Fundación BBVA

Documentos de Trabajo 14

2012

Jesús Peiró Palomino
Emili Tortosa-Ausina

Social Capital, Investment and Economic Growth

Evidence for Spanish Provinces

Fundación BBVA

Social Capital, Investment and Economic Growth

Evidence for Spanish Provinces

Jesús Peiró Palomino[1]
Emili Tortosa-Ausina[1,2]

[1] *UNIVERSITY JAUME I*
[2] *THE VALENCIAN INSTITUTE OF ECONOMIC RESEARCH (Ivie)*

Abstract

This working paper analyzes the impact of social capital on economic growth in Spain during the 1985-2005 period. The literature in this context is virtually nonexistent and, in addition, whereas most studies, regardless of their context, have used survey data in order to measure social capital, we use a measure whose construction is based on similar criteria to other measures of capital stock. In addition, compared with more standard measures of social capital and trust, the measure we use is available with a high level of disaggregation, and with annual frequency for a long time period. Following a panel data approach, our findings indicate that social capital has a positive impact on GDP per capita growth in the context of Spanish provinces, implying that *social features* are important for explaining the differences in wealth observable across Spanish provinces. Following some recent contributions, we also explore the transmission mechanisms from social capital to growth, finding a highly positive relation between social capital and private physical investment.

Key words

Growth, physical capital investment, province, social capital.

Resumen

Este documento de trabajo analiza el impacto del capital social en el crecimiento económico español durante el período 1985-2005. Los trabajos en este contexto son prácticamente inexistentes y, mientras que la mayoría de los estudios, independientemente de su contexto, han usado datos procedentes de encuestas para medir el capital social, en este documento se emplea una medida cuya construcción está basada en criterios similares a otras aplicadas en *stock* de capital. Además, en comparación con otras medidas más estándares de capital social y confianza, la aquí empleada está disponible con un alto nivel de desagregación, y con periodicidad anual para un largo período temporal. Siguiendo una aproximación de datos de panel, los resultados indican que el capital social impacta positivamente en el crecimiento económico en el contexto de las provincias españolas, evidenciando que las *características sociales* importan para explicar las diferencias en términos de riqueza observables entre las provincias españolas. Siguiendo recientes contribuciones, se explora además los mecanismos de transmisión del capital social hacia el crecimiento, encontrando una fuerte relación positiva entre el capital social y la inversión física privada.

Palabras clave

Crecimiento, inversión física privada, provincia, capital social.

Versión: Septiembre 2012

EDITA / PUBLISHED BY
Fundación BBVA, 2012
Plaza de San Nicolás, 4. 48005 Bilbao

1. Introduction

TRADITIONALLY, economic growth has been one of the topics that has attracted most interest in the economic literature. The first steps in the question are attributed to Solow (1957), who proposed a model that included physical capital investment, labor and technological change. Subsequently, the economic growth literature has considered a large set of *potential* explanatory variables of a different nature, such as human capital or regional, political, religious and social variables. However, despite considerable efforts to determine what the *robust* factors behind the economic growth really are (Levine and Renelt 1992; Sala-i-Martin 1997; Crespo et al. 2011), no consensus has yet been reached.

In the last few years, several studies on this issue have considered a new variable: social capital, which was popularized in sociology by Coleman (1988)—although Loury (1977) had introduced it into modern social science research some years before. As Durlauf and Fafchamps (2005) noted, one may think of social capital as the informal forms of institutions and organizations that are based on the social relationships, networks, and associations that create shared knowledge, mutual trust, social norms, and unwritten rules. Therefore, in the particular context of growth empirics, on which we focus, the analyst would be confronted with evaluating whether social features such as trust, associationism, social participation, or public-spiritedness influence the economic performance of one country or region, and how important this social component might be.

However, despite the growing importance of these issues, scholars face two important problems. The first one is what some authors refer to as the *vagueness* of the concept (Torsvik 2000). Social capital is characterized by its interdisciplinary nature and, although this might be *a priori* good, in practical terms it impedes a consensus about the impact of social capital—both *where* and *how* it truly impacts. The second problem scholars face when approaching the concept, and perhaps the most relevant from the point of view of *measuring* how it affects growth, is that data on social capital are relatively scarce and the data provided by different institutions usually carry different meanings—and, therefore, the implications for growth may also vary from one measure to the other. As we will see throughout the study, this will ultimately be the main reason for considering a social capital measure which has been constructed with similar underpinnings to those used for building other databases such as physical or human capital.

Within the particular discipline of economics, over the last few years some studies have analyzed how social capital affects different dimensions of economic activity in different countries and regions, finding positive links between trust and economic growth, and using social capital data provided by The World Values Survey (WVS) and The European Values Survey (EVS)[1]. In this line of research the number of contributions is already substantial. Although perhaps the most prominent studies were those by Knack and Keefer (1997) and Temple and Johnson (1998), which found a positive correlation between social capital and economic growth, other salient contributions have been made, such as those by Portela and Neira (2002) or Schneider et al. (2000), among others, who also focus on cross-country studies. More recently, some studies have focused on regional levels such as Beugelsdijk and Van Schaik (2005), who consider a sample of 54 European regions.

Some of the studies cited above report interesting conclusions contributing to the understanding of why some countries, or regions, are systematically richer than others in terms of GDP per capita. In the particular case of Spain, on which we focus, Pérez García (2007) concluded that all provinces experienced intense economic growth during the 1955-2005 period. However, there is a broad consensus among scholars who have studied the Spanish case that the process of regional convergence in GDP per capita slowed down in the 1980s, whereas labor productivity followed a convergent path (see, for instance, Raymond and García Greciano 1994; Maudos et al. 1998; Goerlich and Mas 2001; Goerlich et al. 2002).

Nevertheless, this literature seems to have fallen into a period of *stagnation*. Whereas it is true that contributions on the matter are growing (Castro 2007; Peña 2008; Pons and Tirado 2008; Peña 2011; Escribá and Murgui 2011), these studies confirm previous results using more sophisticated techniques, but they do not offer additional evidence on the factors behind the disparities apart from the traditional and well-known private and public capital, human capital or productivity. Studies such as De la Fuente (2003) and Martín Mayoral and Garcimartín (2009) recognize the influence of additional factors and highlight the need to study the "black box", or Solow's residual of the Neoclassical model that might hide factors such as business climate or the institutions effect affecting growth profiles. We hold that social capital could be one important variable embedded in that *residual*.

[1] More detailed information on these databases and the information used in the studies in section 2.2.

There are powerful additional arguments supporting the use of social capital. Pérez García (2007), determined that persistent disparities are a consequence of the distinct abilities of provinces to attract economic activity. In that sense, studies such as Becattini (1979), or Trigilia (2005), concluded that the existence of social capital in a given territory is one of the key factors for attracting new activity and boosting local development. Furthermore, the presence of social capital in one territory can also trigger off the generation of other types of capital, such as human or physical capital (Dearmon and Grier 2011). In this sense, it is well-known that the availability of credit is crucial to impel physical capital formation, and the relationship banking literature corroborates, in light of some recent contributions, that social capital has a major effect on credit decisions (Guiso et al. 2004; Pérez García et al. 2006). In our particular case, since economic development in Spain has been accompanied by high levels of physical investment (Pérez García 2007), we go further and analyze the importance of social capital as a driver of physical capital formation in the Spanish provinces, and also distinguish between total investment and non-residential investment.

Therefore, the main objective of this study is to contribute to the understanding of how social capital has affected the growth profiles of Spanish provinces over the last two decades. To this end, we will proceed in two steps. First, we will consider a variant of Mankiw et al.'s (1992) model of economic growth, in which social capital is included. This will tie in with previous contributions that analyze the *direct* link between trust and social capital, and economic development. However, in a second step, we will also consider recent contributions by Dearmon and Grier (2009, 2011), who advocate digging more deeply into the relationship between trust and the accumulation of human and physical capital, since the link between trust and economic development could be more involved—or *indirect*. In addition, we will follow a panel data approach which, as stated by Dearmon and Grier (2009), is very unusual, given the general unavailability of data on trust and social capital for long periods and large cross sections of countries or regions. We are able to do this thanks to a relatively new and unique dataset, provided by the BBVA Foundation and the Valencian Institute of Economic Research (Ivie), which provides this information for a period of over twenty years, and not only for Spanish regions and provinces but also for a large number of countries.

The empirical evidence on these issues in the case of Spanish regional growth is scant. We find that studies generally offer two different levels of disaggregation, namely, regions or *comunidades autónomas*, and provinces, or *provincias*. They correspond to NUTS

levels 2 and 3, respectively, in European terminology. In the particular case of Spain, apart from corresponding to two different levels of territorial organization and, therefore, being nested (each region contains one or more provinces), they differ remarkably in terms of powers, since both health and education competencies have been transferred to the regions. However, there are notable differences in the size of the population living in each province—for instance, the province of Madrid has more than 6 million inhabitants as of 2011, whereas those living in Soria are fewer than 100,000. Therefore, the analysis is relevant both for regions (given how important they are in terms of powers and, therefore, how responsible they might be for the levels of public deficit) and provinces (given the remarkable disparities in terms of population, which has a major implication when the analyst considers the wealth of all inhabitants in the country). Although many studies confine their analysis to the regional level, since the number of provinces (50) is much higher than the number of regions (17), and we have information for all variables at the provincial level, we consider it is far more informative to conduct the analysis at this level of disaggregation.

This paper is structured as follows. In section 2 we present a brief review of the literature on social capital and its measurement. In section 3 we document some of the advantages of using Pérez García et al.'s (2005) model of social capital generation and accumulation. Section 4 presents the models to be estimated and in section 5 some descriptive statistics are reported. Results are presented in section 6 and, finally, section 7 provides some conclusions. Appendix A (section 8) gives more details on the social capital measure used and Appendix B (section 9) provides a description of the variables employed.

2. A Brief Review of the Social Capital Literature

2.1. Two different approaches to the same concept

The concept of social capital can be examined from different perspectives. A great number of contributions deal with the concept itself and its impact on a variety of fields. It is widely accepted among scholars that social capital contributes to reducing transaction costs and positively affects economic development, among other beneficial effects. To date, however there is no agreement as to which definition, approach or methodology is the most appropriate to determine its effects.

Robert Putnam, in his seminal study *Making Democracy Work* (1993), analyzed the effect of social capital in explaining the differences in economic development and institutional performance in the Northern and Southern regions of Italy. His main conclusion was that social capital partly explains the large differences between the North and South of Italy in terms of institutional performance and economic development. Other authors have tested whether Putnam's results can be generalized using a sample of countries (Schneider et al. 2000), finding some conflicting results.

We can find two distinct views to explain the origins of social capital. Jackman and Miller (1998), compiled and discussed the various social capital approaches. They argued that the pioneering social capital studies employed an *endogenous* approach to the concept. That view implies that social capital is born inside individuals and organizations. Where *A* and *B* are two representative individuals in one specific society, Coleman (1988) defined trust as the expectation created in *A* of being returned by *B* when *A* does something for *B*. This would imply that a stock of social capital in a given society can be created by the accumulation of reciprocal trust relationships. Coleman (1988) also argued that information is needed to provide a basis for trusting others[2]. Another relevant factor is the penalties imposed if one individual acts in opportunistic way[3]. Opportunistic behavior may imply exclusion and the prevention from participating in the aggregated benefits that social capital provides[4]. Thus, trust in the long term is also viewed as an instrument to achieve a cooperative solution in the context of the Prisoner's Dilemma (Torsvik 2000)[5].

In contrast, the *exogenous* view of the concept, stresses that social capital is not a personal cooperative decision but a structural element of the society created by a confluence of certain cultural values, religion, political system, past and current institutions and social

---

[2] In a society with accurate and clear information, making decisions is easier and more secure because individuals can check all the important variables they need to make a decision.

[3] The nature of these penalties may be formal (laws and regulations) or informal (social cost imposed on opportunistic actors). The latter one would be closely related to social capital.

[4] Exclusion has a damaging effect not only on the excluded but on the society as a hole.

[5] In the classic iterated Prisioner's Dilemma game, participants cooperate because they know that long-term benefits of cooperation are higher than short-term benefits derived from deviations from the cooperative solution. The nature and the mechanisms of the endogenous view are very close to this theory.

structure. Whereas the above-mentioned views are incompatible for some authors like Jackman and Miller (1998), others do not make that distinction, combining different endogenous and exogenous aspects. These include, Knack and Keefer (1995, 1997), Keefer and Knack (1997, 2002), Putnam (1995), Helliwell and Putnam (1995), Akçomak and Ter Weel (2009), La Porta et al. (1997), Fukuyama (1995), or Granato et al. (1996a).

Within the exogenous view, other authors focus on social capital as a result of political regimes and policies (Granato et al. 1996b; Paldam and Svendsen 2000; Torcal and Montero 2000; Rose 2000; Paxton 2002)[6], as well as on the implications of social capital for the credit market. Guiso et al. (2004) are one of the maximum exponents[7].

The preceding paragraphs have focused on the different views of social capital and the fields where its positive effects have been demonstrated. Nevertheless, in order to understand how social capital spreads inside a society we need be aware of a key concept: the *network*, the role of which has been emphasized (Coleman 1988; Woolcock and Narayan 2000; Paldam and Svendsen 2000; Paxton 2002; Torsvik 2000). The network is understood as the relationships and ties between members of a society and is the instrument which enables the diffusion of social capital. If individuals in a society are rich in terms of social capital but the network is not wide enough, the positive effects that social capital provides will not be achieved. According to Pérez García et al. (2005), high trust societies are characterized by a high-density, well connected network[8].

The above overview has shown that there is no consensus on how social capital should be understood. Only one thing seems clear: regardless of the approach followed, either endogenous or exogenous, in those areas where social capital is abundant, contracts and agreements may be enforced with lower transaction costs. However, in spite of the advances in the knowledge on this issue, more evidence on the effects of social capital is needed —at least from the point of view of some disciplines such as economics.

---

[6] The general conclusion is that democracy and social capital are highly correlated and that communist societies are detrimental to the generation of social capital.

[7] The authors concluded that in countries or regions with high social capital endowments, their inhabitants can gain better access to credit since there is an increase in the number of credit instruments used.

[8] Societies with isolated groups may be detrimental to the creation of a social capital stock (Paxton 2002).

Yet this is not an easy task, since the analysts are firstly confronted with the difficulties of quantifying social capital itself. Accordingly, in recent years there has been a growing academic interest in determining and quantifying how important social capital is in order to achieve certain levels of economic development.

2.2. Measuring social capital

From the previous section it may be easily inferred that one of the major problems in the study of social capital is its *measurement*. Two of the measures traditionally used (Granato et al. 1996a; Knack and Keefer 1997; Zak and Knack 2001) are the *trust* and *associational activity* indicators contained in the World Values Survey (WVS)[9] and in the European Values Survey (EVS)[10] databases. Trust is measured using what scholars have referred to as the *generally speaking* question. Specifically, the question asked by the WVS and the EVS is: 'Generally speaking, would you say that most people can be trusted, or that you cannot be too careful in dealing with people?', with two possible answers: 'most people can be trusted', or 'can't be too careful'. Both WVS and EVS also provide a membership association indicator.

Other measures have also been taken as proxies for social capital including political participation, institutional variables, confidence in government, compound civic indicators, as used by Knack and Keefer (1997), or different items or questionnaires used to measure specific social capital levels in a particular region such as Narayan and Pritchett's (1999) measure from The Social Capital and Poverty Survey Questionnaire, that tests the role of social capital viewed from a domestic perspective.

Unfortunately, the measures reviewed in the preceding paragraphs have certain disadvantages which can jeopardize their use under some circumstances. First, they have a limited coverage both in terms of space (number of countries or regions included) and time (years in the sample). Second, in the particular case we are dealing with, in which we attempt to understand how social capital might have affected the wealth profiles of the fifty Spanish *provinces*, the measures reviewed above do not provide the required level of disaggregation (provinces,

[9] See http://www.worldvaluessurvey.org.

[10] See http://www.europeanvaluesstudy.eu.

NUTS 3 in European terminology, which would also include the autonomous cities of Ceuta and Melilla)[11].

In order to expand both the space and time dimensions of our data we will consider a new measure of social capital constructed by the Ivie in collaboration with the BBVA Foundation. This measure is available not only for Spanish provinces and regions, but also for a large sample of countries and a long time span, and is updated on a regular basis. It has some additional features that enhance its use in this particular setting. We summarize its main characteristics in the next section. This measure has already been used in recent studies applied to different contexts, but with aims related to those of the present study, such as Pastor and Tortosa-Ausina (2008) or Miguélez et al. (2011).

3. Using an Economic Approach to Social Capital

AS indicated above, an important branch of the literature has measured the impact of social capital on growth using proxies from surveys. In contrast to other measures of social capital such as those reviewed in the previous section, the measure we use is somewhat more sophisticated. This section explains the features that are most relevant to our study. Appendix A, in section 8, provides further technical details on the measure[12].

As discussed previously, data from surveys provided by WVS or EVS are unavailable at a detailed level such as the Spanish provinces and for the analyzed time period[13]. In contrast to the surveys described above, the measure of social capital we use provides yearly data, enabling us to construct a balanced panel dataset, therefore, leading to sounder conclusions.

---

[11] As indicated in the introduction, some studies such as Beugelsdijk and Van Schaik (2005) have analyzed social capital issues for European *regions;* however, the level of disaggregation employed was far less detailed than that corresponding to Spanish NUTS 3.

[12] However, all details on the measure we use are provided by its authors in (Pérez García *et al.* 2005) or, more concisely, in Pérez García *et al.* (2006).

[13] Data are provided at country level, enabling a European regional disaggregation in EVS, although there is no data with a high enough level of disaggregation to study Spanish provinces during our reference period. With respect to time periods, surveys are available for several years, but their frequency is by no means annual.

One of the most interesting features of the measure we use is that it deals with social capital as an asset in which to invest. Solow (2000) contested the idea that social capital may be one of the drivers of economic activity, partly because he did not accept that social capital could be considered as *capital*. Specifically, he claimed that the word *capital* is related to a *stock* of factors of production which are expected to yield productive services for a given period of time.

Dasgupta and Serageldin (2001) suggested the plausibility of the construction of an index of aggregated social capital and highlighted the need for further research in that direction. Meanwhile, Glaeser et al. (2000) stated that the traditional measures for social capital might not be the most appropriate in the particular field of economics. They developed a model of individual social capital accumulation, acknowledging the existence of difficulties in the aggregation at the society level. Therefore, this model cannot provide an answer when studying the differences among provinces, which are not individuals but communities of individuals and, consequently, aggregation becomes essential. In the same line, Durlauf (2002) criticized the lack of a theoretical framework for the determinants of social capital formation and accumulation and also pointed out the *weakness* of those studies which test the importance of social capital from a macroeconomic perspective.

The social capital measure we use provides an answer in this respect. The construction of the social capital accumulation model considered is based on similar ideas to those for models of physical capital accumulation. This implies that social capital is understood as an additional *input* in the production process, and a stock of social capital is available for each society, which depreciates over time like any other type of capital stock. Individuals invest in social capital because they expect future positive returns derived from that investment. Our approach considers that social capital provides services, and those services translate reduced transaction costs. That cost reduction represents the final benefits of investing in social capital.

Another advantage of this approach is the importance that the measure gives to the economic aspects in the generation of social capital, as opposed to other measures focusing on social and cultural characteristics. Our approach considers the economic relationships such as trade, employment, finance or income distribution as determinants of the incentives for investing in social capital. Pérez García et al. (2005, 2006) claim that the cited economic variables have not been sufficiently considered by the social capital literature, and that their importance could have been underrated compared to other, more widely accepted, social or cultural vari-

ables. These authors also provide several explanations to justify the dominance of social variables over economic variables in the measurement of social capital. The main conclusion they draw is that social capital generation cannot be exclusively confined to non-economic relationships, and that economic relationships must also be taken into account, especially when dealing with advanced economies with expectations of continuous progress —which is, precisely, the case of Spanish provinces.

The above arguments provide reasons to justify that our approach might be more appropriate in the specific context we are dealing with. This *economic approach* to measure social capital overcomes some of the biggest difficulties highlighted by the literature: the *vagueness* of the concept (Torsvik 2000), its measurement, the aggregation issues, the treatment of social capital as an asset in which to invest, and the consideration of economic variables in the social capital formation process. It can also offer additional insights in order to better understand the role of a concept characterized by a multifaceted perspective, and its use will allow for comparison with previous results from studies which have used more *traditional* measures, as described above.

4. Model Specification

4.1. Determinants of economic growth

Selecting the explanatory factors which determine economic growth is not an easy matter. As noted in the introduction, a vast number of contributions have focused on determining the *true* determinants of economic growth (Brock and Durlauf 2001). The contributions to this literature continue to growth in both quantity and quality, as demonstrated in other recent papers such as those by Durlauf et al. (2008), Ciccone and Jarocinski (2010), Henderson et al. (2012), or Moral (2012), to name a few. The number of theories put forth that attempt to explain economic growth is so large that they have led to an empirical conundrum known as *theory open-endedness* (Brock and Durlauf 2001), which suggests that, while several theories may explain the growth of an economy's output, no particular theory can possibly rule out another theory as an authoritative predictor of cross-country growth (Henderson et al. 2012).

Few variables appear to be significant across studies. Among them, we can highlight three, namely, initial level of income, investment rate and human capital. However, one should also take into account that recent contributions in the field advocate using different techniques which do not focus on *average* effects, but rather allow for variation in the parameter coefficients (Henderson et al., 2012). Yet studies based on linear specifications still dominate. Among them are the 'Barro-type' regressions (Barro 1991), including the three variables referred to above as well as a great number of regressors which are potential drivers of economic growth.

Sala-i-Martin (1997), in an effort to further investigate additional (more robust) variables apart from those cited, considered a modified version of the *extreme bounds test* initially developed by Leamer (1985), concluding that a considerable set of variables could be used as *robust growth determinants*[14]. Unfortunately, a measure of social capital was neither included in this robustness analysis nor in the majority of studies on the determinants of economic growth, partly because most of the studies incorporating social capital are relatively recent and the data on social capital have some availability limitations.

Our study is based on Mankiw et al. (1992) (henceforth MRW), which is one of the most widely-accepted models in the economic growth literature. One of the reasons is that when studying *regions* within a country instead of *countries*, some widely used variables in 'Barro-type' regressions such as political, religious, or cultural variables are quite homogeneous and it is difficult to draw sensible conclusions which could explain economic growth disparities. The MRW model is simpler in that sense. It is an extension of Solow's basic model, including human capital as an additional regressor, so that the final list of regressors comprises the initial level of income, population growth, physical capital investment and human capital. We add to these variables our variable of interest, namely, social capital.

Following MRW, the economic growth will be estimated using a model such as:

$$GGDP = \alpha + \beta_1 GDP_0 + \beta_2 NGS + \beta_3 PRPK + \beta_4 PLPK + \beta_5 HK + \beta_6 SK + \mu \qquad (1)$$

[14] Specifically, along with the three cited variables, Sala-i-Martin (1997) found nine different *groups* of robust variables: regional variables, political variables, religious variables, types of investment, primary sector production, trade openness, types of economic organization and former Spanish Colonies.

where the dependent variable is economic growth (*GGDP*), measured as the difference of real income per capita logarithm between the end and the beginning of the period. The explanatory variables are: (i) the initial level of real income per capita (GDP_0); (ii) population growth (*NGS*), corresponding to the growth population rate plus a fixed coefficient equal to 0.05[15]; (iii) private (*PRPK*) and public (*PLPK*) physical capital investment, as a percentage of GDP[16] and (iv) human capital (*HK*), which is measured in terms of number of years in education of the working population[17].

These variables make up the MRW framework. We also factor in social capital per capita (*SK*)[18]. A full description of the variables and sources is provided in Appendix B (section 9).

4.2. Determinants of investment

In the second stage of the study we test the impact of our social capital measure on private physical capital investment. This additional study is justified in the light of some recent contributions, which consider that the impact of social capital on growth might be channeled through other factors. For instance, Akçomak and Ter Weel (2009) or Miguélez et al. (2011)[19], found evidence in favor of positive links from social capital to innovation. Closer to this section of the paper, Knack and Keefer (1997), Zak and Knack (2001) and recently, Dearmon and Grier

[15] In contrast to MRW and, in line with Islam (1995), we take the total population growth instead of the working population growth. The coefficient 0.05 represents technological growth and depreciation rate and its value is the used in the MRW model, commonly accepted in the literature.

[16] In MWR, both variables are considered together but we prefer a separate inclusion because there is no consensus on the role of public investment among the studies. Separate inclusion, which will allow for comparison, is therefore and interesting alternative.

[17] This variable differs from the original MRW model, which measured human capital taking the rate of working age population with secondary school studies. Nevertheless, this variable is not free of criticism, (see Islam (1995) for a complete discussion of this matter) and, therefore, we proxy human capital with the years of education.

[18] As previously commented on section 3, the Ivie social capital index is an aggregation of individuals' social capital, so we must take *average per capita* values in order to control for the population factor.

[19] This study focuses on Spanish regions (NUTS 2) and uses social capital data provided by the BBVA Foundation and the Ivie.

(2011), showed a positive impact of social capital on physical investment, highlighting that investment processes need trust and, consequently, social capital is a relevant element in the investment decision. In this part of the paper we analyze which elements are driving the investment in the Spanish provinces and if social capital plays an important role in this concern.

Once more, there is no agreement as to what the determinants of this type of investment really are, as manifested by Temple (1999). Authors studying this matter have weighed in different explanatory variables. Studies such as those by Knack and Keefer (1997) or Zak and Knack (2001), consider the price of investment goods, which is, *a priori*, one of the potential drivers of investment. However, the consensus on this matter is not widespread and other recent contributions such as Dearmon and Grier (2011) do not consider this variable, but incorporate other *macroeconomic indicators* which capture the investment environment in a certain period such as lagged inflation, lagged government spending as a percentage of GDP and lagged GDP growth, along with a human capital indicator, for which it is argued that some spillover effects that can affect investment may be present. We estimate a very similar model for our sample of Spanish provinces, although with some differences that will be explained in the ensuing paragraphs.

Specifically, in the case analyzed here the dependent variable is the private physical capital investment as a percentage of GDP (*PRPK*) and the explanatory variables are: (i) the real interest rate (*R*)[20]; (ii) lagged GDP growth ($GGDP_{-1}$); (iii) lagged inflation (INF_{-1}); (iv) lagged public investment as a percentage of GDP ($PLPK_{-1}$) and (v) human capital (*HK*). To Dearmon and Grier's basic framework we add social capital per capita (*SK*) as an additional regressor[21].

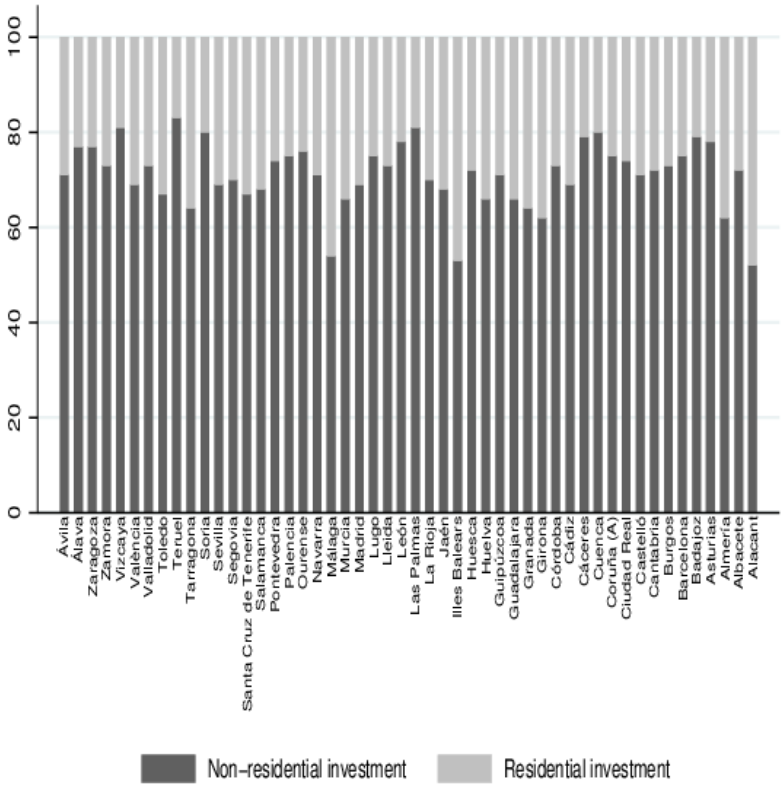
In addition, due to the large impact of the construction sector in Spain during some years of the analyzed period, which is partly responsible for the current crisis affecting the country, we also use the dependent variable of the private physical investment minus the

[20] This variable is not included in Dearmon and Grier (2011) but we have considered it as relevant in the investment decision in line with Knack and Keefer (1997) and Zak and Knack (2001).

[21] Dearmon and Grier (2011) incorporate a social capital measure provided by WVS. They also include variables such as openness or trade liberalization, but we have not considered them because the information used in their construction is more addressed to countries instead of regions inside a single country, the case dealt with here. A description of how exactly these variables are constructed can be found in their paper.

amount corresponding to the residential investment (*PRPKNR*). Figure 1 shows how in provinces such as Málaga (in the region of Andalusia), Alacant (in the region of Valencian Community), and Illes Balears (which is a region, the Balearic Islands, consisting of a single province), the residential component is around the 50% of total private physical investment. To our knowledge, there is virtually no literature on the role of social capital in investment subtracting this residential component. We consider this a valid strategy in the specific case of Spain, where this separate analysis is essential. The reason is that the construction bubble, which burst around 2008, shortly after the US subprime crisis, had started in the mid-nineties, after the 1993-94 economic crisis. Therefore, a large part of the analyzed period is affected by these events. If social capital is one of the determinants of investment, it could be of interest to determine whether its effects remain significant when the residential component is removed, and how important the possible differences might be.

FIGURE 1: **Investment components by province. Mean values, 1985-2005**



Therefore, we estimate two models, the only difference being the dependent variable. In the first one, the dependent variable is the *total private physical capital investment*, whereas in the second it is *non-residential private physical capital investment*. A complete description of the variables and their sources can be found in Appendix B (section 9). The models are:

$$PRPK = \alpha + \beta_1 R + \beta_2 GGDP_{-1} + \beta_3 INF_{-1} + \beta_4 PLPK_{-1} + \beta_5 HK + \beta_6 SK + \mu \quad (2)$$

$$PRPKNR = \alpha + \beta_1 R + \beta_2 GGDP_{-1} + \beta_3 INF_{-1} + \beta_4 PLPK_{-1} + \beta_5 HK + \beta_6 SK + \mu \quad (3)$$

5. Data and Descriptive Statistics

BEFORE reporting the estimation results of the previous models, in this section we carry out a brief descriptive analysis of our data. Table 1 reports some basic data for the Spanish territorial units. The first column of the table displays the different *comunidades autónomas* (NUTS 2) and in the adjacent column, the *provincias* (NUTS 3), into which each *comunidad autónoma* is subdivided. The subsequent columns show some important variables at the beginning (1985) and the end (2005) of the studied period, enabling a better knowledge of the differences across provinces, and showing quite large disparities in some cases[22].

As noted in section 4.2, figure 1 depicts the decomposition of investment in its residential and non-residential components, and provides some rationale as to the importance of the double analysis developed, due to the relevancy of the non-residential component in most of the provinces.

Figures 2, 3 and 4 plot bivariate densities, estimated using nonparametric kernel smoothing, which is a popular tool for visualizing the distribution of data (see, for instance Silverman

[22] Note that the variables physical capital investment (total and non-residential) and public investment are provided in monetary terms instead of rates, as in the regression analysis. We prefer this option for the table because it allows for a better comparison of the magnitudes across provinces.

1986) [23]. All values have been 0-1 scaled, to ease comparisons. In the first case, when we jointly evaluate GDP per capita and social capital per capita, a positive relationship emerges. A remarkable amount of probability mass clusters along the 45-degree line, making this a high-density area and, pointing to positive relationship between GDP per capita and social capital per capita. We also found an isolated high-density area for higher values of GDP per capita, which corroborates this result for the richest provinces. Figures corresponding to investment, both total and non-residential, show a very similar pattern. A positive correlation and high densities around the mean appear for both cases. However, in this case, isolated high-density areas are not apparent.

We also provide maps in order to better understand how variables are distributed across Spanish provinces. Map 1 reveals that this is actually the case, as significant disparities exist within the Spanish territory. In 1985, the Mediterranean coastal regions, comprising some provinces of Catalonia (Tarragona, Barcelona and Girona), Valencian Community (especially València and Alacant), Murcia, Balearic Islands, as well as Zaragoza in the region of Aragon, some of the Northern regions (A Coruña in the region of Galicia, the Basque Country and Asturias), Sevilla and Málaga in the region of Andalusia and Madrid, had the highest levels of GDP per capita, whereas the rest of the country had lower levels. The pattern differs slightly for 2005, but remarkable differences across provinces persist. Specifically, the wealthier regions are located in the North and the Northeast part of the country, with the exception of Madrid.

[23] Specifically, they were estimated specifying a Gaussian kernel and the multivariate generalization of the plug-in bandwidth selector by Wand and Jones (1994), and implemented using the ks package for R (see Duong 2007).

TABLE 1: **Descriptive statistics for Spanish provinces, 1985-2005**

Region	Province	GDP per capita[a]		Private physical capital[b]		Private physical capital (non-residential)[b]		Public investment[b]		Population	
		1985	2005	1985	2005	1985	2005	1985	2005	1985	2005
Andalusia	Almería	7,550	15,330	710,204	2,740,018	369,453	1,825,803	139,415	357,079	430,069	612,315
	Cádiz	7,804	13,010	1,365,110	4,532,782	703,085	3,023,796	274,546	763,525	1,034,533	1,180,817
	Córdoba	7,043	11,070	820,859	2,410,765	514,528	1,862,800	207,220	548,778	741,582	784,376
	Granada	6,243	11,590	1,245,980	3,078,974	602,352	1,998,060	327,410	533,311	776,907	860,898
	Huelva	8,581	13,960	612,504	2,272,457	301,740	1,506,026	110,460	311,578	429,582	483,792
	Jaén	6,949	10,550	709,590	2,024,585	460,162	1,408,666	200,590	366,352	646,066	660,284
	Málaga	8,008	13,390	2,229,009	7,541,517	868,325	4,014,079	374,068	925,160	1,072,204	1,453,409
	Sevilla	7,597	13,160	1,954,017	6,702,257	1,037,225	4,888,329	435,952	835,515	1,542,752	1,813,809
Aragon	Huesca	10,905	16,810	541,352	1,705,614	383,475	1,046,041	152,944	277,149	212,937	215,864
	Teruel	10,472	17,760	359,153	967,757	269,409	815,867	90,669	300,966	151,006	141,091
	Zaragoza	10,168	18,420	1,620,467	4,530,717	1,069,562	3,430,601	297,180	706,192	837,727	912,072
Asturias	Asturias	8,973	14,750	1,840,294	4,686,708	1,442,251	3,135,047	318,698	1,013,603	1,124,646	1,076,635
Balearic Islands	Illes Balears	13,324	18,280	1,032,476	5,926,796	650,902	3,713,662	245,533	828,264	665,580	983,131
Canary Islands	Las Palmas	10,718	15,810	1,676,442	4,089,235	1,070,897	3,193,413	271,603	690,601	730,419	1,011,928
	Sta. C. de Tenerife	8,988	14,590	1,756,380	5,512,771	1,074,423	3,367,001	262,561	653,286	685,354	956,352
Cantabria	Cantabria	10,027	16,360	1,111,854	2,904,759	673,303	1,921,967	186,882	707,455	523,640	562,309
Castile and León	Ávila	7,539	13,440	297,323	752,477	185,600	542,461	90,487	151,371	181,565	167,032
	Burgos	11,909	19,330	891,089	2,246,669	530,420	1,441,889	115,957	361,784	361,872	361,021
	León	9,422	14,890	1,421,383	2,096,107	914,184	1,840,156	195,393	584,490	531,887	495,902
	Palencia	9,764	16,720	384,868	946,299	340,874	637,787	86,551	190,924	190,306	173,990
	Salamanca	7,655	14,140	621,404	1,512,273	507,488	901,996	164,953	341,011	366,367	352,414
	Segovia	10,189	17,460	300,672	1,034,366	198,484	692,543	67,069	266,586	149,749	155,517
	Soria	10,536	16,230	246,127	400,218	156,595	283,739	73,450	123,413	99,281	92,773
	Valladolid	10,372	18,100	892,359	2,470,537	631,953	1,825,826	147,273	445,883	491,911	514,674
	Zamora	7,773	12,910	415,005	799,689	303,497	551,533	95,979	170,479	224,498	198,045

TABLE 1 *(cont.):* **Descriptive statistics for Spanish provinces, 1985-2005**

Region	Province	GDP per capita[a]		Private physical capital[b]		Private physical capital (non-residential)[b]		Public investment[b]		Population	
		1985	2005	1985	2005	1985	2005	1985	2005	1985	2005
C.-La Mancha	Albacete	7,600	12,610	412,674	1,622,143	269,041	1,334,066	121,612	302,928	342,768	384,640
	Ciudad Real	7,897	13,150	813,625	2,087,364	479,829	1,412,041	159,747	371,372	479,256	500,060
	Cuenca	7,414	12,990	327,427	958,033	253,039	853,040	115,482	327,880	214,622	207,974
	Guadalajara	9,492	14,680	276,865	1,214,615	208,738	747,728	77,132	466,372	146,104	203,737
	Toledo	8,295	13,440	808,405	3,258,054	493,077	2,309,667	140,191	696,617	483,733	598,256
Catalonia	Barcelona	10,941	19,860	6,078,015	24,876,603	4,962,312	17,751,762	984,079	2,668,053	4,461,185	5,226,354
	Girona	12,742	19,950	1,859,843	4,107,277	794,235	2,593,299	159,623	466,700	480,939	664,506
	Lleida	12,303	19,490	738,945	2,201,314	585,722	1,468,780	150,015	390,917	355,331	399,439
	Tarragona	14,337	20,110	1,831,663	6,197,371	1,133,040	3,196,789	235,779	527,957	525,942	704,907
Valencian C.	Alacant	9,798	14,450	3,044,543	7,646,879	1,036,961	4,286,020	408,446	885,462	1,207,292	1,739,389
	Castelló	11,160	18,130	833,327	2,717,139	462,700	1,985,540	143,925	372,765	439,108	543,432
	València	9,751	15,290	2,754,498	9,866,996	1,766,609	6,871,262	547,515	1,562,106	2,091,526	2,416,628
Extremadura	Badajoz	5,595	11,560	1,054,138	2,000,653	680,113	1,582,951	279,507	589,369	653,414	671,299
	Cáceres	7,090	11,590	909,945	1,857,649	627,879	1,120,060	145,631	435,852	422,285	412,580
Galicia	A Coruña	9,105	14,400	1,998,946	5,220,250	1,328,368	3,625,406	366,440	1,008,110	1,100,896	1,126,707
	Lugo	8,889	13,270	748,892	1,342,710	567,804	945,050	200,223	268,165	401,690	357,625
	Ourense	7,302	12,090	678,495	1,213,252	460,553	883,513	159,815	306,094	403,489	339,555
	Pontevedra	8,334	13,550	1,413,538	3,526,668	879,861	2,429,082	241,702	671,329	896,355	938,311
Madrid	Madrid	12,770	22,120	8,390,965	34,926,663	5,633,038	23,942,998	1,382,975	5,087,283	4,810,015	5,964,143
Murcia	Murcia	9,056	13,810	1,608,605	5,861,135	854,005	4,057,558	247,860	1,022,518	997,149	1,335,792
Navarre	Navarra	12,814	21,450	882,062	3,915,349	674,644	2,775,697	239,767	453,661	516,918	593,472
Basque Country	Álava/Araba	15,539	23,780	684,908	2,015,551	509,142	1,387,599	102,529	187,317	266,527	299,957
	Guipúzcoa/Gipuzkoa	12,379	21,740	1,056,681	3,813,429	892,246	2,480,161	325,743	405,325	696,000	686,513
	Vizcaya/Bizkaia	12,239	20,970	2,173,846	6,368,429	2,024,123	4,622,732	533,014	927,447	1,189,955	1,136,181
La Rioja	La Rioja	11,195	18,460	490,859	1,825,959	330,550	1,259,599	103,622	226,491	260,118	301,884 0.16

[a] In (€). Deflated using 2000 as the base year.

[b] In thousands (€). Deflated using 2000 as the base year.

FIGURE 2: **GDP per capita *vs*. social capital. Bivariate kernel density estimation, 1985-2005**

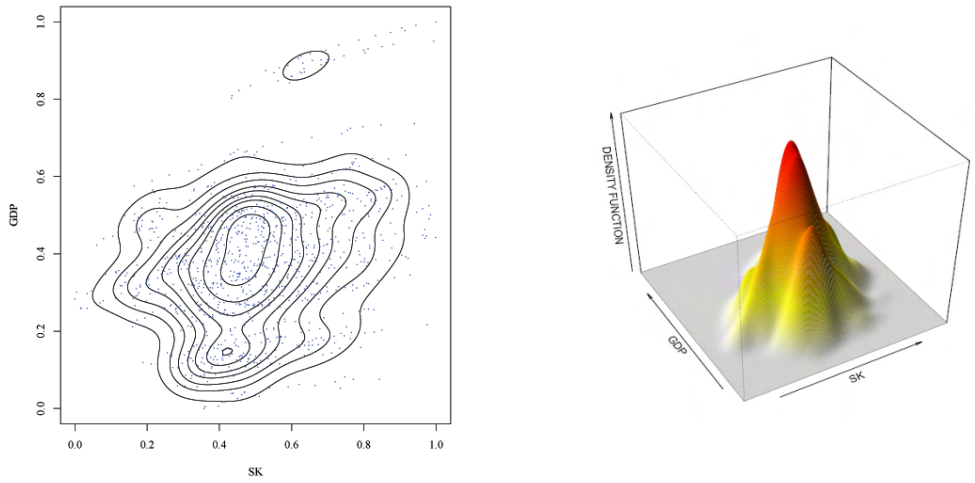


FIGURE 3: **Total physical capital investment *vs*. social capital. Bivariate kernel density estimation, 1985-2005**

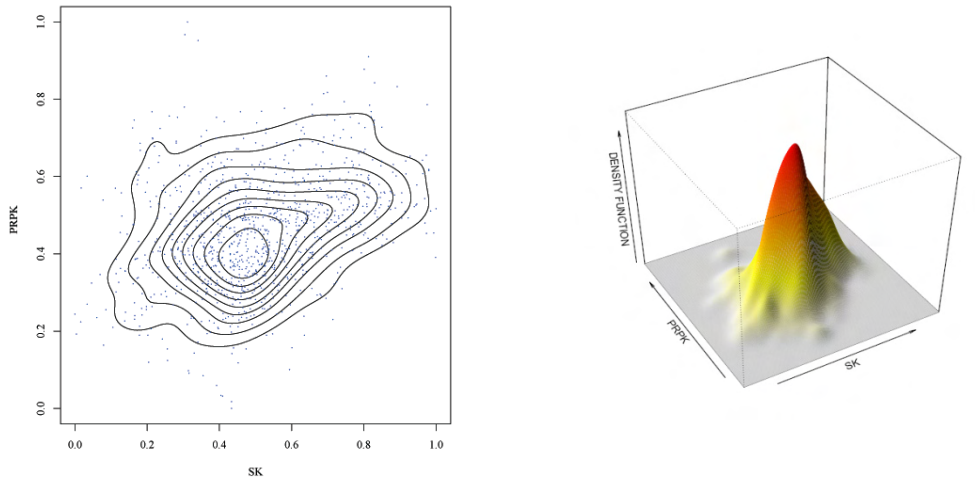
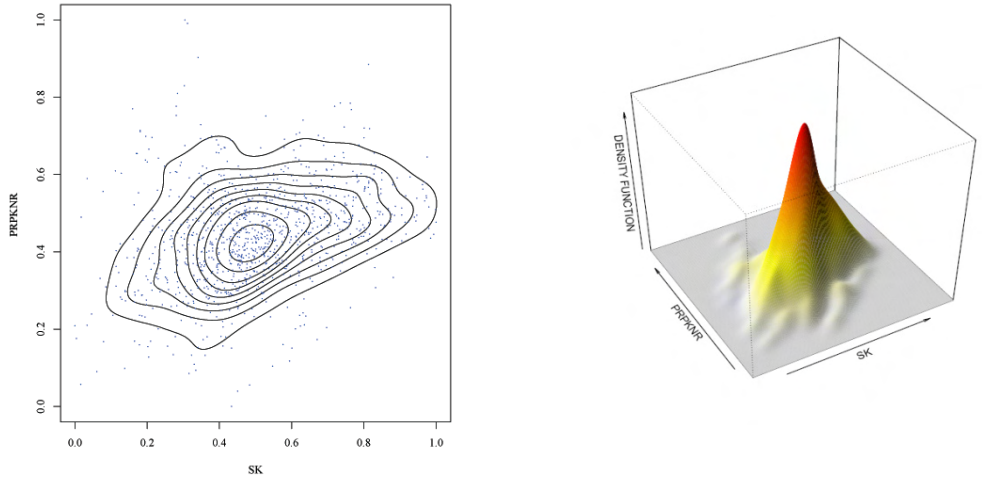


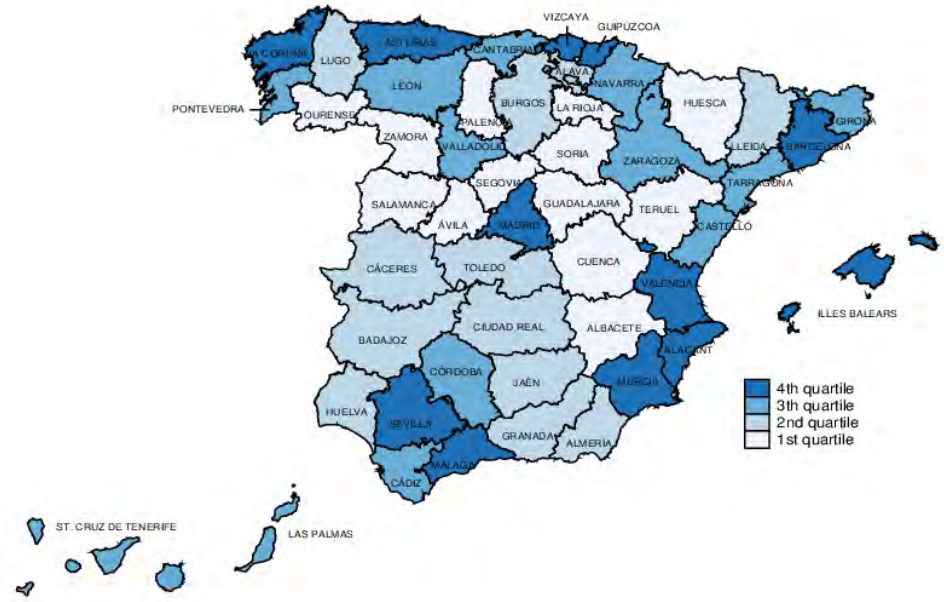
FIGURE 4: **Non-residential physical capital investment *vs.* social capital. Bivariate kernel density estimation (1985–2005)**



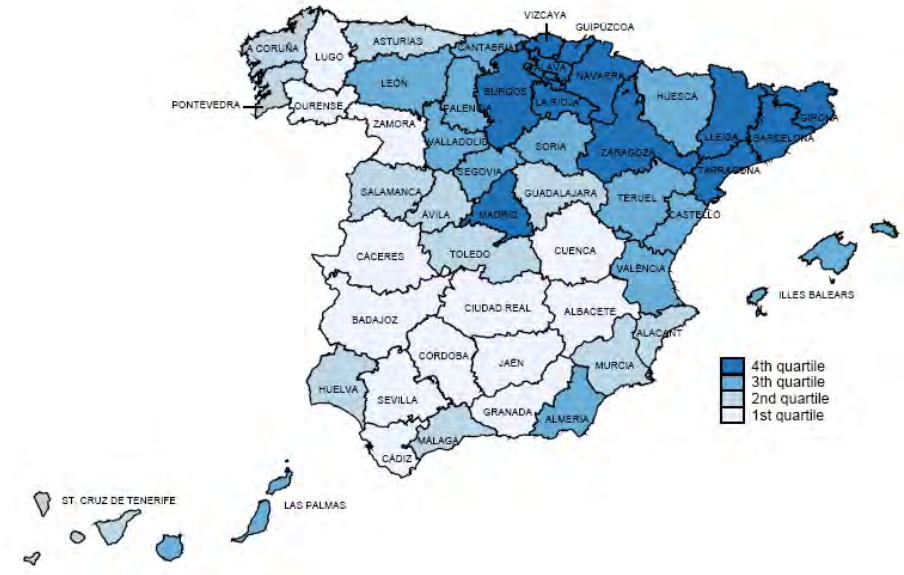
Focusing on the stock of social capital, map 2 depicts how the largest quantities in 1985 correspond to Madrid, part of Catalonia (Barcelona, Girona and Lleida) and Northern provinces such as Cantabria, some coastal provinces of the Basque Country and all provinces of Galicia (A Coruña, Lugo, Pontevedra and Ourense), together with Balearic Islands. The differences are specially noticeable if we compare the Northern and the Southern provinces. The map for the year 2005, reveals the notable shift of the largest social capital stocks to the Northeast part of the country. Social capital decreases markedly in Galicia and Asturias while in the region of Valencian Community (Castelló, València and Alacant), Guadalajara (in the region of Castile-la Mancha), La Rioja and finally, Zaragoza (in the region of Aragon), stock of social capital per capita increased.

MAP 1: GDP per capita by provinces

a) 1985

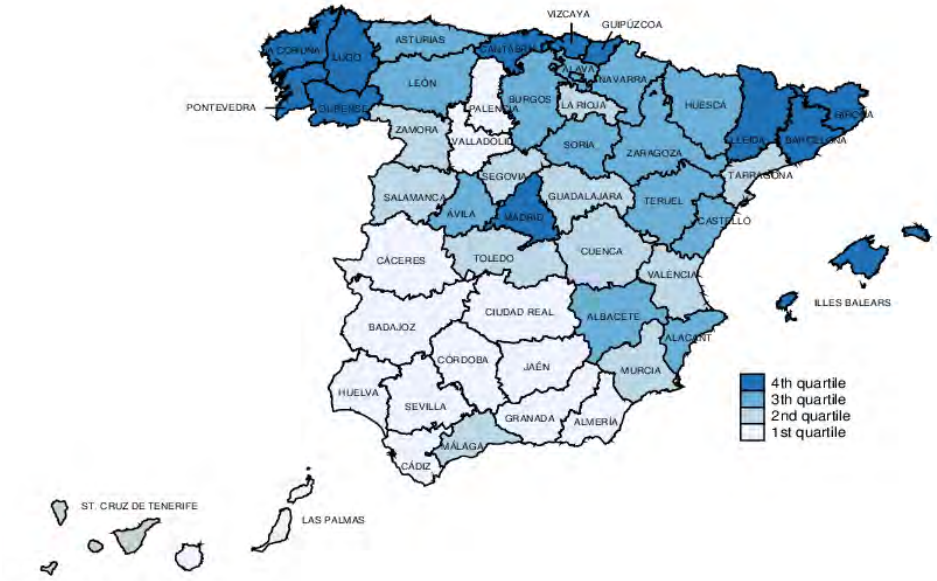


b) 2005

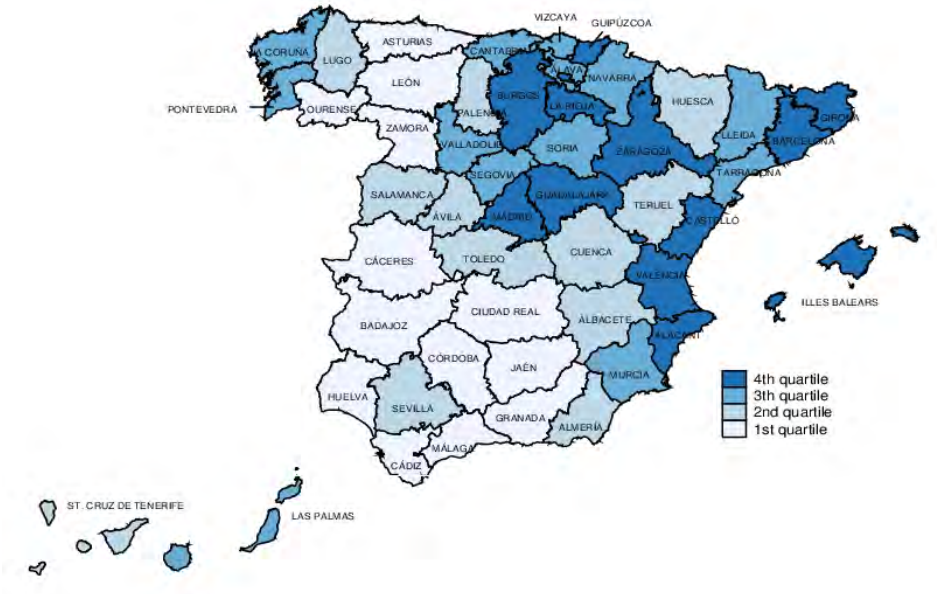


MAP 2: Social capital per capita by provinces

a) 1985



b) 2005



This section provides a preliminary picture of the distribution and behavior of our data. Kernel density graphs exhibit positive relationships between social capital and both GDP per

capita and investment (total and non-residential). Furthermore, in light of what the maps reveal, one may infer similar patterns in changes in GDP per capita and social capital. In 2005, the polarization among the Spanish provinces is evident, with the Northeast provinces presenting higher levels of both social capital per capita and GDP per capita.

6. Results

6.1. Social capital and growth

In this part of the paper we perform a regression analysis that includes the variables defined in section 4.1. We take the data as averages of five-year periods. Studies such as Islam (1995) broadly discussed this consideration and concluded that when working with panel data in the field of economic growth, using yearly data is not recommended because of the high volatility of growth rates, although it considerably reduces the number of observations. The common approach in the literature is the construction of five-year averages. Since we have data for the 1985-2005 period, they will be disaggregated in four periods, namely, 1985-1990, 1990-1995, 1995-2000 and 2000-2005. With such an aggregation we will be leading with 200 observations. We test for potential specification problems[24]. Table 2 provides the results of these tests.

In order to control for unobservable heterogeneity, we use fixed effects by province. We test its suitability using the Hausman test. Because the standard Hausman test does not work properly under the specification problems referred to above, we adopt the refinement proposed by Wooldridge (2002), which provides valid statistical inference for these particular circumstances. Results corroborate that fixed effects are indeed important, and contributions such as Islam (1995) have largely supported their adequacy in cross-country or cross-region economic growth studies.

[24] We tested for heteroskedasticity, using the modified Wald test considering Greene and Zhang's (2003) suggestion, which makes the test work properly under the assumption that errors are non-normally distributed. Serial autocorrelation is tested with Wooldridge's (2002) autocorrelation test and finally, Pesaran's (2004) spatial autocorrelation test allows for testing whether our data suffer from cross-sectional dependence. For all three tests we reject the null hypothesis of no specification problem and, therefore, we carry out the estimations by resolving the mentioned problems in order to provide valid statistic inference.

In this paper we also consider some modifications in the estimation techniques usually disregarded in the analysis of Spanish regional data. Whereas heteroskedasticity, endogeneity or individual fixed effects are topics broadly discussed in the literature, when dealing with spatial observations it is particularly important to handle carefully the issue of spatial heteroskedasticity and autocorrelation. Anselin (1988) made this point forcefully more than two decades ago, and the number of contributions published since then, following his initial ideas, is already quite substantial. Many of these contributions, though, were designed for cross-sectional data. In our case, however, we are dealing with panel data, for which the number of alternatives is substantially lower. Driscoll and Kraay (1998) initially stressed the importance of the issue, indicating that ignoring cross-sectional correlation in the estimation of panel data models can lead to severely biased statistical results. However, in the case of studies analyzing regional growth and convergence in Spain, this question has been largely overlooked, despite its importance. In this paper we will also attempt to fill this gap in the literature.

Therefore, our empirical strategy initially consisted of testing for spatial correlation, using Pesaran test, which led us to reject the null hypothesis of no-correlation, as shown in table 2, and then estimating the model using Driscoll and Kraay's (1998) standard errors. These results, reported in table 3, provide robust standard deviations in presence of heteroskedasticity and both serial and *spatial* correlation, instead of the more usual White-robust standard errors, which only correct for heteroskedasticity.

TABLE 2: **Specification tests**

Test	Model 1 (dependent variable: *GGDP)*	Model 2 (dependent variable: *PRPK*)	Model 3 (dependent variable: *PRPKNR*)
Fixed effects Hausman test	212.53***	5.24***	3.11***
Heteroskedasticity Wald test	10,786.40***	983.23***	719.98***
Serial autocorrelation Wooldridge test	12.15***	71.10***	47.65***
Spatial autocorrelation Pesaran test	14.57***	8.35***	15.34***

*, ** and *** indicate significance at 10%, 5%, and 1% significance levels, respectively.

TABLE 3: **Determinants of economic growth for Spanish provinces, 1985-2005**

	Dependent variable: GGDP		
	Model 1[a] (OLS)	**Model 2[a] (OLS)**	**Model 3[b,c] (2SLS)**
(Intercept)	5.956***	6.675***	6.090***
	(1.306)	(1.438)	(2.164)
GDP_0	-0.936***	-0.978***	-0.870***
	(0.165)	(0.167)	(0.157)
NGS	-0.129	-0.185***	-0.590***
	(0.090)	(0.075)	(0.118)
PRPK	0.135***	0.125***	0.109*
	(0.014)	(0.015)	(0.059)
PLPK	-0.109***	-0.106***	-0.083***
	(0.037)	(0.033)	(0.032)
HK	1.078***	1.019***	0.898***
	(0.193)	(0.173)	(0.169)
SK		0.029***	0.117**
		(0.010)	(0.059)
N	200	200	150
F	497.23***	22.72***	544.84***
R^2 (within)	0.69	0.70	0.63

*, ** and *** denote significance at 10%, 5%, and 1% significance levels, respectively.

[a] OLS regressions with Driscoll and Kraay's (1998) standard errors in brackets.

[b] 2SLS regression with robust standard errors in brackets. Variable SK instrumented using SK_{-1}.

[c] The use of lagged values of SK as an instrument generates the loss of 50 observations.

In addition, we also perform a two stage least squares (2SLS) regression with instrumental variables to control for the possibility of endogeneity. As an instrument for social capital, we use its own lagged value (one period lag). As several authors note (Temple 1999; Dearmon and Grier 2009), among others, using lags of one variable as instruments for its current value is a valid strategy when there is not a long list of likely instruments to choose from.

All results are reported in table 3. The columns correspond to models for which different types of regressions are performed. The first two models correspond to ordinary least squares (OLS) regressions, where the social capital variable is introduced sequentially —it is included in the second model only.

Results generally support the hypothesis that the variable of interest, social capital (*SK*), has a positive and significant impact on growth. Specifically, a 10% increase in per capita levels of social capital yields a 0.29% increase in growth. This impact is relatively modest in comparison with the coefficients shown by physical capital or human capital, whose coeffi-

cients are higher in all regressions. This result is not surprising, given that physical and human capital are expected to have a more *direct* impact on growth, but social capital impact might be more *indirect* and it could be channeled in other ways.

This positive impact is in accordance with previous studies using country-level data such as Knack and Keefer (1997), Zak and Knack (2001), Whiteley (2000) and, more recently, Neira et al. (2010), or data for European regions (Beugelsdijk and Van Schaik 2005), although the magnitude of the coefficient is not directly comparable because the approach and the proxy variables used differ.

When potential endogeneity is controlled for by conducting a 2SLS instrumental variables regression, conclusions are analogous to standard OLS regressions, but in this case the effect of social capital is higher (1.2% increase in growth as a response to 10% increase in social capital), comparable with the effect of physical capital, and its significance drops until 5%.

The rest of variables considered in the model are also mostly significant throughout at the 1% level. This is the case of the initial level of GDP (GDP_0), whose sign is negative according to the *Neoclassical growth model* and represents the well-known β *conditional* convergence effect, which implies that poorer provinces are converging faster with their own steady state, rather than with the richest provinces. The growth of population plus the fixed value 0.05, the last component capturing depreciation and technology advance (*NGS*), also has a negative and significant coefficient, although this effect only exists for the most comprehensive models (models 2 and 3), both of which include social capital. Finally, the variable measuring public physical investment (*PLPK*) also has a negative and significant (at the 1% level) effect, in contrast to some previous contributions for the Spanish case such as Peña Sánchez (2008) —although their study focuses on NUTS 2 (regions) instead of NUTS 3 (provinces). However, some relevant country-level studies such as, for instance, Grier and Tullock (1989), or Barro (1991), have also found a negative impact.

What seems to be clear is that social capital matters for explaining the disparities across Spanish provincial growth profiles. By factoring in this variable it is possible to take a step further towards understanding why some of the inequalities in GDP per capita observed across the Spanish territory still persist.

6.2. Social capital and investment

In order to test the impact of social capital on private physical capital investment, both total and non-residential, we now estimate the models presented in section 4.2. Once more, the availability of data for all years of the period analyzed allows us to construct a balanced panel dataset. One of the great problems scholars face when dealing with panel data in the field of economic growth is the shortage of observations derived from the aggregation of the data, as we did in the previous section. However, on this occasion data will not be aggregated in five-year periods because there is no evidence to suggest that such an aggregation may be more appropriate for measuring the determinants of investment, since investment rates are quite stable over time. Therefore, we will use yearly data, obtaining a larger sample of 1,050 observations, although the final sample was actually slightly smaller because some of the variables included in the analysis are lagged (one period), as presented in section 4.2.

As indicated in the previous section, fixed effects is an issue to control for. Heteroskedasticity, serial and spatial autocorrelation tests indicate that we can reject the hypothesis of no specification problems (see table 2). In order to provide valid statistical inference, results are also estimated using Driscoll and Kraay's standard errors. Once more, in order to control for the potential endogeneity of social capital, we perform a two stage least squares (2SLS) regression, using as an instrument for social capital its own lagged value (one period). Table 4 reports the estimation results.

We find a positive and significant (1% level) relationship between social capital and investment, for both total investment and non-residential investment. Specifically, when the variable considered is total investment, an increase of 10% in social capital corresponds to a 1.1% increase in investment and, for the case of non-residential investment, the same increase in social capital reflects a 0.81% increase in non-residential

TABLE 4: **Social capital and physical investment, 1985-2005**

	Dependent variable: *PRPK*			Dependent variable: *PRPKNR*		
	Model 1[a] (OLS)	**Model 2[a] (OLS)**	**Model 3[b] (2SLS)**	**Model 1[a] (OLS)**	**Model 2[a] (OLS)**	**Model 3[b] (2SLS)**
(Intercept)	-1.844***	0.466	0.373	-2.090***	-0.395	-0.677*
	(0.426)	(0.682)	(0.370)	(0.432)	(0.739)	(0.386)
R	-0.057***	-0.022***	-0.024***	-0.049***	-0.023*	-0.025**
	(0.011)	(0.008)	(0.009)	(0.010)	(0.013)	(0.011)
$GGDP_{-1}$	0.531**	0.345**	0.353**	0.525**	0.389***	0.400***
	(0.201)	(0.135)	(0.143)	(0.199)	(0.142)	(0.141)
INF_{-1}	-0.044	-0.045***	-0.045***	-0.048*	-0.048*	-0.048***
	(0.030)	(0.016)	(0.014)	(0.027)	(0.025)	(0.015)
$PLPK_{-1}$	0.164***	0.152***	0.152***	0.195***	0.186***	0.187***
	(0.027)	(0.022)	(0.017)	(0.028)	(0.024)	(0.019)
HK	0.364*	-0.800	-0.060	0.353*	0.028	0.055
	(0.189)	(0.183)	(0.092)	(0.188)	(0.210)	(0.094)
SK		0.110***	0.105***		0.081***	0.074***
		(0.024)	(0.016)		(0.026)	(0.019)
N	1,000	1,000	1,000	1,000	1,000	1,000
F	84.22***	156.69***	2024.18***	36.74***	77.60***	1598.45***
R^2 (within)	0.36	0.40	0.62	0.33	0.36	0.63

*, ** and *** denote significance at 10%, 5%, and 1% significance levels, respectively.

[a] OLS regressions with Driscoll and Kraay's (1998) standard errors in brackets.

[b] 2SLS regressions with robust standard errors in brackets. Variable SK instrumented by SK_{-1}.

The estimations via 2SLS lead to analogous conclusions. The regression results allow us to evaluate other important relationships. As expected, the real interest rate coefficient (R) is negative and significant in all instances, a result in accordance with previous findings in the literature such as Zak and Knack (2001) or Knack and Keefer (1997). The lagged value of growth ($GGDP_{-1}$) and the lagged value of public investment ($PLPK_{-1}$) have a positive impact on private investment and are all highly significant. However, the positive impact that we find for public investment contrasts with Dearmon and Grier's (2011) findings, and also with our own results reported in the previous section (table 3). This can be interpreted as further evidence on the *ambiguity* of public capital, since it affects private investment *positively*, as shown in table 4, but economic growth *negatively*, as shown in table 3.

The lagged value of inflation (INF_{-1}) is significant in all cases, except when total investment is considered but social capital is not. Its effect is negative for all regressions, a result which contrasts with the findings of Dearmon and Grier (2011). Barro (1996) found that inflation only affects investment and growth when high-inflation countries are included in the sample, although there is no broad consensus on this matter (Temple, 2000). In our case, results are in line with Pindyck and Solimano (1993), who concluded that high inflation implies higher economic uncertainty, reducing the levels of investment. Finally, human capital (HK) shows an unexpected pattern. It is positive and significant if social capital is not included in the model but when it is included, it becomes non-significant, casting some doubts about the possible spillover effects of human capital.

In this part of the paper we have highlighted the fact that social capital is one of the elements contributing to explaining the heterogeneity of private physical capital investment patterns across Spanish provinces. There is no previous evidence in this respect for the Spanish case and, therefore, comparison with previous results is unfeasible. Our results are, however, in line with those encountered in other cross-country studies such as Hall and Jones (1999) and, more recently, Zak and Knack (2001) or Dearmon and Grier (2011).

In general, there is a broad consensus across studies about the positive effects of physical capital on growth. Our results are aligned with these findings, thus the growth patterns of the different provinces depend, among other factors, on their ability to attract investment, which can generate more activity, employment and wealth. Linked to that idea, the results of the second stage of the paper suggest that the differences in social capital

endowments among provinces may be one of the factors which contribute to explaining the large disparities in terms of income per capita growth during the period analyzed.

6.3. Robustness analysis

In order to test the robustness of our results, we perform a bootstrap estimation, which is a common nonparametric resampling procedure. It assumes that the sample is the population and runs a great number of different regressions using several sub-samples with replacement. We perform 400 repetitions, a high enough number to estimate standard errors according to the literature (Andrews and Buchinsky 2000). Standard errors are constructed as the mean standard deviation of the 400 standard deviations calculated. table 5 reports the results for all three regressions.

When the bootstrap is applied to Model (1) (first column of table 5), where (*GGDP*) is the dependent variable, all variables remain significant, although the significance of social capital is eroded (from 1% to 10%). However, when the bootstrap is applied to Models (2) and (3) (columns two and three), where (*PRPK*) and (*PRPKNR*) were the dependent variables, the real interest rate, which was significant in the previous analysis (non-bootstrapped) is now non-significant. The rest of the variables show small changes in significance but all remain significant and the conclusions we can draw are exactly the same. Our variable of interest, social capital, remains highly significant (1% level). These results would broadly corroborate the hypothesis that the positive effects of social capital on growth and investment are not driven by a particular sample, since results remained basically unaltered.

TABLE 5: **Robustness analysis (bootstrap estimations), 1985-2005**

Coefficient	Model 1[a] (OLS, bootstrapped)	Model 2[a] (OLS, bootstrapped)	Model 3[a] (OLS, bootstrapped)
Intercept	6.675***	0.466	-0.395
	(0.603)	(0.752)	(0.640)
GDP_0	-0.978***		
	(0.055)		
NGS	-0.185***		
	(0.070)		
PRPK	0.125***		
	(0.047)		
PLPK	-0.106***		
	(0.028)		
HK	1.019***	-0.800	0.028
	(0.066)	(0.188)	(0.156)
R		-0.022	-0.023
		(0.015)	(0.016)
$GGDP_{-1}$		0.345**	0.389**
		(0.161)	(0.171)
INF_{-1}		-0.045***	-0.048**
		(0.017)	(0.019)
$PLPK_{-1}$		0.152***	0.186***
		(0.022)	(0.020)
SK	0.029*	0.110***	0.081***
	(0.017)	(0.031)	(0.030)
N	200	1,000	1,000
χ^2	548.91***	220.96***	313.69***
R^2 (within)	0.70	0.40	0.36

*, ** and *** indicate significance at 10%, 5%, and 1% significance levels, respectively.
[a] Standard errors are calculated by performing 400 bootstrap replications.

7. Concluding Remarks

SPANISH provinces have historically presented considerable disparities in terms of GDP per capita and growth patterns. Although differences declined significantly during the 1955-1980 period, and the conclusions hinge upon the variable considered (income per capita, labor productivity, capital intensity or total factor productivity), the literature has reached a consensus that convergence had come to a halt by the end of the 1980s.

Although several factors contribute to explaining the differing growth and convergence patterns among provinces, there is an relevant variable whose importance has been overlooked by most of the literature, namely, social capital. This importance has been stressed by an increasing number of contributions which have attempted, among other things, to determine whether social capital has an impact on economic growth.

In the particular case of the Spanish territorial units, data on social capital have only been made available recently. The availability of a new database, which provides data for the period 1983-2005 not only for Spanish regions and provinces but also for a broad sample of countries, enabled us to include social capital in our study for the Spanish provinces and to analyze its role with some precision.

As mentioned throughout the study, an important feature of the social capital measure we use is that it is not only available for both a higher degree of disaggregation and a wider time span than other measures based on more frequently used surveys, but it also solves some of the problems highlighted by the literature in terms of measure, aggregation and how it is constructed —apart from the elements it comprises.

According to our results, social capital has a positive influence on growth for Spanish provinces, corroborating the importance of this variable found in previous research studies. This would support its importance as an additional factor to control for when analyzing the differences presented by Spanish provinces in terms of GDP per capita. Therefore, if social capital is one of the mechanisms to achieve higher economic performance, policies should aim to generate greater endowments of social capital in those provinces where this *asset* is relatively scarcer.

Our results also indicate that social capital is important to foster investment. We report evidence that investment may be one of the candidate channels through which social capital impacts on growth. This evidence is new for the case of Spain. Furthermore, the huge importance of the construction sector in Spain, especially in second half of the analyzed period (1995-2005), leads us to decompose the physical capital investment variable to gain a closer look at the residential component. Results indicate that the effects of social capital are slightly lower when we detach the latter component.

Therefore, investment is not only a relevant factor in itself for explaining economic growth, but also an activity for which trust is essential. It is well-documented that borrowing is crucial for investment activities. According to our results, the presence of social capital in a

given society or region impacts positively on these types of activities, by making them easier and cheaper. The theory of social capital claims it is important, among other issues, due to its ability to reduce transaction costs. As indicated by the relationship banking literature, if banks can save costs in monitoring and supervising the reliability of their clients, then clients can obtain cheaper credit. So, in the current economic context in which the flow of credit has slowed dramatically in recent years, social capital might be an additional instrument to help restore the pre-crisis levels of credit and thereby foster growth once again.

8. Appendix A. An Economic Approach to Measuring Social Capital. Some Basic Ideas

THE social capital measure we use, provided by the BBVA Foundation and the Ivie, and explained in detail by Pérez et al. (2006, 2005) is based on three initial hypothesis:

1) Cooperation in a society is favored by the economic incentives derived from a higher expected incomes, resulting from continuous growth.
2) The incentives for cooperation are reinforced/weakened by two factors:
   - The effective opportunity of participation in final incomes.
   - The culture of reciprocity fulfillment.
3) The effects of cooperation are increased in societies with a high density network.

The investment in social capital is denoted by I_s. A member in a given society invests in social capital if the expected benefits of cooperation are positive (i.e. if $I_s > 0$). If the economy follows a continuous growth trend, the income achieved is higher than the simple replacement of the production factors and, moreover, the results increase over time, i.e.:

$$y > rk + \overline{w} \tag{4}$$

where y is the income, rk is the cost of the physical capital and $\overline{w}$ correspond to the price of labor.

Other assumptions of this approach are:

- Individuals observe the difference in the incomes that they obtain under certain time and place conditions and other less favorable conditions.
- This difference determines the incentives for cooperation and trust (investment in social capital).

An individual incurs two types of costs to obtain incomes:

- Cost of contribution with productive resources (we expect a return equal to the replacement costs).
- Cost in terms of effort of cooperation inside an incomplete information environment. The cost of cooperation includes both time and psychic costs.

Following the above statements, the benefits would be expressed as:

$$\pi = y - (rk + \overline{w}) - \overline{w}C(I_s) \tag{5}$$

where $C(I_s)$ is the cost of cooperation measured in terms of wages.

If a given individual *owns* social capital, she/he would expect to obtain additional income using it for her/his economic transactions. The T horizon defines her/his expectations according to the length of her/his economic links inside a particular society, or network. If her/his expectations are not fulfilled, her/his social capital will be depreciated at ρ rate.

In a given moment, our representative individual invests in social capital if,

$$\pi = \sum_{t=0}^{T} \frac{1}{(1+\rho)^t} (y_t(1-G) - rk_t - \overline{w}_t(1+C(I_{st}))) > 0 \tag{6}$$

where $(1 - G)$ is the Gini coefficient which measures the inequality in the society.

The next step is to focus on the services that social capital provides (*fks*). The ability of social capital to contribute to an increase of total output depends on its capacity for generating services, i.e. a reduction in transaction costs.

$$fks_i = c_i ks_i \tag{7}$$

where c_i is the *degree of connection* of the network and ks_i is the social capital stock for the i individual. If a given individual is perfectly *connected* (to this network), it would imply that $c_i = 1$ and then the contribution of social capital would be maximum. The opposite would hold for $c_i = 0$. The economic value of the services of social capital is defined in terms of its use cost u_i:

$$u_i = \rho_i + d_i \tag{8}$$

where ρ_i is the financial opportunity cost, and d_i is the depreciation cost.

Therefore, the value of the *services* of social capital can be expressed as:

$$vks_i = u_i fks_i = (\rho_i + di)c_i ks_i \tag{9}$$

The final step is the *aggregation* of the individuals' social capital. Services cannot be directly added because of their varying nature. Therefore, authors follow a multiplying process, weighting each social capital unit by its own use cost weighted with respect to the total use cost. The weight is calculated as:

$$v_i = \frac{vks_i}{\sum_{j=1}^{N} vks_j} \tag{10}$$

And, finally, the services of social capital are aggregated as follows:

$$KS = N\prod_{i=1}^{N} fks_i^{vi} = N\prod_{i=1}^{N} c_i^{vi} ks_i^{vi} \tag{11}$$

9. Appendix B. Variables and Data Sources

- *GGDP*: real GDP per capita growth. This corresponds to the difference, in logarithms, between the final and the initial value of each five-year period. The GDP is measured in euros, and it has been deflated using 2000 as the base year. [*Source*: Spanish Bureau of Statistics (Instituto Nacional de Estadística, INE)].
- GDP_0: real GDP per capita in the first year of each five-year period. [*Source*: INE].
- *PRPK*: private physical capital investment, measured as a percentage of GDP, deflated using 2000 as the base year. [*Source*: BBVA Foundation and INE].
- *PRPKNR*: private physical capital investment, detracting the residential component as a percentage of GDP, deflated using 2000 as the base year. [*Source*: BBVA Foundation and INE].
- *PLPK*: public physical capital investment as a percentage of GDP, deflated using 2000 as the base year. [*Source*: BBVA Foundation and INE].
- *NGS*: total population growth plus a fixed component equal to 0.05. The latter represents depreciation and technological advance. [*Source*: Spanish Bureau of Statistics (Instituto Nacional de Estadística, INE)].
- *HK*: years of education of the working population. [*Source*: Ivie].
- *SK*: stock of social capital per capita services. The data come from the BBVA Foundation and Ivie's (1964-2001) database, updated until 2005. Both series were merged using Spain (1983 = 100) as the base year. [*Source*: BBVA Foundation and Ivie].
- *INF*: consumer Price Index (CPI) variation. The CPI series are homogenized (year 2001 = 100). [*Source*: INE].
- *R*: real interest rate. [*Source*: INE].

10. References

Akçomak, I. and Ter Weel, B. (2009): 'Social capital, innovation and growth: Evidence from Europe'. *European Economic Review* 53 (5), 544-567.

Andrews, D. and Buchinsky, M. (2000): 'A three-step method for choosing the number of bootstrap repetitions'. *Econometrica* 68 (1), 23-51.

Anselin, L. (1988): *Spatial Econometrics*. Dordrecht: Kluwer.

Barro, R. (1991): 'Economic growth in a cross section of countries'. *The Quarterly Journal of Economics* 106 (2), 407.

——— (1996): 'Inflation and growth'. *Proceedings*, Federal Reserve Bank of Saint Louis, 78 (May): 153-169.

Becattini, G. (1979): 'Dal settore industriale al distretto industriale. alcune considerazioni sullunità di indagine delleconomia industriale'. *Rivista di Economia e Politica Industriale* 5 (1), 7-21.

Beugelsdijk, S. and Van Schaik, T. (2005): 'Social capital and growth in European regions: an empirical test'. *European Journal of Political Economy* 21 (2), 301-324.

Brock, W.A. and Durlauf, S.N. (2001): 'What have we learned from a decade of empirical research on growth? Growth empirics and reality'. *The World Bank Economic Review* 15 (2), 229-272.

Ciccone, A. and Jarocinski, M. (2010): 'Determinants of economic growth: will data tell?' *American Economic Journal: Macroeconomics* 2 (4), 222-246.

Coleman, J. (1988): 'Social capital in the creation of human capital'. *American Journal of Sociology*, pages 95-120.

Crespo-Cuaresma, J., Foster, N., and Stehrer, R. (2011): 'Determinants of regional economic growth by quantile'. *Regional Studies* 45 (6): 809-826.

Dasgupta, P. and Serageldin, I. (2001): *Social capital: A Multifaceted Perspective*. Washington, D.C.: World Bank Publications.

De la Fuente, A. (2002): 'On the sources of convergence: A close look at the Spanish regions'. *European Economic Review* 46 (3), 569-599.

Dearmon, J. and Grier, R. (2009): 'Trust and development'. *Journal of Economic Behavior & Organization* 71 (2), 210-220.

Dearmon, J. and Grier, R. (2011): 'Trust and the accumulation of physical & human capital'. *European Journal of Political Economy* 27 (3), 507-519.

Driscoll, J.C. and Kraay, A.C. (1998): 'Consistent covariance matrix estimation with spatially dependent panel data'. *Review of Economics and Statistics* 80 (4), 549-560.

Duong, T. (2007): 'ks: Kernel density estimation and kernel discriminant analysis for multivariate data in R'. *Journal of Statistical Software* 21 (7), 1-16.

Durlauf, S. (2002): 'On the empirics of social capital'. *The Economic Journal* 112 (483), 459-479.

Durlauf, S.N. and Fafchamps, M. (2005): 'Social capital'. In P. Aghion and S.N. Durlauf, eds. *Handbook of Economic Growth*. Amsterdam: North-Holland, volume 1B, chapter 26, 1639-1699.

Durlauf, S.N., Kourtellos, A., and Tan, C.M. (2008): 'Are any growth theories robust?' *The Economic Journal* 118 (527): 329-346.

Escribá, J. and Murgui, M. (2011): 'Determinantes regionales de la productividad total de los factores en la economía española (1995-2008): Un enfoque dinámico'. Working Paper No. 2011-01, Madrid: Dirección General de Presupuestos, Ministerio de Economía y Hacienda y FEDER.

Fukuyama, F. (1995): 'Social capital and the global economy: A redrawn map of the world'. *Foreign Affairs* 75 (4).

Glaeser, E., Laibson, D., and Sacerdote, B. (2000): 'An economic approach to social capital'. *The Economic Journal* 112, 437-458.

Goerlich, F. and Mas, M. (2001): *La Evolución Económica de las Provincias Españolas: 1955-1998*. Bilbao: Fundación BBVA.

Goerlich, F., Mas, M., and Pérez García, F. (2002): 'Concentración, convergencia y desigualdad regional en España'. *Papeles de Economía Española* 93 (2002): 17-36.

Granato, J., Inglehart, R., and Leblang, D. (1996a): 'Cultural values, stable democracy, and economic development: A reply'. *American Journal of Political Science* 40 (3): 680-696.

_____ (1996b): 'The effect of cultural values on economic development: theory, hypotheses, and some empirical tests'. *American Journal of Political Science* 40 (3): 607-631.

Greene, W. and Zhang, C. (2003): *Econometric Analysis*. Volume 5, Upper Saddle River, NJ: Prentice Hall.

Grier, K. and Tullock, G. (1989): 'An empirical analysis of cross-national economic growth, 1951-1980'. *Journal of Monetary Economics* 24 (2): 259-276.

Guiso, L., Sapienza, P., and Zingales, L. (2004): 'The role of social capital in financial development'. *American Economic Review* 94 (3), 526-556.

Hall, R. and Jones, C. (1999): 'Why do some countries produce so much more output per worker than others?' *Quarterly Journal of Economics* 114 (1), 83-116.

Helliwell, J. and Putnam, R. (1995): 'Economic growth and social capital in Italy'. *Eastern Economic Journal* 21, 295-307.

Henderson, D. J., Papageorgiou, C., and Parmeter, C. F. (2012): 'Growth empirics without parameters'. *The Economic Journal* 122 (559), 125-154.

Islam, N. (1995): 'Growth empirics: a panel data approach'. *The Quarterly Journal of Economics* 110 (4), 1127-1170.

Jackman, R. and Miller, R. (1998): 'Social capital and politics'. *Annual Review of Political Science* 1 (1), 47-73.

Keefer, P. and Knack, S. (1997): 'Why don't poor countries catch up? A cross-national test of an institutional explanation'. *Economic Inquiry* 35 (3), 590-602.

_____ (2002): 'Polarization, politics and property rights: Links between inequality and growth'. *Public Choice* 111 (1), 127-154.

Knack, S. and P. Keefer (1997): 'Does social capial an economic payoff? A cross country investigation.' *The Quarterly Journal of Economics* 112, 1251-1288.

——— (1995): 'Institutions and economic performance: cross-country tests using alternative institutional measures'. *Economics & Politics* 7 (3), 207-227.

La Porta, R., López de Silanes, F., Shleifer, A., and Vishny, R. (1997): 'Trust in large organizations'. *The American Economic Review* 87 (2), 333-338.

Leamer, E. (1985): 'Sensitivity analyses would help'. *The American Economic Review* 75 (3), 308-313.

Levine, R. and Renelt, D. (1992): 'A sensitivity analysis of cross-country growth regressions'. *The American Economic Review* 82 (4), 942-963.

Loury, G.C. (1977): 'A dynamic theory of racial income differences'. In P.A.Wallace and A.M. LaMond, eds. *Women, Minorities, and Employment Discrimination.* Lexington, MA: Lexington Books, 153-186.

Mankiw, N., Romer, D., and Weil, D. (1992): 'A contribution to the empirics of economic growth'. *The Quarterly Journal of Economics* 107 (2), 407-437.

Martín Mayoral, F. and Garcimartín, C. (2009): 'Población, inversión y tecnología en la convergencia de las regiones españolas. un análisis de datos de panel dinámicos'. *Investigaciones Regionales* (16), 169-180.

Maudos, J., Pastor, J., and Serrano, L. (1998): 'Convergencia en las regiones españolas: cambio técnico, eficiencia y productividad'. *Revista Española de Economía* 15 (2), 235-264.

Miguélez, E., Moreno Serrano, R., and Artís Ortuño, M. (2011): 'Does social capital reinforce technological inputs in the creation of knowledge? Evidence from the Spanish regions'. *Regional Studies* 45 (8), 1019-1038.

Moral Benito, E. (2012): 'Determinants of economic growth: a bayesian panel data approach'. *The Review of Economics and Statistics* 94 (2), 566-579.

Narayan, D. and Pritchett, L. (1999): 'Cents and sociability: household income and social capital in rural Tanzania'. *Economic Development and Cultural Change* 47 (4), 871-897.

Neira, I., Portela, M., and Vieira, E. (2010): 'Social capital and growth in European regions'. *Regional and Sectoral Economic Studies* 10 (2).

Paldam, M. and Svendsen, G. (2000): 'Missing social capital and the transition in Eastern Europe'. Working Paper No. 00-05, University of Aarhus, Aarhus School of Business, Department of Economics.

Pastor, J.M. and Tortosa-Ausina, E. (2008): 'Social capital and bank performance: An international comparison for OECD countries'. *The Manchester School* 76 (2), 223-265.

Paxton, P. (2002): 'Social capital and democracy: An interdependent relationship'. *American Sociological Review* 67 (2), 254-277.

Peña Sánchez, A. (2008): 'Las disparidades económicas regionales en España'. *Revista de Estudios Regionales* 82, 105-132.

_____ (2011): 'Desarrollo económico regional en españa: análisis de la productividad y del empleo como factores determinantes'. *Boletín económico de ICE Información Comercial Española* 3007, 39-48.

Pérez García, F. (2007): *Claves del Desarrollo a Largo Plazo de la Economía Española*. Bilbao: Fundación BBVA.

Pérez García, F. (dir.), J. Fernández de Guevara, M. Illueca, J. Maudos, J.M. Pastor and E. Tortosa (2006): *Banca Relacional y Capital Social en España: Competencia y Confianza*. Bilbao: Fundacion BBVA.

Pérez García, F., Montesinos, V., Serrano, L. and Fernández de Guevara, J. (2005): *La Medición del Capital Social: Una Aproximación Económica*. Bilbao: Fundación BBVA.

_____ (2006): 'Measurement of social capital and growth: An economic methodology'. Documento de Trabajo núm. 4, Bilbao: Fundación BBVA.

Pesaran, M. (2004): 'General diagnostic tests for cross section dependence in panels'. CESifo Working Paper No. 1229, Center for Economic Studies and Ifo Institute for Economic Research; IZA Discussion Paper No. 1240, Institute for the Study of Labor.

Pindyck, R. and Solimano, A. (1993): 'Economic instability and aggregate investment'. In O. Blanchard and S. Fischer eds. *NBER Macroeconomics Annual 1993.* Volume 8, Cambridge, MA: The MIT Press.

Pons Novell, J. and Tirado Fabregat, D. (2008): 'Los determinantes de la desigualdad económica regional en España'. *Información Comercial Española, ICE: Revista de economía* 842, 195-216.

Portela, M. and Neira, I. (2002): 'Capital social: concepto y estudio econométrico sobre el capital social en España'. *Estudios Económicos de Desarrollo Internacional* 2 (2),1.

Putnam, R.D. (1993): *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton, NJ: Princeton University Press.

_____ (1995): 'Bowling alone: America's declining social capital'. *Journal of Democracy* 6, 65-78.

Raymond Bara, J. and García Greciano, B. (1994): 'Las disparidades en el PIB per cápita entre comunidades autónomas y la hipótesis de convergencia'. *Papeles de Economía Española* 59, 37-59.

Rose, R. (2000): 'Getting things done in an antimodern society: social capital networks in Russia'. In P. Dasgupta and I. Serageldin, eds. *Social Capital: A Multifaceted Perspective.* Washington, DC: World Bank, 147-172.

Sala-i-Martin, X. (1997): 'I just ran two million regressions'. *The American Economic Review* 87 (2), 178-183.

Schneider, G., Plumper, T., and Baumann, S. (2000): 'Bringing Putnam to the European regions'. *European Urban and Regional Studies* 7 (4), 307-317.

Silverman, B.W. (1986): *Density Estimation for Statistics and Data Analysis*. London: Chapman and Hall.

Solow, R. (1957): 'Technical change and the aggregate production function'. *The Review of Economics and Statistics* 39 (3), 312-320.

_____ (2000): 'Notes on social capital and economic performance'. In P. Dasgupta and I. Serageldin, eds. *Social Capital: A Multifaceted Perspective.* Washington, DC: World Bank, 6-10.

Temple, J. (1999): 'The new growth evidence'. *Journal of Economic Literature* 37 (1), 112-156.

_____ (2000): 'Inflation and growth: stories short and tall'. *Journal of Economic Surveys* 14 (4), 395-426.

Temple, J. and Johnson, P.A. (1998): 'Social capability and economic growth'. *The Quarterly Journal of Economics* 113 (3), 965-990.

Torcal, M. and Montero, J. (2000): 'La formación y consecuencias del capital social en España'. *Revista Española de Ciencia Política* 1 (2), 79-121.

Torsvik, G. (2000): 'Social capital and economic development'. *Rationality and Society* 12 (4), 451-476.

Trigilia, C. (2005): *Sviluppo Locale: Un Progetto per l'Italia*. GLF editori Laterza.

Villaverde Castro, J. (2007): 'Crecimiento y convergencia regional en españa. (Algunas) causas del cambio'. *Papeles de Economía Española* 111, 240-254.

Wand, M.P. and Jones, M. C. (1994): 'Multivariate plug-in bandwidth selection'. *Computational Statistics* 9, 97-116.

Whiteley, P. (2000): 'Economic growth and social capital'. *Political Studies* 48 (3), 443-466.

Woolcock, M. and Narayan, D. (2000): 'Social capital: implications for development theory, research, and policy'. *The World Bank Research Observer* 15 (2), 225-249.

Wooldridge, J. (2002): *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: The MIT press.

Zak, P. and Knack, S. (2001): 'Trust and growth'. *The Economic Journal* 111 (470), 295-321.

NOTA SOBRE LOS AUTORES - *ABOUT THE AUTHORS**

JESÚS PEIRÓ PALOMINO graduated in Organization and Business Administration from the University Jaume I and received the award of the Confederación de Empresarios de Castellón in recognition for his academic career. He also obtained a PhD scholarship from the Valencian Government VALi+d 2011 program. He is currently a postgraduate student of the Master in Economic Internationalization, speciality in Economic Integration and, also, a member of the Department of Economics at the University Jaume I, where he is working on his PhD thesis, focused on how social features in societies, commonly known as social capital, affect their economic development. He has participated in different national congresses.
E-mail: peiroj@uji.es

EMILI TORTOSA-AUSINA graduated in economics from the University of Valencia and holds a PhD in economics from the University Jaume I, where he is currently a lecturer in applied economics. He has also taught at the University of Alicante (1994-1995) and has received scholarships from various institutions (Fundación Caja Madrid, among others). He has held posts as visiting researcher at the Autonomous University of Barcelona, the University of New South Wales (Australia), and the Department of Economics of Oregon State University (USA). His specialized fields are banking economics and the analysis of productivity and efficiency, application of different techniques applied to problems in the banking sector. He has published various books in collaboration with others and his articles have appeared in specialized journals. He has participated in many Spanish and international congresses and is main researcher on the Spanish National Research Program *Evaluación de la eficiencia y la productividad de las organizaciones en un contexto de crisis económica: instituciones financieras y sector público*
E-mail: tortosa@uji.es

Any comments on the contents of this paper can be addressed to: Jesús Peiró Palomino, Departament d'Economia, Universitat Jaume I, Campus del Riu Sec, 12071 Castelló de la Plana, Spain. Tel.: +34 964387163, fax: +34 964728591, peiroj@eco.uji.es

* Both authors thank José Carlos Pernias Cerrillo and Christian Volpe Martincus for helpful comments, and Luisa Alamá Sabater for useful documentation, as well as the Generalitat Valenciana (VALi+d ACIF/2011/180 and PROMETEO/2009/066) for financial support. Emili Tortosa-Ausina also acknowledges the financial support of the Spanish Ministry of Science and Education (ECO2011-27227).

ÚLTIMOS NÚMEROS PUBLICADOS – *RECENT PAPERS*

DT 13/12 *Esperanza de vida y causas de muerte: Un análisis de descomposición (1975-2009)*
Francisco J. Goerlich Gisbert

DT 12/12 *Impact of the Subprime Crisis on Bank Ratings: The Effect of the Hardening of Rating Policies and Worsening of Solvency*
Carlos Salvador Muñoz, José Manuel Pastor Monsálvez y Juan Fernández de Guevara Radoselovics

DT 11/12 *A Multilevel Decomposition of School Performance Using Robust Nonparametric Frontier Techniques*
Claudio Thieme, Diego Prior y Emili Tortosa-Ausina

DT 10/12 *El transporte ferroviario de alta velocidad: Una visión económica*
Francisco Javier Campos Méndez, Ginés De Rus Mendoza e Ignacio M. Barrón de Angoiti

DT 09/12 *Trade Integration in the European Union: Relative Contributions of Openness and Interconnectedness*
Iván Arribas Fernández, Francisco Pérez García y Emili Tortosa-Ausina

DT 08/12 *Life Potential as a Basic Demographic Indicator*
Francisco J. Goerlich Gisbert y Ángel Soler Guillén

DT 07/12 *Unpaid Work, Time Use Surveys, and Care Demand Forecasting in Latin America*
María Ángeles Durán y Vivian Milosavljevic

DT 06/12 *Unpaid Care Work in Africa*
Mónica Domínguez Serrano

DT 05/12 *Regions Overburdened with Care: Continental Differences in Attention for Dependent Adults*
Jesús Rogero-García

DT 04/12 *Estimates of Worldwide Demand for Care (2010-2050): An Econometric Approach*
Montserrat Díaz Fernández y María del Mar Llorente Marrón

DT 03/12 *Childcare in Europe: A Reflection on the Present Economic Approach*
Susana García Díez

DT 02/12 *Desempeño en los centros educativos:¿Un problema de recursos o de capacidades organizativas?*
Claudio Thieme, Diego Prior, Víctor Jiménez y Emili Tortosa-Ausina

Documentos de Trabajo 14

Fundación BBVA

Plaza de San Nicolás, 4
48005 Bilbao
España
Tel.: +34 94 487 52 52
Fax: +34 94 424 46 21

Paseo de Recoletos, 10
28001 Madrid
España
Tel.: +34 91 374 54 00
Fax: +34 91 374 85 22

publicaciones@fbbva.es
www.fbbva.es