

## **DYNREG**

Dynamic Regions in a Knowledge-  
Driven Global Economy  
Lessons and Policy Implications for the EU

# **WORKING PAPERS**

## **Social Capital and Growth in Brazilian Municipalities**

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# Social capital and Growth in Brazilian Municipalities\*

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*FIRST DRAFT*

*“The advantage to mankind of being able to trust one another, penetrates into every crevice and cranny of human life: the economical is perhaps the smallest part of it, yet even this is incalculable”*

(J. S. Mill (1848/2004))

## **Abstract**

*According to the modern theory of social capital (see Coleman (1990), Putnam (1993), Fukuyama (1995)), widespread trust would influence the economic performances of a country through a) reduction of transactional costs (monitoring and preventive activities to protect themselves from being exploited in economic transactions) and legal disputes; b) higher percentage of time devoted to innovation in new products or processes; c) higher reliability of formal institutions like the government and the central bank which implies that people can adopt more appropriate horizons in making investment decisions and choose production technologies that are optimal over the long, rather than short, run; d) a stronger social cohesion due to the sharing of ethical norms which induces cooperative behaviours and organisational innovations. On the basis of these theories a large number of empirical contributions which confirm the existence of a positive relation between growth, efficiency and the level of trust has been produced. Following the seminal work by Knack et al. (ibidem), we try to explain growth in Brazil over the period 2000-2003 using indicators of social capital. We develop our analysis at the most detailed geographical level, considering all 5507 municipalities. This choice is motivated by the great heterogeneity inside every country in terms of growth rate. While we observe homogeneity in some countries, like Sergipe, in other countries, like Sao Paulo, we have huge differences. This forces us to consider the municipalities as unit of observation; otherwise the country level would force us to lose all the heterogeneity. In order to obtain good measures of social capital, we start from a set of objective measure, and then analyse them with factor component analysis. We find a robust evidence of the positive effect of social capital on growth rates of income per capita.*

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## 1. Introduction

This work aims at investigating the role of social capital on economic performance. In order to achieve this objective, we consider extensively the previous literature on social capital, in order to draw testable predictions. According to the modern theory of social capital (see Coleman (1990), Putnam (1993), Fukuyama (1995)), widespread trust would influence the economic performances of a country via several channels. Firstly, it implies a reduction of transactional costs (monitoring and preventive activities to protect themselves from being exploited in economic transactions) and legal disputes. Secondly, it allows a higher percentage of time devoted to innovation in new products or processes. Thirdly, social capital implies higher reliability of formal institutions like the government and the central bank, which in turn implies that people can adopt more appropriate horizons in making investment decisions and choose production technologies that are optimal over the long, rather than short, run. Finally, a stronger social cohesion due to the sharing of ethical norms induces cooperative behaviours and organisational innovations.

On the basis of these theories a large number of empirical contributions which confirm the existence of a positive relation between growth, efficiency and the level of trust has been produced (including Putnam (*ibidem*) and Fukuyama (*ibidem*), the reader can also refer to Heliwell et al. (1995), Keefer et al. (1997), Knack et al. (2001), La Porta et al (1997)).

Following the seminal work by Knack et al. (*ibidem*), we try to explain growth in Brazil over the period 2000-2003 using indicators of social capital. We develop our analysis at the most detailed geographical level, considering all 5507 municipalities. This choice is motivated by the great heterogeneity inside every country in terms of growth rate. While we observe homogeneity in some countries, like Sergipe, in other countries, like Sao Paulo, we have huge differences. This forces us to consider the municipalities as unit of observation; otherwise the country level would force us to lose all the heterogeneity.

In order to obtain good measures of social capital, we start from a large set of social indicators, and then analyse them with factor component analysis. We find a robust evidence of the positive effect of social capital on growth rates of income per capita. The paper is structured as follows: section 2 present the review of the literature, section 3 the model specification, the data and the methodology, section 4 the results and robustness, and finally section 5 concludes.

## **2. Review of the Literature on Social Capital**

### **2.1. Civil Society and Civil Economy**

We live in a time in which both the ideal concepts of state and market have failed to fulfil our expectations of an “ordered” life and a rich existence. Political and ideological walls break down while the assumptions upon which capitalism finds its sense reveal connotations which appear immoral rather than a-moral. Much worse, they both fail to guide people in taking their daily decisions. As Alan Wolfe points out (Wolfe [2000]), neither the market nor a vague concept of state can offer an adequate theory of moral obligation which delimits our freedom of action and which makes the coexistence with our neighbours possible.

Obviously, accusing both the state and the market of being inefficient and useless does not represent a credible solution since it totally omits to consider what these entities are and why we still need them. Indeed, they are by-products of our social life and they hide deep characteristics of our culture and our social values. As Bellah clearly states “we are not self-created atoms manipulating or being manipulated by objective institutions. We form institutions and they form us every time we engage in a conversation that matters” (Bellah [2000], page 76).

These institutions were created in order to establish an ordered and efficient social life addressed to a wide definition of “common good” which reflects our cultural connotations. Therefore, rather than theorising an anarchic society without these institutions, a more sensible solution would be to give them back their civil and civic meaning.

The question remains open: if social life influences institutions and institutions are so important for social life that we cannot imagine a world without them, do social scientists have any chance to theorise normative indications to guide this self-perpetuating system? As soon as this question became more and more incisive, the idea of a virtuous self-governing community composed by individuals linked one another through a strong sense of mutual obligation (re)appeared in the literature and offered new elements to reinterpret those old and inefficient institutions.

Sometimes thinkers use the expression “civil society” in a reductive way to identify the set composed by the voluntary associations which are placed between the state and the individual (Durkheim [1893/1997], page 28).

However, the most of the times the concept of civil society seems to be melt with the deepest idea of “good society” which “differs from that of the civil one in that while the former also strongly favors voluntary associations – a rich and strong social fabric, and civility of discourse – it formulates and seeks to uphold some particular social conception of the good. The good society is [...] centered around a core of substantive, particularistic values. For instance, different societies

foster different values or at least give much more normative weight to some values than other societies that exhibit a commitment to the same values” (Etzioni [2000], page132).

As Alexis De Toqueville addressed more than two hundreds years ago in his “Democracy in America” (De Toqueville [1835/2000]), the community becomes the main generator of moral values, norms of cooperation and “common good.” Neither the state nor the market can substitute the community in finding its identity and in defining its ends. Americans voluntary created clubs, religious associations, churches, fraternal order to serve their private interests and their specific needs. However, in addition to these specific objectives, they also triggered a virtuous process of learning the essential habits of cooperation and trust. In economic terms, they created social capital in the form of social ties, a flourishing democratic life and a feeling of mutual obligation. Using a coloured expression, De Toqueville says that Americans had found the secret key upon which “the progress of all the rest depends.”

The neo-Toquevillean theorist Robert Putnam uses the same thesis of civic behaviour of citizens used by the French author to explain both the economic and social development in Italy. In his article “The Prosperous Community” (Putnam [1993]), he firstly defines social capital as “the features of social organization, such as networks, norms, trust that facilitate coordination and cooperation for mutual benefit” (page 35) and then he uses this concept to compare the northern regions with the southern regions on the basis of the level of civic engagement –voter turnout, newspaper readership, membership in clubs, associations, churches and other realities. As result, the growth rate of the northern regions would have been stimulated by the virtuous civil life dramatically.

On the basis of this line of research, Putnam clearly states in his “Bowling Alone” (Putnam [1995]) that the decline in the civic engagement represents one of the most dangerous aspect of the modern social life in USA. He finds that by almost every measure, Americans engagement in politics, in religious associations, in labour unions, in the parent-teacher association, in civic and fraternal organizations has fallen steadily and sharply over the last generation. The author concludes that the erosion of social capital over time could even undermine the economic performance of United States.

Rather than offering a further definition of a concept which probably cannot be defined, we focus our attention on distinctive aspects which of the concept of civil society. Firstly, we describe an alternative concept of rationality used by an individual to act in a cooperative way and to establish mutual obligations. Secondly, we present a new theory of reciprocity based on the assumption that individuals are anonymous. Finally, we stress the importance of widespread trust which probably represents the most important by-product of a virtuous coexistence based on mutual

assistance. In particular, we offer an explanation of how trust can spread among man and among different activities.

## **2.2. Rationality and Civil Society: Rational Egoism, Kantianism, and We-Rationality**

The concept of “rational egoism” is the most important assumption to explain how an individual behaves when he faces a situation of choice. The two words describe a unique vision of a man who is rational if and only if he maximises his utility function taking into account both his budget constraint and the decisions of the other individuals. Unfortunately, with the development of the modern game theory, the operational limits of this assumption started being highlighted dramatically. The typical situation used to describe the implications of the assumption of rational egoism in human interaction is the well known public good game. An individual can benefit from the public good contributed by his community regardless of whether he contributes to its provision. Therefore, he has not any incentive to contribute towards the public good. Since the same holds for everybody in the community, an inefficiently low quantity of public good is provided.

Antonio Genovesi, contemporary of Hume and Smith, proposed the first concrete alternative to the assumption of rational egoism. According to the author, given a universal human desire for social relationship, economic and political cooperation is rational in the same sense that friendship is since it makes possible to reach what he called the “public happiness” (Genovesi [1766/1973]), where the adjective “public” captures the structural nature of happiness: happiness has to be public otherwise it is not happiness.

As Bruni and Sugden [2000] have suggested “the most useful framework to use [to understand Genovesi] is the rationality of we-rationality as advocates by Hollis” (page 26). In his “Trust within Reason” (Hollis 1998) Hollis proposes his definition of we-rationality. He says: “Adam can decide what to do by reflecting that the good of the team requires Adam to do a and Eve to do e, and then threat this as an unconditional reason to do his bit. It no longer worries him that he does well to do a only if Eve will indeed do e, because Eve will have a similarly unconditional reason for doing e as her bit. Each now has the assurance that the other will not wait to contribute” (page 137). Then, he stresses the importance that individuals recognise themselves as members of the same body: “to prevent conditionals from resurfacing, team membership needs to be a stronger relation than membership of a mere association. One way to make the point is to say that members of teams have ‘we-intentions’: each, if asked ‘what do you intend to do?’, replies ‘We intend to keep left.’ This will be no small innovation, if we-intentions presuppose we-desires and we-beliefs, in shorts if

teams or groups can be agents only if they have relevant attributes of individual agents” (page 138). Once having accepted that being a person means belonging to a community, it is clear both why and how a person behaves cooperatively in favour of the well-being of the group.

Accepting the “we-rationality” as a principle of action leaves open another crucial question on the definition of the community of reference. One suggestion is proposed by Hollis. When he explains the differences between the concept of team and the weaker one of, for example, the association he says: “one [way to conceive of team and of actions done for the good of the team] is to think of the team as an entity transcending its members, with a group which transcends and determines theirs” (page 138). And later he continues: “[...] the we is neither a sum of associated individuals nor all humanity but a matter of membership. Titmuss is right, I think, to call the practice one of ‘gifts between the strangers’ but these are relative strangers – unknown members of our network” (page 147).

Whatever the definition of the “others” consists of, it implicitly refers to a situation in which a group of individuals are, using an economic expression, strategically interconnected to each other. This idea is well-captured by the definition of group assumed by Sugden in his model of reciprocity. He says: “The individual has an obligations, not to ‘society’ but to any groups of individuals from whose efforts he derives benefits. Groups need not be formally constituted organisations. The groups that have claims on the individual may be occupational, racial, religious or political; they may be local, national or international.” (Sugden [1984], page 775).

### **2.3. Social Reciprocity and Anonymous Contributors**

Once defined the concept we-rationality, Hollis asks a crucial question: “why do people who contribute to public goods fret about free-riders in some cases but not others?” (page 147). The answer he proposes highlights a new definition of social reciprocity which is particularly coherent with the concept of civil society. He says: “There is a logic of ‘enough’, I submit, which can overcome the dominance of defection, provided that a sense of membership is in play. [...] Thus, public goods which depend on creative altruism are a matter both of a large enough total to secure the good and of enough contributors for mutual reassurance that contributing is a worthy activity.”

Starting from Hollis’ logic of enough, we build a theory of social reciprocity.

Suppose that Mr. Jeaves is taking a walk in a public park and he finds a plastic bag on the ground. He has to decide whether to pick the bag up, contributing to the quality of the park but spending a bit of effort to find a bin, or to leave the plastic bag where he has found it. It is

reasonable to expect that Mr. Jeaves' decision would be influenced by the actual state of the park: the cleaner it is, the higher the chance that Mr. Jeaves will pick the bag up, contributing towards the respect of nature.

Mr Jeaves' behaviour is an example of what we define as "social reciprocity." With this expression we refer to those situations in which, by observing a "sufficiently high" level of public good, anonymous and unobserved individuals are induced to contribute more than what is usually predicted by the public good models. According to this class of models, in deciding how much to contribute towards a specific social project which affects the well-being of all the contributors, individuals are inexorably bound to fall into "free-riding" and exhibit the "crowding-out" in personal contribution (see e.g. Andreoni [1988]). The puzzle given by the empirical invalidation of these results (in addition to Andreoni's paper, see e.g. Sugden [1982] and Rose-Ackerman [1996]) has driven economists to take part in the discussion, by building reasonable and elegant models of reciprocal contributions.

Although the economic literature nowadays boasts a large number of these theories, none of them can be easily applied to the concept of "social reciprocity."

Consider for instance the "Inequity Aversion" hypothesis. Extending their theory to many contexts (the public good game being one of them), Fehr and Schmidt [1999] assume that an individual is induced to cooperate with other players, whose material payoffs are below an equitable benchmark (defined as an equal monetary payoff for all players), but he feels envy when their material payoffs exceed this level. However, the implicit assumption of perfect knowledge, which allows individuals to compare others' payoffs with the benchmark, makes this theory not applicable to a context in which people can observe only the total amount of public good collected until that moment. Moreover, as stressed by Bardsley [2000], one of the most doubtful predictions implied by the theory when used to explain private contributions to a public good is that individuals with less than the average income are very likely to behave as free riders because they would experiment disadvantageous inequality (page 214). This implication seems not to be confirmed by the empirical evidence on public goods. For instance, Andreoni [1988] reports that, according to the results of three surveys on the American philanthropic sector in the seventies, over 85% of all the American households support "big" charities with their voluntary donations. Moreover, the average giving is over \$200 per household. This shows that the percentage of households who consistently contribute to charities is much higher than the percentage of households with more than the average income.

Another interesting theory of reciprocity is presented in Rabin [1993]. Rabin assumes that individuals' willingness to cooperate depends on the kindness showed by the persons they are interacting with (page 1282). Unfortunately, it can only be applied to simple two-persons, normal-



form, complete-information games. As directly suggested by Rabin, an extension to the public good context appears doubtful from the psychological point of view since, in deciding the amount to contribute, an individual is forced “[...] to choose either to help everybody or to hurt everybody.” This leads the author to the question: “does one contribute to reward those who have contributed or not contribute to punish those who have not contributed?” (page 1296).

The theory here presented directly refers to the social reciprocity context. Indeed, we assume that individuals contribute their “fair” contribution when they consider that particular behaviour as correct, otherwise they continue behaving as free-riders. This behavioural assumption arises at least two questions. Firstly, what kind of psychological process do individuals follow in order to judge the correctness of a particular social behaviour? Secondly, how can they define a fair contribution under the assumption of it being anonymous and unobservable?

Cialdini’s theory of “Social proof” represents a good answer to the first question. According to Cialdini [2001], “[...] we view a behaviour as correct in a given situation to the degree that we see others performing it” (page 95). Moreover, by interpreting Cialdini’s theory in terms of social reciprocity, it suggests a sort of “Crowding-in” effect, which is not based on any kind of discernability of personal contributions. When an individual has to choose whether to contribute fairly or selfishly, he will base his decision on what the other members of his society have done, even if he knows that his contribution will remain completely indistinguishable within the total amount of public good. However, since the same holds for everybody, the only information each individual can use to infer how the others have behaved is the total quantity of public good collected.

We model this psychological process by assuming that different people respond differently to the “social proof” described before. There are people who start a particular project motivated by their ideals regardless of what the rest of the world does: people who create new NGOs, leaders of religious, political, social movements and so on. On the contrary there are individuals who decide not to conform to the generalised behaviour with the purpose of taking personal advantage. Between these two extreme classes of individuals, there exist people who decide to contribute on the basis of the existing level of the public good. One way to introduce this difference in an economic theory is to assume that each individual is characterised by his personal “attitude to contribute fairly,” which simply expresses the proportion of fair contributors he would like to observe so as to be induced to contribute “fairly.” However, since nobody in the society can observe other personal contributions, we can imagine that each individual applies a simple inferential procedure through which he can infer the proportion of fair contributors by observing the level of public good. If the inferred parameter is greater than his personal attitude to fairness, then he

contributes his fair contribution. In other words, when an individual considers that “enough” people have acted cooperatively, then he joins the “teamwork,” contributing what should be optimal to contribute if everybody did the same. The definition of “enough” represents a personal characteristic; it can vary from a level associated with an unconditional team-thinker who always acts for the benefits of the community to a level associated with an unconditional egoist who always behaves as a free-rider.

Now consider the second question, the problem of defining a “fair contribution.”

Although Sugden’s theory of reciprocity (Sugden [1984]) is based on the (already discussed) assumption of common knowledge of personal contributions, it contains a little recognised and crucial point which my theory shares: in deciding their contribution towards the public good, individuals are always able to define an unconditional, “fair” contribution that they should contribute regardless of what the others do. Sugden defines individual’s obligation to contribute in the following way: “For any vector of contributions  $q$ , for any group of individuals  $S$ , and for any member of that group  $i$ :  $i$  is meeting his obligation to  $S$  if and only if either (a) or (b) for some other person  $j$  in  $S$ , ” (page 777) where  $c_j$  is the level of contribution that  $j$  would choose if he could choose it for all members of  $S$ .

Sometimes economists refer to this amount as the “Kantian contribution”. According to the concept of Kantian categorical imperative adapted to the public good context, an individual should firstly define the amount he would like others to contribute if they were in his circumstances and, secondly, contribute that amount regardless of what the others do. It is clear that the main implication of this concept, particularly applicable to a context characterised by anonymous and unobservable contributors, is that an individual is able to determine his fair contribution even if he cannot compare it with others’ contributions.

Given the definition of Kantian contribution, it is reasonable to assume that an individual contributes fairly if his contribution is equal to the higher of the Kantian contribution and the self-interested one. Indeed, if the Kantian contribution is lower than the self-interested one (as it is formally possible given the heterogeneity I am going to discuss), there is not any “ethical or logic” reason why the individual should refuse to contribute the amount which maximising his utility function in favour of the Kantian level.

## 2.4. Widespread Trust and Economic Performance

As clarified by Bruni and Sugden [2000], Genovesi defines “Fede Pubblica” (literally public trust) as a common and mutually-recognised commitment to the virtues of friendship and reciprocal assistance where these two expressions basically refer to the concept of reciprocity under the principle of we-rationality. In the appendix of his “Lezioni” (Genovesi [1765-1767/1820]), Genovesi clarifies, “This word, fides, means rope, which ties and joins. Public trust is, therefore, the bond of families united in a friendly life.” This entity was so important for Genovesi that “[...] nothing is more necessary than public trust in a wide and easy circulation [...]. Trust is for civil bodies what the law of gravity is for natural bodies [...]. There, because of lack of trust, there is no reciprocal reliability, no society, no industry and no trade among peoples” (Lezioni, II, cap. X, p. 148-149).

In other words, for Genovesi, widespread trust has two main characteristics: a) it is produced by a virtuous community of individuals who share a feeling of mutual obligations and, b) it spreads its effects in every human activity. Given these premises, Genovesi’s main suggestion to the governors of Naples was to cultivate the public trust in order to stimulate the economic performances of the country. One mechanism through which the governors would have obtained this ambitious result was to encourage and the civil and the religious education of the citizens.

The concept of trust used by Fukuyama in his book is not dissimilar from the one offered by Genovesi. In particular Fukuyama refers to an “alchemic” combination of two elements which characterise a society: a generalised tendency to cooperate and a shared morality based on the cultural connotations of the society. He defines trust as “the expectation that arises within a community of regular, honest, and cooperative behaviour, based on commonly shared norms, on the part of other members of that community. Those norms can be about deep “value” questions like the nature of God or justice, but they also encompass secular norms like professional standards and codes of behaviour” (Fukuyama [1995], page 26).

The virtuous consequence of high level of trust is social capital. Indeed he says: “Social capital is a capability that arises from the prevalence of trust in a society or in certain parts of it.” After having defined both the concepts of trust and social capital, he states the indissoluble linkage between them and the culture of the society. He says: “Social capital differs from other forms of human capital insofar as it is usually created and transmitted through cultural mechanism” where culture is defined as an inherited ethical habit. Then, he states the importance of considering the cultural characteristics of a community in delimiting the ethical habits. He says that “[...] the most important habits that make up cultures have [...] to do with the ethical codes by which societies

regulate behaviour – what the philosopher Nietzsche called a people’s ‘language of good and evil’. Despite their variety, all cultures seek to constrain the raw selfishness of human nature in some fashion through the establishment of unwritten moral rules” (Fukuyama [1995], page 34).

Given this definition of trust, we now explain how the level of trust can affect the economic performances. The idea that widespread trust can influence economic performances has always been accepted by economists. For instance, in his “Principles of Political Economy,” J. S. Mill pointed that “the advantage to mankind of being able to trust one another, penetrates into every crevice and cranny of human life: the economical is perhaps the smallest part of it, yet even this is incalculable” (Mill [1848/2004], page 131). Moreover, there is a large number of empirical contributions which confirm the positive correlation between growth, efficiency and the level of trust (including the findings of Putnam [1993] and the cultural considerations of Fukuyama [1995], one can also refer to Heliwell et al. [1995], Keefer et al. [1997], Knack et al. [2001]).

According to the theorists of social capital, the channels through which trust would influence the economic performance of the country are: a) reduction of transactional costs (monitoring and preventive activities to protect themselves from being exploited in economic transactions) and legal disputes; b) higher percentage of time devoted to innovation in new products or processes; c) higher reliability of formal institutions like the government and the central bank which implies that people can adopt more appropriate horizons in making investment decisions and choose production technologies that are optimal over the long, rather than short, run; d) a stronger feeling of teamwork due to the sharing of ethical norms which induces cooperative behaviours and organisational innovations.

Although economists have always assumed that there exists a positive relation between trust and economic performance, they have rarely investigated on how this strong linkage can be explained theoretically. In this paper, since we have indirectly treated the concept of civil society in terms of a typical situation in which individuals are asked to cooperate in order to enjoy a reasonable level of public good, we should clarify how trust, intended as the virtuous product of cooperative individuals, can spread and positively influence the economic performance of the community. This is an old thesis which clearly appears in the thought of modern economists. For instance, in his “Nature of Rationality” (Nozick [1994]), Nozick says: “Cooperating in [the Prisoner’s Dilemma] situation then may get grouped with other activities of cooperation [...]. Hence, non cooperating in this particular Prisoner’s Dilemma situation may come to threaten a person’s cooperating in those other situations – the line between them may not be so salient.” How to justify theoretically this kind of, using Elster’s language, spillover effect (Elster 1998)? Sugden’s mechanism of “diffusion by analogy” (Sugden 1989) can be used to answer this question. He says:

“A convention can start to evolve as soon as some people believe that other people are following it. But what gives rise this initial belief? One possibility is that the same forces are at work as enable people to coordinate their actions without communication in unrepeated games. Some forms of coordination are more prominent than others, and people have a prior expectation of finding the most prominent ones. But, [...] prominence is largely a matter of common experience. The implication is that conventions may spread by analogy from one context to another. If it is a matter of common knowledge that a particular convention is followed in one situation, then that convention acquires prominence for other, analogous situations. [...] [Finally], if conventions can spread by analogy, then the conventions that are best able to spread are those that are most susceptible to analogy. Thus we should expect to find family of relationships among conventions, and not just a chaos of arbitrary and unrelated rules” (page 93).

In other words, if people learn to cooperate in collecting public good, then it is reasonable that the same attitude will spread “by analogy” to the productive sector in which everybody is involved. Individual work becomes more productive because of a higher coordination and a higher cooperation with colleagues and, moreover, production becomes more efficient because of a considerable reduction in transaction costs.

### **3 Empirical Evidence**

#### **3.1 Specification**

In the empirical analysis we focus on the role of social capital on economic performance. Among the others, we want to test whether, and to what extent, social capital is a determinant of economic growth. In order to implement this analysis, we will estimate the following reduced form equation:

$$\Delta GDPpc_i = \alpha + \beta GDPpct_{0i} + \gamma soc\_cap_i + \varepsilon_i$$

where the dependent variable is the change over time in the logarithm of income per capita. As explanatory variable, we will employ the logarithm of income per capita in the initial time period, which allows us to control if absolute convergence is taking place. We add a set of different indicators of social capital, to control if these measures influence GDP growth rates.

### 3.2 Data Description and Methodology

In order to test this prediction, we focus our empirical analysis on Brazil. As regards data on GDP per capita, we have information at the municipality level for all the years ranging from 1999 to 2003. These data come from the Pesquisa de Informações Básicas Municipais, which is an annual survey sent to all municipalities by IBGE, the Brazilian Institute for Geography and Statistics. Social capital variable come mainly from the 2000 Census by IBGE, on 169,799,170 individuals. As these variables lack time dimension, we are forced to implement a cross section regression. Nonetheless, we can exploit the cross section variability as we have data on 5507 municipalities.

We choose to exploit this level of disaggregation mainly because we observe huge variations of our dependent variable within each State. Figure 1 shows kernel densities for the growth rate of GDP per capita over the period 2000-2003, plotted by State.

*[Insert Figure 1 about here]*

We can clearly observe that States are largely heterogeneous as regards growth rates of Municipalities. While we observe homogeneity in some countries, like Sergipe, in other countries, like Sao Paulo, we have huge differences.<sup>1</sup> Therefore, we can affirm that reducing the analysis at the State level implies losing information given by heterogeneity.

We would regress the variation of GDP per capita over the interval 1999-2003 on the level of GDP per capita in the initial time period and a number of social capital indicators. As in 1999 Brazil faced currency crisis, we consider a safer choice to implement our analysis starting from year 2000. Nonetheless, the main results on the role of social capital are robust using 1999 as starting year, as shown in the robustness analysis.

We build our measure of social capital using factor analysis. This methodology is able to extract from a large number of variables just few factors, which linearly reconstruct the original variables. This technique presents many advantages. First, it helps reducing a variable set to a manageable size. Second, it is useful to understand the structure underlying a set of variables, via the interpretation of the factor loadings. Third, it is appropriate to measure a complex concept, or a concept that cannot be measured directly, which is exactly the case of social capital.

The variables used to extract the different factors are listed in Appendix A, while Table 1 presents the correlation matrix between social capital variables. We find that the correlations

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<sup>1</sup> Distrito Federal is missing, as this State is contains only one municipality: Brasilia.

between social factors are generally highly significant,<sup>2</sup> while the coefficients are not large in size, thus suggesting that they are capturing different aspects of social capital, and are not simply replicating the same underlying phenomena. Therefore, we feel confident while using these regressors together in the same estimating equation.

*[insert Table 1 about here]*

#### **4. Results and Robustness**

We start our empirical analysis performing an exploratory analysis on patterns of growth in Brazil. Table 2 shows the results regressing GDP per capita growth on the initial level of GDP.

*[insert Table 2 about here]*

We find a tendency to divergence while pooling together all observations, when considering 2000 as starting year. If we perform the same estimate considering the period 1999-2003, we find no significant coefficient for the initial level of GDP. Thus, we observe that the inclusion of year 1999 seems to change significantly the results concerning patterns of growth. This supports the intuition that 1999 may be a peculiar year.<sup>3</sup> To better understand growth dynamics, we perform the same equation at State level. In this way, we can understand growth dynamics within States. Results are shown in Table 3. We observe that three types of situations occur.

*[insert Table 3 about here]*

We have a majority of State which show no significant pattern of convergence or divergence between their municipalities. Some States present instead a pattern of convergence among municipalities, while few other present divergence within themselves. Notably, among the States that show divergence we have the State of Rio de Janeiro. The coefficient of the initial level of income is positive, although not significant, also in Sao Paulo State. Thus, we seem to find some evidence of different patterns of growth between large metropolitan areas and their surrounding

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<sup>2</sup> With the exception of the correlation between the measure of social division and the indicator of religiousness, which are not significantly correlated.

<sup>3</sup> Performing the same type of regression over shorter type periods always produces a positive and significant coefficient for the initial level of GDP per capita. This coefficient is not significant only when considering 1999 as a starting year.

located in the same State. Interestingly, if we shift the focus of our analysis, and look for the any pattern between States, we observe a tendency to convergence between States.

*[insert Table 4 about here]*

Overall, we observe a general divergence between Brazilian municipalities. This pattern is stronger within some States, while in others there any clear tendency and in some others there is a tendency to convergence between municipalities located in the same State. Analysis at State level suggests instead that income levels of States are converging. This apparent contradiction can be explained in the light of the ecological fallacy and the modifiable areal unit problem (MAUP). The first suggests that inference on characteristics of the individuals, based on aggregate statistics may lead to errors of interpretation, while the MAUP underlines that referring to aggregate zone which may be arbitrary in nature and could be a source of error in spatial studies.

Moving to analysis of the role of social capital, we enrich our baseline estimate by adding a number of indicators. We observe in Table 5 that the factor that summarizes social cohesion has a positive and significant impact on growth rates of income per capita across all different specifications.

*[insert Table 5 about here]*

As predicted by the theory, social capital has a positive effect on growth rates. If we include a factor that summarises division within the society, or in other terms, lack of social capital, we observe that it has a negative impact on growth rates. The lack of religiousness has a negative impact, and this is coherent with the idea that religious institutions are one of the channels through which social capital grows. Our variable on murders results not significant. We would have expected a negative sign. We are quite safe that this is not due to problems of multicollinearity, as its correlation with the initial level of income is only 0.201. One could argue that murders are endogenous to GDP growth rates, but the correlation between our dependent variable and the factor that summarises murders is small in size and not significant. Our measure of murders thus seems to be safe from the risk of endogeneity. Finally, the variable the summarizes political participation has a negative and significant coefficient. We would have expected a positive impact of participation on growth rates, nonetheless, this result could depend on the peculiarity of Brazil. In this country, an increase in political participation could imply larger political instability, which in turn undermines growth rates.



We have seen that States have different patterns of growth within themselves, and we know that they are different, running from Amazonian states like Acre to the State of Rio de Janeiro, São Paulo or Distrito Federal. Therefore, we include in our analysis a set of State dummies, in order to control for spatial heterogeneity. Results are reported in Table 6.

*[insert Table 6 about here]*

We observe that the results on the role of social capital are robust to the inclusion of State dummies. The goodness of fit of our estimates is improved, although we observe that the initial level of income per capita loses significance. We suppose that its role is captured by the regional controls.

#### **4.1 Robustness**

In this section we show that our results, as far as concerns the role of social capital, do not depend on the time period considered. We decide to implement our previous analysis starting from 2000, due to the financial crisis of 1999. Table 7 shows the results of the same estimates considering the growth in income per capita over the period 1999-2003. We obtain again confirmation that social capital has a positive impact on growth rates.

*[insert Table 7 about here]*

All social capital variables maintain their sign and level of significance, while murders become negative and significant. The initial level of income per capita turn out to be significant and negative, thus suggesting a tendency to convergence.

A further robustness check concerns the choice of factor analysis. One could think that using the single variables that constitute a factor, instead of the factor itself, would produce the same result, with a more direct interpretation of the coefficient estimates.<sup>4</sup> We show that this is not true, thus reinforcing our choice of this methodology. As an example, we show different regression, using first our factor that summarizes the lack of religiousness, and then its four components. The first two enter in the factor with a negative factor loading, while the second two with a positive. We

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<sup>4</sup> We thank our discussant at II DYNREG Workshop for underlying this point.

would thus expect a positive sign for the coefficient estimate when considering the first two variables, and a negative sign for the second two.

*[insert Table 8 about here]*

Table 8 shows that this is not true, when considering civil weddings and couples which cohabit without wedding. This suggests that factor analysis is relevant in the sense that it does not simply “merge” different variables, but it captures underlying characteristics that these variables share.

## **5. Conclusions and Policy Implications**

The aim of the present work is to investigate the role of social capital in growth. We first review the literature on social capital, to draw some testable predictions. We test this prediction using a detailed dataset on Brazilian municipalities, finding evidence of the positive impact of social capital on growth rates. This result is robust to the inclusion of State dummies, and to the time period considered. We focus our analysis on the period 2000-2003, but we show that the inclusion of year 1999 does not change the results concerning social capital.

This is interesting as it allows us to affirm that social capital has a positive effect on growth rate, independently from the economic cycle. The financial crisis of 1999 does not alter the role of social capital in our growth estimates.

This works suggests that governments should aim at promoting social capital, as it has a positive effect on economic growth. Policies that promote social cohesion and increase associationism (which in our work is proxied by the relevance of the religiousness, and the appartenance of a religious community) are beneficial to economic performance of a country.

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## **Appendix A**

### **Variables Employed in Factor Analysis**

- social cohesion: number of cohabiting individuals over total population, number of married individuals over total population, number of married cohabiting individuals over total population, number of divorced cohabiting individuals over total population, number of widow cohabiting individuals over total population, number of single cohabiting individuals over total population
- social division: number of separated individuals over total population, number of separated cohabiting individuals over total population, number of separated not cohabiting individuals over total population, number of divorced individuals over total population, number of divorced cohabiting individuals over total population, number of divorced not cohabiting individuals over total population

- no religion: number of civil and church weddings over total population, number of civil weddings over total population, number of church weddings over total population, number of cohabiting individuals over total population
- murders: murders per capita over different time periods ranging from 1989 to 1999
- political participation: percentage of voters during the period 1994-1998

## Appendix B

### Tables and Figures

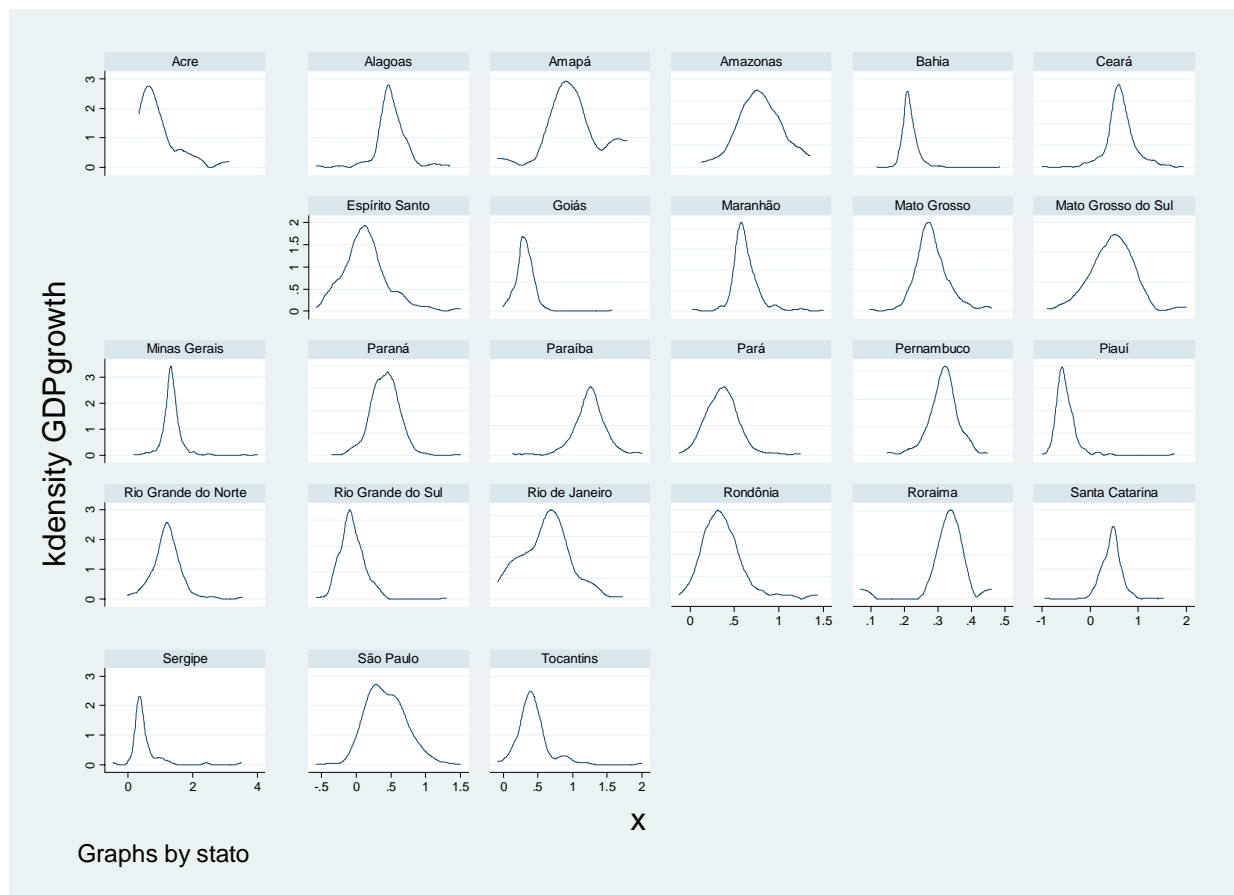


Figure 1: Kernel densities of GDP per capita growth over the period 2000-2003, by State

	social cohesion	social division	no religion	murders	political participation
social cohesion	1				
social division	0.519***	1			
no religion	-0.255***	-0.015	1		
murders	-0.040***	0.234***	0.086***	1	
political participation	0.621***	0.424***	-0.228***	-0.074***	1

Table 1: Correlations between Factors

Dep. Var: GDP p.c. Growth (1999-2003)		Dep. Var: GDP p.c. Growth (2000-2003)	
GDP p.c.1999	0.000388 (0.0055)	GDP p.c.2000	0.0426*** (0.0050)
Constant	0.467*** (0.044)	Constant	0.0317 (0.040)
Observations	5507	Observations	5507
R-squared	0.00	R-squared	0.01

Table 2: Convergence at Country Level

State	GDPpc2000	
Acre	-0.026	(0.248)
Alagoas	-0.167	(0.070)**
Amapá	-0.473	(0.147)***
Amazonas	-0.215	(0.059)***
Bahia	0.014	(0.022)
Ceará	-0.156	(0.033)***
Espírito Santo	0.166	(0.073)**
Goiás	0.060	(0.026)**
Maranhão	-0.031	(0.059)
Mato Grosso	0.114	(0.043)**
Mato Grosso do Sul	-0.003	(0.042)
Minas Gerais	0.001	(0.012)
Paraná	-0.038	(0.028)
Paraíba	-0.194	(0.039)***
Pará	-0.003	(0.025)
Pernambuco	-0.042	(0.026)
Piauí	-0.013	(0.052)
Rio Grande do Norte	-0.056	(0.028)*
Rio Grande do Sul	-0.070	(0.031)**
Rio de Janeiro	0.174	(0.077)**
Rondônia	-0.383	(0.125)***
Roraima	-0.191	(0.121)
Santa Catarina	-0.062	(0.029)**
Sergipe	0.265	(0.109)**
São Paulo	0.018	(0.022)
Tocantins	-0.090	(0.056)

Table 3: Convergence within States



Dep. Var: State GDP p.c. Growth (2000-2003)	
GDP p.c.2000	-0.0640** (0.030)
Constant	0.447*** (0.046)
Observations	27
R-squared	0.16

Table 4: Convergence between States

Dep. Var: GDP p.c. Growth						
GDP p.c.2000	0.0426*** (0.0050)	0.0165** (0.0064)	0.0414*** (0.0070)	0.0328*** (0.0071)	0.0316*** (0.0073)	0.0438*** (0.0077)
social cohesion		0.0313*** (0.0049)	0.0406*** (0.0049)	0.0360*** (0.0050)	0.0370*** (0.0052)	0.0539*** (0.0059)
social division			-0.0410*** (0.0048)	-0.0350*** (0.0049)	-0.0357*** (0.0050)	-0.0306*** (0.0052)
no religion				-0.0380*** (0.0068)	-0.0385*** (0.0069)	-0.0431*** (0.0073)
murders					0.00317 (0.0040)	-0.000791 (0.0042)
political participation						-0.0415*** (0.0054)
constant	0.0317 (0.040)	0.243*** (0.052)	0.0411 (0.057)	0.111* (0.058)	0.121** (0.059)	0.0192 (0.063)
State dummies	No	No	No	No	No	No
Observations	5507	5507	5507	5507	5507	4925
R-squared	0.01	0.02	0.03	0.04	0.04	0.05

Table 5: The Role of Social Capital

Dep. Var: GDP p.c. Growth						
GDP p.c.2000	-0.00712 (0.0071)	-0.0103 (0.0072)	0.00315 (0.0073)	0.00235 (0.0073)	0.00149 (0.0073)	0.00675 (0.0078)
social cohesion		0.0162*** (0.0060)	0.0200*** (0.0059)	0.0205*** (0.0059)	0.0224*** (0.0061)	0.0252*** (0.0067)
social division			-0.0422*** (0.0049)	-0.0402*** (0.0049)	-0.0411*** (0.0050)	-0.0396*** (0.0052)
no religion				-0.0198*** (0.0069)	-0.0209*** (0.0069)	-0.0230*** (0.0074)
murders					0.00596 (0.0043)	0.00408 (0.0044)
political participation						-0.0233*** (0.0057)
constant	0.537*** (0.075)	0.590*** (0.078)	0.458*** (0.079)	0.463*** (0.078)	0.474*** (0.079)	0.422*** (0.081)
State dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5507	5507	5507	5507	5507	4925
R-squared	0.24	0.24	0.26	0.26	0.26	0.27

Table 6: The Role of Social Capital, controlling for Spatial Heterogeneity

Dep. Var: GDP p.c. Growth (1999-2003)						
GDP p.c.1999	-0.0684*** (0.0081)	-0.0733*** (0.0082)	-0.0584*** (0.0084)	-0.0592*** (0.0084)	-0.0575*** (0.0084)	-0.0453*** (0.0089)
social cohesion		0.0261*** (0.0069)	0.0300*** (0.0069)	0.0305*** (0.0069)	0.0277*** (0.0071)	0.0241*** (0.0077)
social disgregation			-0.0446*** (0.0057)	-0.0426*** (0.0057)	-0.0412*** (0.0058)	-0.0423*** (0.0061)
no religion				-0.0196** (0.0079)	-0.0180** (0.0080)	-0.0155* (0.0085)
murders					-0.00865* (0.0050)	-0.0133*** (0.0051)
political participation						-0.0117* (0.0066)
Constant	0.930*** (0.087)	1.013*** (0.089)	0.867*** (0.091)	0.873*** (0.091)	0.854*** (0.091)	0.744*** (0.094)
State dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5507	5507	5507	5507	5507	4925
R-squared	0.20	0.20	0.21	0.21	0.21	0.22

Table 7: Robustness: Different Time Period

Dep. Var: GDP p.c. Growth					
GDP p.c.2000	0.0318*** (0.0051)	0.0226*** (0.0059)	0.0498*** (0.0061)	0.0423*** (0.0050)	0.0428*** (0.0050)
no religion	-0.0531*** (0.0067)				
civil and church weddings		0.269*** (0.043)			
church weddings			0.304** (0.15)		
civil weddings				-0.0832 (0.12)	
cohabiting not married					0.0982 (0.082)
constant	0.119*** (0.041)	0.133*** (0.043)	-0.0351 (0.052)	0.0388 (0.042)	0.0204 (0.041)
State dummies	No	No	No	No	No
Observations	5507	5507	5507	5507	5507
R-squared	0.02	0.02	0.01	0.01	0.01

Table 8: Robustness: Decomposition of Factors