government. The findings also show that there is a direct and positive association between political trust and both social trust and quality of government. Taken together these two findings show that social trust (Keele, 2007; Newton et al., 2018; Newton & Zmerli, 2011) and the quality of government (Khan, 2016; Newton et al., 2018) are important for the formation of political trust, which therefore works as one of the mechanisms through which they influence economic growth.

These findings suggest that there is a need to consider the interrelationships between formal and informal institutions, such as political trust, social trust and the quality of government, when building institutions to foster growth. Policymakers and stakeholders wishing to promote political trust and regional development should consider both top-down and bottom-up processes through targeted interventions. Thus, top-down processes should focus on the quality of government and bottom-up processes on the role of civil society to generate and transmit social trust.

However, the paper is not without limitations. First, the generalisability of the findings is limited to regions in the EU. Second, due to the limited availability of data at the regional level, we resort to a pseudo panel approach using pooled data, and as a result, cannot explain how these envisaged relationships change over time.

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Appendix 1: Overview of variables

Variable	Definition	Constituent parts/meaning	Source
Dependent variable			
ln_GDP	Natural Log of GDP per capita	GDP at current market prices, PPS per inhabitant	Eurostat
Explanatory variables			
Social trust	Trusting of unfamiliar people or strangers	• Most people can be trusted, or you can't be too careful (ppltrst) • Most of the time people helpful or mostly looking out for themselves **(pplhlp)** • Most people try to take advantage of you, or try to be fair **(pplfair)**	
Political trust	Evaluation of the political culture	• Trust in politician (trstplt) • Trust in parliament (trstprl) • Trust in political party (trstprl) • Trust in police • Trust in legal system • Trust in European Parliament • Trust in United Nations	
Quality of government	Quality of government is the extent to which a government delivers public goods in an impartial, efficient and non-corrupt manner	• Control of corruption • Rule of law • Government effectiveness • Voice and accountability	Muringani et al (2019) based on European quality of government index (EQI)(Charron et al., 2010, 2014)
Control variables			
Research and development	Research and development	R&D expenditure as a percentage of GDP	Eurostat
Human capital	Human capital measured using education as a proxy	Percentage of population over 25 with a tertiary qualification	
Employment in manufacturing	Share of employment in manufacturing as a percentage of total employment	Percentage of employment in the manufacturing sector	
Population density	Natural Log of pop density	Population density per 1000 inhabitants per square metres	
Road accessiblity	Natural log of road accessibility	Road access per 1000 inhabitants	

Appendix 2: Factor analysis of social and political trust

Variable	Factor 1	Factor 2	Uniqueness
Trusting in people		0.6832	0.5047
Fairness in people		0.7070	0.5144
Helpfulness in people		0.6389	0.5951
Trusting parliament	0.7466		0.3711
Trusting legal	0.5910		0.4752
Trusting police	0.4845		0.5997
Trusting politician	0.8439		0.2619
Trusting party	0.8476		0.2732
Trusting European parliament	0.7799		0.4942
Trusting the United Nations	0.6905		0.5516
Blank represents factor loading <.3			

Appendix 3: VIF and tolerance levels for variables

VARIABLES	VIF	1/VIF
Road accessibility	2.61	0.383397
Population density	2.55	0.392185
Social trust	2.28	0.438685
Political trust	2.01	0.498138
Human capital	1.80	0.554063
Employment in manufacturing	1.45	0.688466
R&D	1.42	0.704198
Quality of government	1.41	0.710134
Mean VIF	1.94	

Appendix 4: Mediation analysis using the post estimation medsem command

Significance testing of indirect effect (standardised) of social trust through political trust

Estimates	Delta	Sobel	Monte Carlo
Indirect	0.034	0.034	0.034
Std Err	0.014	0.013	0.014
z-vlue	2.505	2.506	2.491
p-value	0.012	0.012	0.013
Conf. Interval	0.007, 0.060	0.007, 0.060	0.007, 0.060

As the Monte Carlo test above is significant, have complementary mediation (partial mediation)!

RIT = (Indirect effect / Total effect): (0.034 / 0.266) = 0.127, Meaning that about 13 % of the effect of generalised trust on economic growth is mediated by political trust!

RID = (Indirect effect / Direct effect): (0.034 / 0.232) = 0.146, The mediated effect is about 0.1 times as large as the direct effect of generalised trust on economic growth

Significance testing of indirect effect (standardised) of quality of government on economic growth through political trust

Estimates	Delta	Sobel	Monte Carlo
Indirect	0.012	0.012	0.012
Std Err	0.005	0.005	0.005
z-vlue	2.505	2.506	2.491
p-value	0.014	0.014	0.016
Conf. Interval	0.002, 0.022	0.002, 0.022	0.002, 0.022

As the Monte Carlo test above is significant, STEP 1 is significant and their coefficients point in same direction,

you have complementary mediation (partial mediation)!

RIT = (Indirect effect / Total effect): (0.012 / 0.062) = 0.196. Meaning that about 20 % of the effect of quality of government on economic growth is mediated by political trust!

RID = (Indirect effect / Direct effect): (0.012 / 0.050) = 0.245. The mediated effect is about 0.2 times as large as the direct effect of quality of government on economic growth