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Measuring social capital for local economic development studies: the case of French rural areas

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1. Introduction: on the role of capital social on local economic development

1.1. An attractive notion

The notion of social capital is based on the idea that social relationships and social norms may give access to valuable resources that can improve the welfare of individuals (Fafchamps and Minten, 2001), families (Narayan and Pritchett, 1997), communities (Bowles and Gintis, 2002) or even regions or nations (Knack and Keefer, 1997). The notion of social capital is an attractive attempt to synthesise the various effects of sociological and institutional factors on economic welfare. The fact that social relationships have a significant impact on individual economic success has a sound theoretical and empirical basis (Burt, 2000). However, dealing with issues of regional economic development, the role of sociological factors are much more debatable (Durlauf and Fafchamps, 2004). One problem in testing the role of social capital on development is that indicators of the relevant sociological features are generally lacking in statistical databases. In fact, the choice of variables that are used in empirical studies is generally justified not by theory but by practical availability considerations.

The aim of this paper is to determine which indicators should be most suited to proxy social capital for empirical studies at regional levels. We proceed in three steps. First, we discuss the potential role of social capital in regional development issues, starting with the economic mechanisms social capital should interfere with. Second, we present a set of social capital indicators, with the intention of capturing the different possible mechanisms interfering with performance. Third, we construct synthetic indices, and examine how they fare on French rural areas by providing simple growth estimations.

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1.2. Social capital and economic mechanisms

Intuitive as it may be, the notion of social capital is difficult to define, particularly at aggregate levels. In this paper, we use one of the clearest definitions of social capital, due to Nan Lin (2001): “*resources embedded in a social structure which are accessed/mobilised in purposive actions*”. Even if such a definition is quite rigorous, at least for studying individual success, it tells nothing about how to estimate social capital. In fact, Ronald Burt’s (2000) well-documented essay shows that social capital cannot be measured by a single measure, even for a restricted class of agents. According to Burt, in order to get benefits from his social connections, an agent must trade off two properties: his network’s closure (or density) and his network’s structural holes. Closure implies strong links and a strong social control, which generally guarantee the reliability of the contacts. Structural holes mean that the agent’s contacts will come from different social circles and possibly carry diversified and original information. Burt contends that for the classes of agents he studied (jobseekers, managers, researchers), structural holes are typically the limiting factor: their networks are too closed and they cannot access enough new information and opportunities.

Things are much more complicated when the object under study is a vast system such as a region. Lin’s (2001) definition becomes much less operational, and measures of social capital are all the more difficult to find. Social capital should then be defined as a set of sociological characteristics that potentially enhance the economic welfare of the inhabitants of the region. The problem is that there are many way by which sociological factors may influence economic performance. Even worse, as stressed in Portes and Landolt (1995), both positive and negative forces are at play. That is, sociological characteristics that enhance individual welfare (“individual social capital”) can be detrimental to collective performance. Table 1 (taken from Callois, 2004) lists the main mechanisms by which “social density” influences economic performance. Here “social density” is simply defined as the strength of social relationships and social obligations (norms and values) in the region under study.

Table 1. Effects of “social density” on economic performance

Class of mechanism	Positive mechanisms	Negative mechanisms
Information flows	Valuable information	Lack of opportunities
Individual incentives	Reduction of agency problems and lower transaction costs	- Inertia - Low zeal for work
Collective action	- Risk management - Fluctuation smoothing - Local public goods	Collusion Discrimination

An interesting point is that there is a similar trade-off as the one studied by Burt (2000) at the individual level. Positive mechanisms all stem from what is equivalent to Burt’s network closure, and which is termed “*bonding social capital*” in social capital literature. Negative mechanisms essentially stem from a lack of openness. Indeed, openness would bring new ideas and opportunities, and enhance competitive pressure, which would reduce inertia and collusion. The way of introducing this openness by social links is to develop “*bridging social capital*”, something very close in spirit to Burt’s structural holes. Bridging social capital will be defined as a set of social links between very different agents, which are generally weak ties, but carry information and opportunities from outside the region. The distinction between bonding and bridging social capital is now common (Putnam, 2000). The selection of indicators will be based on it.

1.3. The different forms of social capital

As we can see social capital cannot be measured by a single indicator. There must be at least a clear distinction between two complementary (and partially contradictory) forms, bonding and bridging

social capital¹. However, even this dichotomy is insufficient to characterise the different forms of social capital.

Let us deal with bonding social capital first, which represents what is commonly understood as community cohesion. Its main virtue is to foster co-operative behaviour (but it also reduces opportunism and may carry valuable information). The effects of bonding social capital can stem from two very different kinds of sociological mechanisms. First, cultural predisposition may render co-operation easy, by reinforcing trust, reciprocity and collective identity. Second, co-operation can be achieved through social control, which prevents cheating on agreements and more generally opportunistic behaviour. These two forms of bonding social capital are generally referred to as “*cognitive*” and “*structural*” social capital respectively. Assuredly, they can reinforce each other, but one may be present without the other². Moreover, they do not evolve within the same time scale. Cultural predispositions display a high inertia. They are slowly built and slowly decay. By contrast, social control can be achieved very quickly, even if it cannot work without minimal cultural predisposition. The fact that these two forms are not necessarily correlated implies that they have to be distinguished in empirical studies. Moreover, their different time scales imply different procedures for empirical tests.

Turning now to bridging social capital, it is worthwhile to distinguish three different mechanisms that can bring new information and opportunities to a region. First, emigration and immigration can bring people from different horizons together. Emigrants can keep in touch with their former acquaintances while they accumulate experience and (maybe wealth as well) abroad. Immigrants bring different knowledge with them, and also keep in touch with former acquaintances abroad. We can see that the existence of bridging social capital from immigration requires three elements: a flow of emigrants/immigrants, the existence of valuable resources abroad (information, help...), and the activation of this resource (which means that emigrants/immigrants need to be socially integrated to their new place of residence.

A second form of bridging social capital consists in business networks. The idea is the same as for emigration and immigration, but this form needs to be distinguished from the former one, as it directly concerns the production of wealth. The existence of business relationships between two regions may significantly influence investment decisions, even when objective considerations would direct investment elsewhere. Business networks are suspected to play a significant role in international trade (Rauch, 2001). They should also be important at a regional and inter-regional level.

The third form of bridging social capital that we consider is what shall be called “political relationships”. It entails all the relationships that regional leaders may have outside their region, and that can have an impact on local economic activity. A typical example is when a local politician is a good friend (or a “creditor”) of government members, and can influence their decisions about where to build infrastructures, or which projects should be subsidised. To be rigorous, “political relationships” should not to be restricted to political leaders, although systematic information about all types of leaders may be difficult to find. According to Krishna (2001), political influence at levels outside the region can be a decisive trigger for the effects of bonding social capital to appear. This idea is in tune with the complementarity stressed in § 1.2. between bonding and bridging social capital at the regional level, or between closure and structural holes at the individual level.

¹ Some authors distinguish “bonding social capital” *per se* and “linking social capital”. While the former consists in strong links between individuals of similar status, the latter entails links between individuals who have complementary or hierarchical relative positions. The distinction between “bonding” and “linking” has not been made here, as these two forms are empirically difficult to distinguish in a regional context.

² The fact that there may be social control without social norms dictating co-operation is easy to accept. The reverse might sound more surprising. However, the study by Hofferth and Iceland (1998) suggests that norms of reciprocity can survive long after having totally changed of social circles.

1.4. Social capital and institutions

Social capital literature has much in common with the literature on institutions, especially the work of Douglas North (1991). In fact, the frontier between institutions (in North's definition) and social capital is not clear. Norms and conventions can be seen both as a form of cognitive social capital and informal institutions. In fact, social capital literature borrows many ideas from North's new institutional economics, reinterpreting them into a more sociological vocabulary. Some authors (Collier, 1998) decided to get round the problem by including formal institutions into the definition of social capital. This is debatable, as it makes even more difficult to test the effects on social capital. We contend that it is important to distinguish what stems from the sociological background ("social capital"), and what stems from the structure of the institutional system. For instance, it is well known that importing Western countries' institutional systems in former colonies generally produced neither democracy nor efficiency. Conversely, even a favourable sociological background may lack an appropriate institutional system to reveal its potential and bring development.

The choice made in this paper is to focus only on what stems from purely sociological characteristics, i.e. social norms of action, and the structure of social networks. Institutional aspects such as formal rules and the structure of decision power in organisations will not be discussed here. This choice is both motivated by parsimony considerations and practical reasons, as relevant institutional indicators are at least as difficult to find as social capital indicators. Naturally, sociological characteristics are partly embedded in the institutional structure, so that a wrong match between sociological characteristics and institutional structure may lead to false inferences about the nature and effects of social capital. We believe that restricting the empirical study to a single country, namely France, which has a longstanding tradition of centralisation, minimises the interference between institutional and purely sociological phenomena.

However, one cannot neglect the fact that local institutional arrangements can facilitate the activation of the potential benefits of social capital. For example, co-operation at a large scale will be made easier by creating specific institutions for negotiating and managing the projects. So it will be necessary that the social capital indicators distinguish "informal social capital" from the case when social capital effects are mediated by formal institutions. We return to that topic in section 4.

2. A multidimensional approach of social capital

Section 1 has shown that a multidimensional view of social capital is needed in order to possibly understand and measure the effects of sociological factors on economic performance. In this section, we propose a set of indicators according to the typology given in section 1.2., before discussing them in the case of French rural areas.

2.1. Propensity to co-operate (bonding)

Concerning bonding social capital, we need two types of indicators: indicators of trust, reciprocity or identity (cognitive social capital) and indicators of social network density (structural social capital). For cognitive social capital, past empirical studies use indicators of trust and civic values coming from databases such as the World Values Survey, or the European Values Survey (Knack and Keefer, 1997). Some also use the number of blood donations as an indicator of reciprocity, or electoral turnout as an indicator of civic values (Guiso *et al*, 2004). Unfortunately, these data are not available at fine levels, except electoral turnout. As an alternative trust indicator, we use an indicator called the "phonebook trust indicator". It is obtained by dividing the number of phone numbers in the phonebook by the number of households. Thus, it approximates the share of households who accept to have their name appear in the phonebook. In place of blood donation, we use data on gifts to charities, which are unfortunately only available at the *département* level.

Two other indicators of cognitive social capital are more debatable, but as we shall see yield interesting results. First, we use the inverse of the average farm size. Such a choice may seem awkward, as farm size could be thought as being primarily influenced by the type of production. However, the type of production is not the consequence of particular pedoclimatic conditions only, but also of sociological characteristics. In fact, the areas where the number of farms remained high are characterised by a strong co-operative movement, which sometimes led to the development of intensive pig breeding (this is the case of Brittany for instance). However, there is no guarantee that co-operation in agriculture should spill over in other sectors, although social norms are generally believed to be very stable. Second, we use data on formal co-operation between municipalities. Municipalities are encouraged to pool part of their fiscal resources in order to produce public services more efficiently. The fiscal integration coefficient measures the share of fiscal resources that are pooled. Using that indicator implies the assumption that the behaviour of local politicians reflects that of the population in general.

Turning now to structural social capital, the most widely used indicator in social capital literature is association membership³. Voluntary organisations are poorly accounted for in French statistics. The declaration of an association is only compulsory when it employs at least one worker. Moreover, the disappearance of associations is often not registered. Despite these defaults, we used this indicator, scaled by the total population. Another indicator we used is the number of bars/cafés by inhabitant. A high number of bars may indicate a strong demand for social relationships. However, many rural villages do have a bar, often managed by a retiree, which does not generate much sociability. In order to remove that effect, we only considered the bars/cafés with at least one worker. A last indicator we used was the density of sport facilities. This choice stems from similar considerations as for the bars/cafés.

Table 2 summarises the computation and sources of our bonding indicators.

Table 2. Indicator of bonding social capital

Class	Indicator	Proxies for	Computation	Source
Cognitive	Trust phonebook	Trust	# phone numbers on phonebook/ # households	France télécom 2004, 1999 census
	Charity gifts	Reciprocity	Share of households having had a fiscal deduction for having made a gift in 2001	Ministry of finance
	Electoral turnout	Civic values	Share of voters in first round of presidential election 2002	Ministry of interior affairs
	Inverse farm size	Co-operation (agriculture)	Farmland / # farms	Agricultural census 1970
	Fiscal integration	Co-operation (politics)	Share of taxes pooled between municipalities 2001	Ministry of interior affairs
Structural	Associations	Formal sociability	1000 * # registered associations/population	SIRENE 1999, census 1999
	Bars/cafés	Demand for sociability	1000 * # bars/cafés with at least one worker / population	UNEDIC 1999, census 1999
	Sport facilities	Demand for sociability	1000 * # sport facilities / population	1998 Municipal inventory, 1999 census

2.2. Access to outer opportunities (bridging)

Finding indicators for bridging social capital is much more challenging than for bonding social capital for at least three reasons. First, there have yet been very few empirical studies dealing with this aspect of social capital. Second, the mechanisms at play are much more complicated, as they are often

³ In countries with significant ethnic diversity, ethno-linguistic fragmentation is also commonly used.

indirect, and bridging social capital is not often activated. Third, contrary to bonding social capital, we have little idea of the regions where bridging social capital should be high. The three forms of bridging social capital discussed in section 1.2. need not display any correlation, and work quite differently. The easiest form to deal with is the relationships coming from emigration/immigration. As explained in section 1.2., we need to consider three elements: migration flows, level of outer resources, access to these resources.

An “emigration bridging indicator” can be computed as follows. We suppose that we have defined a set of R regional units on which we want to measure bridging social capital. We also consider a set of U urban poles, where most important resources are supposed to be. The assumption that valuable resources should be mostly in urban poles is motivated by both empirical and theoretical research on agglomeration processes, and of the role of agglomeration on innovation (Fujita and Thisse, 2002). For each regional unit, we summed an “access to outer resources from emigrants” index over all urban poles. This index is the product of three factors:

- Migration rate, computed as the share of inhabitants of the urban pole in the latest census (year t) who resided in the regional unit during the former census (year $t-1$).
- Level of resources in the urban pole, which is taken as the logarithm of employment.
- Access to these resources by emigrants, which is measured as an index of similarity between social categories.

Formally, the emigration bridging indicator is computed by the following equation:

$$Emigrationbridging_i = \sum_{j=1}^U \left[\ln E_i \cdot \left(\frac{M_{i \rightarrow j}}{NM_i + M_{i \rightarrow j}} \right) \left(1 - \frac{1}{2} \sum_{k=1}^6 \left| \frac{M_{k,i \rightarrow j}}{M_{i \rightarrow j}} - \frac{N_{k,j}}{N_j} \right| \right) \right] \quad (1)$$

where index j sums over all urban poles, E denotes employment in period t , M the number of migrants from regional unit i to urban pole j during the period $[t-1, t]$, and NM non migrants of regional unit i during the same period. Index k splits the population of migrants (M) and of the urban poles (N) in period t into the 6 main social categories in French statistics: farm owners, independent workers, executives, intermediary occupations, clerks, and factory workers⁴.

A similar index was constructed for immigration. Here we consider migration from urban poles to regional units. Our similarity index now compares the distribution of migrants across social categories to the distributions of residents of the regional unit (and not of the urban poles as for emigration bridging). Formally, we have:

$$Immigrationbridging_i = \sum_{j=1}^U \left[\ln E_i \cdot \left(\frac{M_{j \rightarrow i}}{NM_i + M_{j \rightarrow i}} \right) \left(1 - \frac{1}{2} \sum_{k=1}^6 \left| \frac{M_{k,j \rightarrow i}}{M_{j \rightarrow i}} - \frac{N_{k,i}}{N_i} \right| \right) \right] \quad (2)$$

Turning now to the second form of bridging social capital, business networks, we used data about multiplant firms. This does not reflect the diversity of business relationships, and in particular neglects the role of mutual shareholding between firms (cf. Combes *et al.* 2004). As many plants in rural areas belong to larger firms, we assume that data about multiplant firms cover a significant part of business relationships between locations. Indeed, by focusing on intra-firm links, we focus on the links by which the most tacit information should be involved.

More precisely, the data we use is the following: for regional unit i and urban pole j , H_{ij} is the number of workers in regional unit i , who work for a firm whose head office is in urban pole j . Second, B_{ij} is the number of workers in urban pole i who work for a firm whose head office is in regional unit i . We then compute two indicators:

⁴ An alternative possibility would have been to take the share of executives in employment as an access indicator. This would rest on the assumption that resources are mostly transmitted by the highest social categories.

- First, a “head office indicator”, which takes into account the flows from head offices to subordinate plants. It is the sum, over all regional unit, of the number of workers “depending” of that regional unit, weighed by the resource level indicator (logarithm of employment again).
- Second, a “back office indicator”, which takes into account the flows from subordinate plants to head offices. It is simply the reverse operation.

Formally, we have:

$$headoffice_i = \frac{1}{E_i} \sum_{j=1}^U H_{ij} \ln E_j \quad (3) \quad \text{and} \quad backoffice_i = \frac{1}{E_i} \sum_{j=1}^U B_{ji} \ln E_j \quad (4)$$

where index j sums over all urban poles again.

The third form of bridging social capital we consider consists in political relationships. Again, due to data availability, we restrict to a particular form, which is the political power of mayors. An ideal way to proxy the power of mayors would be to examine their relationships with representatives of the national government. Alternatively, it could be interesting to look at the number of mandates held⁵. Unfortunately, such information is either unavailable or impossible to compile into simple indicators. Instead, for each municipality, we computed the ratio of subsidies granted to the municipality to an indicator of the municipality’s size, which is the “*dotation globale de fonctionnement*” or DGF, a transfer from the government to municipalities, which is calculated as a function of various parameters reflecting the size and needs of that municipality. In order to temperate idiosyncratic effects (such as punctual important investments), we took the average of that ratio over years 2001 and 2002.

Table 3 summarises the computation and sources of our bridging indicators.

Table 3. Indicator of bridging social capital

Channel	Indicator	Computation	Source
Population	Emigration	See equation (1)	1999 census
	Immigration	See equation (2)	1999 census
Business links	Head office	See equation (3)	1999 census, 1999 SIRENE database
	Back office	See equation (4)	1999 census, 1999 SIRENE database
Politicians	Subsidies	Subsidies received by municipalities / DGF (average 2001-2002)	Ministry of interior affairs

3. Assessment of the relevance of the set of indicators: the case of rural France

Instead of commenting on each indicator separately, and looking at its values for different zones, we proceed in two steps. First, we conduct principal component analysis to look for regularities between these indicators in the case of French rural areas. Second, we provide simple econometric estimations in order to see whether our social capital indicators are related to economic growth.

Our scale of study is the “*bassin de vie*” (INSEE, 2003), which is defined by statistical criteria satisfying two requirements. First, they must be integrated with regard to services. For a list of services considered as “basic”, most inhabitants do not need to get out of the *bassin de vie*. Second, they must be integrated with regard to commuting: most inhabitants of a *bassin de vie* work inside it. Concerning urban poles, we use the INSEE definition of metropolitan areas, i.e. urban units in which there are more than 5000 jobs. There are 357 urban poles according to the 1999 data.

⁵ In France, many elected representatives hold several mandates at the same time, for instance mayor, councillor at the regional council and member of the national Parliament. Although recent regulations tend to limit this practice, it is still very common.

The *bassins de vie* can be fairly small. There are 1745 rural *bassins de vie*, whose population (1999 data) range from 270 to 60 000 inhabitants. The mean population of rural *bassins de vie* is of about 12 000 inhabitants, with a standard variation of 9 500 inhabitants. Even if it is somewhat heterogeneous, this scale of study has proved to be interesting for studying both economic and sociological relationships. For the econometric estimations, because of data reliability problems, we restricted the sample by excluding Corsica and *bassins de vie* with less than 2000 inhabitants, and are left with 1704 regional units. We further discuss the problem of the scale of study in section 4.1.

An alternative possibility would have been the “*zones d’emploi*”, which are larger units defining supposedly integrated economic zones. The population of the *zones d’emploi* ranges from 15 000 to several millions (in the large metropolitan areas of Paris, Lyon or Marseilles). There are at least three problems with that division. First, it was defined according to different rules across the different regions. Second, it was not defined by purely objective rules, but also by political considerations, as it determines the rates of regional aids (determined by the European competition rules). Third, it is almost impossible to provide a typology of *zones d’emploi* according to the degree of rurality. As we want to study development mechanisms in peripheral areas, this feature is problematical.

3.1. Building social capital indices

The indicators presented above each display some correlation with an interesting phenomenon linked to social capital. The last step in constructing measures of social capital is to determine how to assemble all those variables to get parsimonious measures of social capital. The basic tool for doing that is principal component analysis.

Before doing that, we can have a look at table 4, which gives the descriptive statistics of our variables, and table 5 which gives the correlation matrix between all variables. A few noteworthy features are already available there. First, two variables appear to display a very low variability: electoral turnout and charity gifts (however the latter is available at the *département* level only). On the contrary, there is considerable variability of the business networks indicators, which is not surprising, given the important differences in economic activity in rural areas. Looking at the correlation matrix, one can see that there are many correlations between *bonding* variables, most of which are positive as expected. Things are less clear with *bridging* variables.

Table 4. Descriptive statistics

	Mean	Std. error	CV	Median	Min	Max
Trust phonebook	0.80	0.18	22%	0.77	0.19	3.16
Charity gifts	21%	3%	12%	21%	17%	29%
Electoral turnout	72%	3%	4%	72%	62%	81%
Inverse farm size (ha ⁻¹)	0.07	0.05	79%	0.06	0.00	0.85
Fiscal integration	21%	15%	69%	21%	0%	93%
Associations for 1000 inhab.	5.6	2.6	47%	5.2	0.5	27.1
Bars/café for 1000 inhab.	11.1	8.2	74%	9.6	0.0	93.6
Sport facilities for 1000 inhab.	1.17	0.55	47%	1.10	0.10	4.19
Emigration index	0.35	0.16	44%	0.33	0.05	0.94
Immigration index	0.13	0.07	51%	0.12	0.01	0.54
Head office (/1000)	1.6	3.9	241%	0.5	0.0	64.3
Back office (/1000)	7.5	12.7	168%	3.2	0.0	209.5
Subsidies / DGF	0.47	0.30	63%	0.40	0.01	3.36

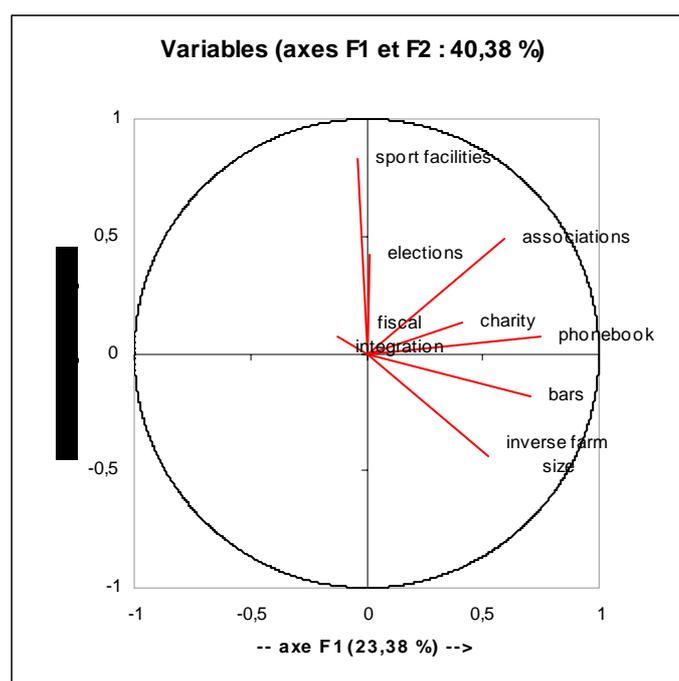
Table 5. Correlation matrix between social capital variables (bold = significant at 5% level)

	phone	char	elect	farm	fisc	asso	bars	sport	emi	immi	head	back	subs
phone		0,10	0,07	0,25	-0,03	0,32	0,40	0,01	-0,19	-0,04	-0,23	-0,17	-0,04
char	0,10		0,10	0,24	-0,03	0,14	0,10	0,07	-0,19	-0,17	-0,03	0,01	0,26
elect	0,07	0,10		-0,01	0,12	0,03	-0,10	0,11	-0,05	0,02	-0,13	-0,05	0,07
farm	0,25	0,24	-0,01		0,01	0,05	0,19	-0,23	-0,11	-0,02	-0,05	-0,01	0,07
fisc	-0,03	-0,03	0,12	0,01		-0,04	-0,09	-0,01	-0,02	-0,10	0,00	0,01	0,00
asso	0,32	0,14	0,03	0,05	-0,04		0,28	0,24	-0,31	-0,25	-0,10	-0,04	0,07
bars	0,40	0,10	-0,10	0,19	-0,09	0,28		-0,13	-0,03	-0,04	0,06	0,03	-0,04
sport	0,01	0,07	0,11	-0,23	-0,01	0,24	-0,13		-0,32	-0,31	-0,21	-0,17	0,23
emi	-0,19	-0,19	-0,05	-0,11	-0,02	-0,31	-0,03	-0,32		0,70	0,14	0,03	-0,12
immi	-0,04	-0,17	0,02	-0,02	-0,10	-0,25	-0,04	-0,31	0,70		-0,01	-0,09	-0,04
head	-0,23	-0,03	-0,13	-0,05	0,00	-0,10	0,06	-0,21	0,14	-0,01		0,73	-0,04
back	-0,17	0,01	-0,05	-0,01	0,01	-0,04	0,03	-0,17	0,03	-0,09	0,73		-0,08
subs	-0,04	0,26	0,07	0,07	0,00	0,07	-0,04	0,23	-0,12	-0,04	-0,04	-0,08	

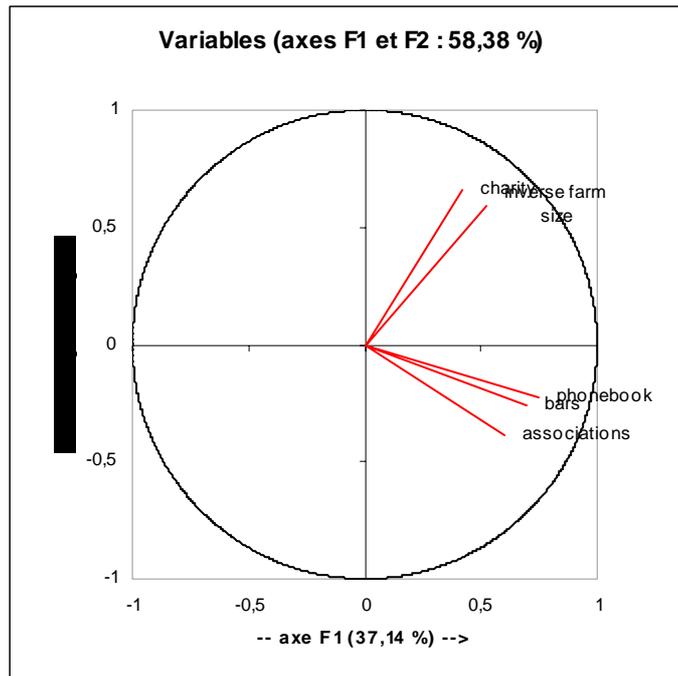
We can now give the results of PCA, beginning with *bonding* variables. As we can see in graph 1, most variables contribute positively to the first axis, except sport facilities, electoral turnout and fiscal integration. Satisfactorily, the first component seems to embody most features of *bonding* social capital: five of the eight variables contribute positively to it. Growth regressions (not presented here) show that only the first component has a significant impact on employment growth. Consequently, only the five variables that contribute most to the first component will be considered in the following discussion. The second component is mostly composed of “sport facilities” and “electoral turnout”. It is hardly surprising that these variables do not work, given their very indirect nature (sport facilities do not guarantee the existence of actual sport practice, and electoral turnout may be more governed by habits than by civic values). The third component is dominated by fiscal integration, which appears to be unconnected to other aspects of sociability; nor to economic growth.

If we make a PCA on the five remaining variables, we get an interesting picture (graph 2). Two groups of variables appear here. First, phonebook, bars and associations, second charity gifts and inverse farm size. The first group is linked to the demand for sociability, while the second one is more linked to co-operation and reciprocity.

Graph 1. PCA on bonding variables

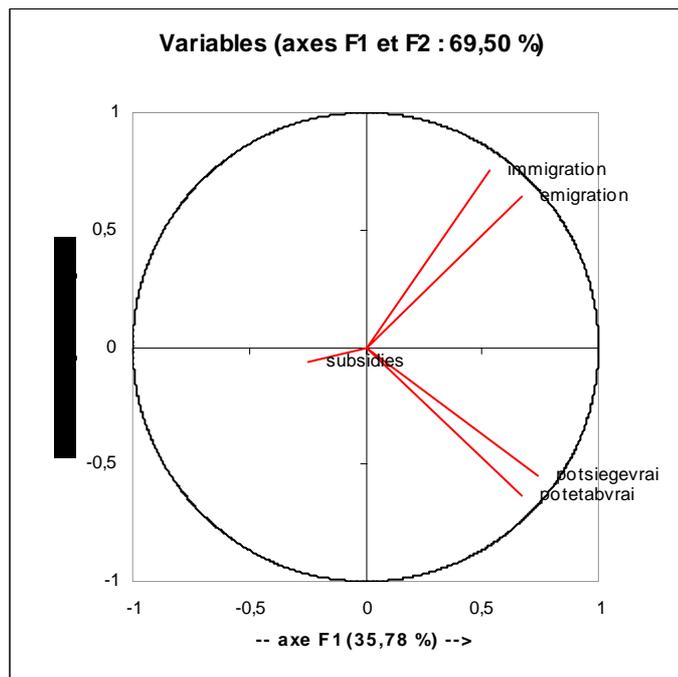


Graph 2. PCA on the five “best bonding variables”



Let us turn now to *bridging* variables (graph 3). Migrations and business networks are the main contributors to the two first component, and political phenomena of the third. Moreover, migrations and business networks form two (almost) orthogonal groups, as was suggested by the correlation matrix (table 5). The first component can be seen as integrating population and economic bridging networks, whereas the second can be identified with the difference between migration and economic networks.

Graph 3. PCA on bridging variables



If we look at the spatial variation of our indicators, we can make a few interesting observations. Map 1 in appendix shows the spatial repartition of the first component of the PCA on all *bonding* variables (graph 1). Satisfactorily, regions known for their rich cultural life such as Brittany and Alsace or the central part of France, turn out to have high values. Conversely, the alluvial plains of the *Bassin Parisien*, known for their individualistic traditions, get very low values. This map also displays some distortions, which should be kept in mind, such as in the Alps, because of the big ski resorts.

Maps 2 to 4 give the three first components of the PCA on bridging variables (graph 3). We can see that “network *bridging*” (component 1) is mostly concentrated in the North of the country, as well as near some important metropolitan areas (notably Marseille and Toulouse). For a still unclear reason, network bridging seems to be higher in the North of France. Concerning the second component, which stands for the difference between migration and economic networks, we have a clear concentration around the main metropolitan areas. This emphasises the fact that migrations usually have a short spatial scope, whereas business relationships more easily connect remote zones. Last, there is no clear pattern emerging from the map on political *bridging*” (third component). This is not surprising, as influent political leaders are likely to emerge everywhere.

3.2. Growth estimations

In order to see whether our social capital indicators are related to economic mechanisms, we perform simple econometric estimations. Our dependent variable is employment growth on the period 1990-1999. We use five control variables:

- As a market potential indicator, distance-weighted employment density (WIDEmp).
- The share of employment in the residential sector (Residential) in 1990.
- The share of employment in the industrial sector (Industry) in 1990, excluding food processing industry.
- As a first human capital indicator, the ratio of qualified workers to non qualified workers (Q/NQ) in 1990.
- As a second human capital indicator, the share of the population between 15 and 60 who owns at least the *baccalaureat* degree in 1990 (Bac).

Column 1 of table 6 shows the results of the regression with controls only. The only unexpected coefficient concerns the market potential indicator WIDEMP. As we are dealing with rural areas, this could be the sign of polarisation forces, which are generally stronger when transport costs with urban areas are low (Fujita and Thisse, 2002).

In column 2, we add social capital indicators. We use the two first components of the PCA on bonding and the three first components of the PCA on bridging indicators. While the first component has a positive impact, the second one is negative. This suggests that sociability has a positive impact on growth, while features related to co-operation would be detrimental to growth. This surprising finding could be explained by the inertia and closure that is sometimes associated with high cohesion (see table 1). However, more detailed investigations are necessary to better understand this phenomenon. “Network bridging” and “political bridging” have a positive impact, whereas the second bridging component (standing for the difference between migration and economic networks) has a negative impact, suggesting that it is the economic networks that have the strongest impact on economic growth.

Note that the market potential indicator WIDEmp now becomes insignificant, whereas the sign of Residential and Industry switch after controlling for social capital.

Table 6. Growth regressions: dependent variable = employment growth 1990-99

	(1)	(2)	(3)
Constant	-0.527***	-0.329***	-0.328***
WIDEmp	-0.002***	0.0004*	0.000
Residential	0.002***	-0.001**	-0.001**
Industry	-0.005***	0.005***	0.005***
Q/NQ	0.088***	0.043**	0.041**
Bac	0.745***	0.529***	0.520***
Bonding1 = sociability		0.064***	0.065***
Bonding2 = reciprocity		-0.044***	-0.046***
Bridging1 = networks		0.020***	0.020***
Bridging2 = differential between population and economic links		-0.059***	-0.060***
Bridging3 = political		0.014***	0.015***
Bonding1 * Bridging1			0.006***
Bonding1 * Bridging2			0.001
Bonding1 * Bridging3			0.002
R ²	0.101	0.334	0.336

*** significant at the 1% level, ** at the 5% level, * at the 10% level

We performed a third estimation to examine whether there is a complementarity between bonding and bridging social capital. In column 3, we added the interaction between Bonding1' and the three components of *bridging* social capital as regressors. The two first coefficients happen to be positive, which suggests a complementarity between bonding social capital and bridging due to outer networks.

4. Discussion

The results presented in section 3 are on the whole encouraging. Indirect as our indicators might be, the relationships between them suggest that they capture at least some aspects of what is meant by “social capital”. Moreover, they do seem to display relationships with economic performance. Another interesting result is that social capital does appear to be multidimensional, and that complementarities exist between its different forms.

In this section, we discuss some problems that arise for testing more rigorously hypotheses about causal relationships between sociological features and economic performance. First, the relevance of social capital indicators may depend on the scale of study. Second, there may be huge endogeneity problems, because of measurement errors, reverse causation, and above all the fact that some social capital indicator may in fact proxy for institutional performance. Last, we discuss some other research perspectives.

4.1. Spatial scale issues

Section 3 was based on the *bassin de vie* level. It is a convenient unit of analysis because it is supposed to be economically and socially integrated. However, there are clearly economic phenomena whose relevant scale of study is above the *bassin de vie*. It is not even necessary to look into industries with high economies of scale: developing tourism in rural areas often implies co-ordinating operators at a spatial scale well above the *bassin de vie*.

What our indicators fail to take into account is the scale at which social capital works. There may be a high social capital for co-ordinating very local actions, while collective action at higher level is very difficult. This echoes the notion of *radius of trust* developed by Francis Fukuyama (1995). If there is a high trust between close neighbours, but not at higher levels, the potential effects of social capital will hardly ever be noticeable.

The question of the radius of *bonding* social capital is closely linked to the question of openness, namely of *bridging* social capital. If a region has a lot of bridging social capital, there should be chances that its bonding social capital would also extend at a high scale. However, in some cases, bridging social capital may be high, but bonding social capital might have a low spatial extent because of “archaic mentalities”. For example, the Aveyron *département* has a high bridging social capital because there have been many emigrants to Paris since the XIXth century. These emigrants and their descendants are very well organised in the French capital (the “*Aveyronnais de Paris*”), and many of them own businesses. However, there are little signs of a high bonding social capital in Aveyron, as the behaviour of economic agents remains very individualistic (Pecqueur *et al.*, 2004).

Finding measures of the radius of trust seems illusory yet. An possibility would be to suppose that a low radius of trust is associated with conservative behaviour. A crude way to measure conservatism is to look at the vote for right winged conservative parties. In rural areas, the conservative vote is very well connected to traditional values, which itself is though to be correlated with the tendency to distrust people outside the local level. However, “conservative parties” not only promote conservative values, but also free market options, so the interpretation of this indicator is difficult. Consequently, the issue remains largely open yet.

4.2. Endogeneity issues

An econometric study on social capital is clearly prone to endogeneity problems. The very indirect nature of many indicators, as well as the bad quality of some data, raise problems of measurement errors and interpretation of variables. A positive impact of some social capital indicator on growth may in fact be due to a different mechanism for which this indicator happens to proxy. In this subsection, we only deal with two quite tricky problems: the possibility of reverse causality and the role of institutions.

The fact that social capital evolves across time is problematical for making inferences about its role on economic performance. If the phenomena that make it evolve are themselves influenced by economic performance, then testing causality relations will be difficult. Norms should evolve more slowly than the structure of networks, so it could be wise to use cognitive measures instead of structural ones. However, an indicator such as charity gifts could heavily depend on economic conditions, so it should be used with care. Inversely, there is little reason why association density should be influenced by economic conditions. Consequently, it will be useful to study the time evolution of social capital variables before linking them to economic issues, and to use past values as instrumental variables. Unfortunately, most of the variables used here are not available before 1998.

Let us now turn to the potential role of local institutional characteristics, which according to Durlauf and Fafchamps (2004) is the most challenging problem for making inferences about the role of social capital on economic performance. The point is that social capital indicators may in fact proxy for the quality of local institutions, in which case a positive coefficient in the regression would not tell anything about the actual role of social capital.

Although formal rules are roughly uniform in France, institutional efficiency may be the result not of sociological characteristics, but simply on idiosyncratic factors such as the presence of efficient managers. Because efficient managers should be attracted to each other (and reciprocally for inefficient ones), there may be circular and cumulative phenomena that might cause a significant variability in institutional efficiency. Institutional efficiency should lead to good work conditions, and a pleasant social atmosphere as well, leading to high social capital measures (and *vice versa*). Case studies surveyed in Callois and Aubert (2005) suggest that the efficiency of local leaders tends to be influenced by the general sociological conditions, in which case social capital would really be an influential factor of performance. However, these results need to be corroborated by other case studies.

Note that two of our indicators are related to formal institutions: association density and fiscal integration. While associations appear to be correlated to informal indicators (trust, bar frequentation), fiscal integration is not related to other *bonding* indicators. Consequently, political co-operation seems to be quite independent of other types of co-operation.

4.3. Further work

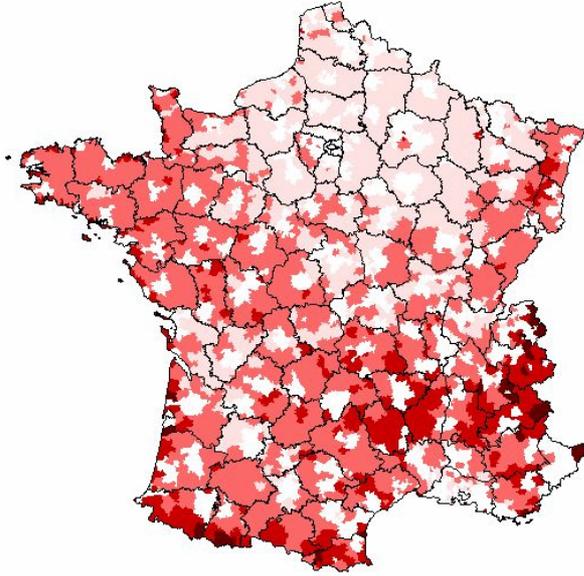
As the two previous subsection show, future research should give emphasis on both case studies and econometric work. More fieldwork would give more precise insights about the respective role of institutions and of sociological characteristics, and also on the spatial scales at which relevant co-operation and information transmission take place. Econometric work is essential to give generality to the results of case studies. Further research should be done in order to improve the quality of indicators by refining the variables used. For instance, the positive impact of the variable “subsidies” has been interpreted as a sign of the role of political relationships. However, this variable encompasses many different subsidies, some of which may have nothing to do with political power.

Unfortunately, for many phenomena links with social capital, relevant measures simply do not exist in current databases, and cannot be constructed. In general, very little information about sociological or institutional features is yet being collected systematically. A stronger political will to deepen the understanding of the role of social capital in development would thus be precious. Policies such as the rural development initiatives *Leader* are clearly inspired by the social capital paradigm, so a more thorough understanding of these development mechanisms has important implications, both theoretical and practical.

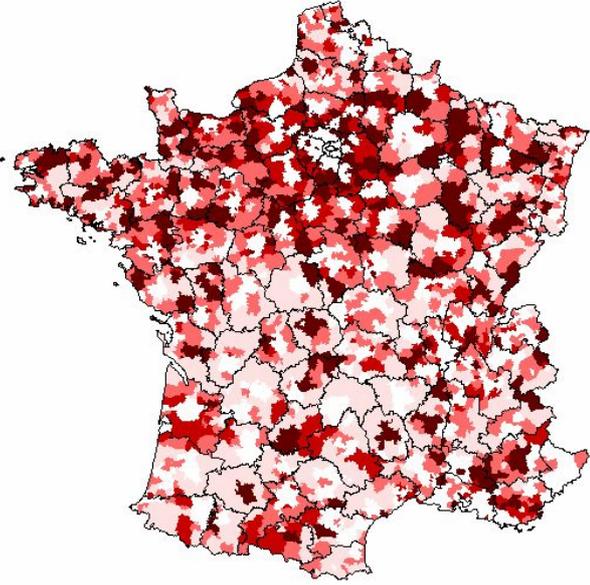
References

- Burt, R. S. (2000). "The network structure of social capital." Research in organizational behaviour **22**: 355-373.
- Bowles, S. and H. Gintis (2002). "Social Capital and Community Governance." Economic Journal **112**(483): F419-436.
- Callois, J-M. (2004), Capital social et développement économique local : Pour une application aux espaces ruraux français, Revue d'économie régionale et urbaine n°2004-4, pp 551-578.
- Callois, J-M., and F. Aubert (2004), Towards indicators of social capital for regional development issues, Working paper (available at request).
- Collier, P. (1998). Social capital and poverty. Social capital initiative, working paper n°4, The World Bank. Washington.
- Combes, P., M. Lafourcade, et al. (2003). The Trade Creating Effects of Business and Social Networks. Document de travail CERAS n°3750.
- Durlauf, S. N. and M. Fafchamps (2004). Social capital. Handbook of economic growth. S. Durlauf and P. Aghion.
- Fafchamps, M. and B. Minten (2002). "Returns to Social Network Capital among Traders." Oxford Economic Papers **54**(2): 173-206.
- Fukuyama, F. (1995). Trust: the social virtues and the creation of prosperity. New York, Free Press.
- Fujita, M. and J. F. Thisse (2002). Economics of agglomeration. Cities, industrial location and regional growth, Cambridge university press.
- Guiso, L., L. Zingales, et al. (2004). "The Role of Social Capital in Financial Development." American economic review **94**(3): 526-556.
- Hofferth, S. L. and J. Iceland (1998). "Social capital in rural and urban communities." Rural sociology **63**(4): 574-598.
- INSEE (2003). Structuration de l'espace rural : une approche par les bassins de vie, Rapport de l'INSEE pour la DATAR (with participation of IFEN, INRA, SCEES).
- Knack, S. and P. Keefer (1997). "Does Social Capital Have an Economic Payoff? A Cross-Country Investigation." Quarterly Journal of Economics **112**(4): 1251-1288.
- Krishna, A. (2001). "Moving from the Stock of Social Capital to the Flow of Benefits: The Role of Agency." World Development **29**(6): 925-943.
- Lin, N. (2001). Building a theory of social capital. Social capital: theory and research. N. Lin, K. S. Cook and R. S. Burt. New York, Aldine de Gruyter: 3-30.
- Narayan, D. and L. Pritchett (1999). "Cents and sociability: household income and social capital in rural Tanzania." Economic development and social change **47**(4): 871-897.
- North, D. (1991). "Institutions." Journal of economic perspectives **5**(1): 97-112.
- Portes, A. and P. Landolt (1996). "The downside of social capital." The American prospect **26**: 18-21.
- Pecqueur B., Roux E., Vollet D.,(2004), Les ressources font territoire, les institutions aussi, des produits aux territoires de l'Aubrac et des Baronnie, Colloque de la SFER « Les systèmes de production agricole : performances, évolutions, perspectives », Lille, 18-19 novembre 2004, 15 p.
- Putnam, R. D. (2000). Bowling alone: the collapse and revival of American community. New York, Simon & Schuster.
- Rauch, J. E. (2001). "Business and Social Networks in International Trade." Journal of Economic Literature **39**(4): 1177-1203.

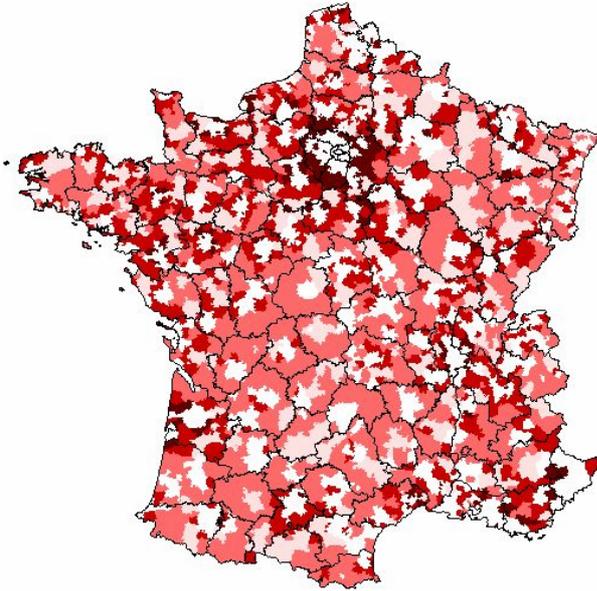
Map 1. Bonding (first component)



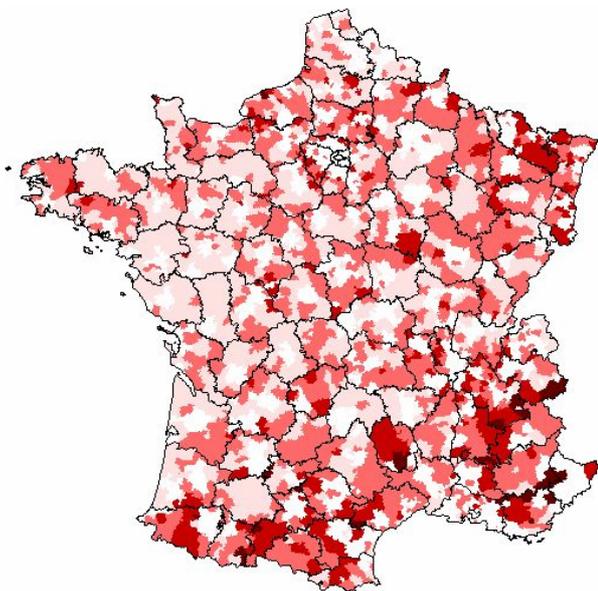
Map 2. Bridging ("network" component)



Map 3. Bridging ("differential" component)



Map 4. Bridging ("political" component)



WORKING PAPER

Can Williamson's Analysis of Discrete Structural Alternatives Help Regulators to Choose Between Environmental Policy Instruments? Douadia Bougherara, Gilles Grolleau, Naoufel Mzoughi (UMR INRA-ENESAD CESAER Dijon), **2005/1**, 10 p.