Journal of Urban Economics 68 (2010) 191–204

Contents lists available at ScienceDirect

Journal of Urban Economics

www.elsevier.com/locate/jue

Local social capital and geographical mobility

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ARTICLE INFO

Article history:
Received 29 August 2008
Revised 19 April 2010
Available online 13 May 2010

Keywords:
European unemployment
Geographical mobility
Social capital

ABSTRACT

In the North of Europe, club membership is higher than in the South, but the frequency of contacts with friends, relatives and neighbors is lower. We link this fact to another one: the low geographical mobility rates in the South of Europe relative to the North.

To interpret these facts, we build a model of *local* social capital and mobility. Investing in local ties is rational when workers do not expect to move to another region. We find that observationally close individuals may take different paths characterized by high local social capital, low mobility and high unemployment, vs. low social capital, high propensity to move and higher employment probability. Employment protection reinforces the accumulation of local social capital and thus reduces mobility.

European data supports the theory: within a country and at the individual level, more social capital is associated with lower mobility.

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1. Introduction

> "[. . .] it appears evidently from experience that a man is of all sorts of luggage the most difficult to be transported."
> Adam Smith, "Wealth of Nations"

In Europe the fraction of the 0–99 years old population having moved to their current residence within a year is small (around 5%), according to estimates from the European Community Household Panel (ECHP hereafter). This value varies across European countries, with residential mobility being lowest in Southern European countries (2.8% in Spain, 2.7% in Portugal, 2.1% in Italy, 1.9% in Greece) and in countries such as Ireland and Austria (1.9 and 2.3, respectively) and is highest in Scandinavian countries (7% in Sweden, 9% in Finland, 6.6% in Denmark) and in Germany (6.8%). In contrast, according to the US Census population, the US residential mobility rate in 2000 was 15.5%. Regional mobility is also low in Europe, compared to the US where about 30% of individuals were born in a different state. By contrast, in Europe this proportion is only 20% for individuals born in a different region within the same country (at least in regions similar in size to the US states).[1]

We link these facts to another set of facts: countries differ quite widely as regards to social capital investments, and more precisely, in the type of social capital accumulated. In the ECHP, individuals are asked about: (i) the frequency of relationships with neighbors, (ii) the frequency of contacts with friends and relatives outside the household, and (iii) club membership. Transforming the answers to the first two questions into a daily frequency[2] to simplify the exposition, we report country averages in Table 1. With respect to the above questions, one can observe a striking *North–South divide*: in the South of Europe (and in Ireland too), there is a higher frequency of contacts with friends, relatives and neighbors, and lower membership rates in clubs and associations. The opposite holds in the North of Europe.

We interpret this as a difference in the nature of social capital. Strong family and friendship ties reflect a relatively more *local* social capital, thus *making mobility more costly*. Local social capital reflects the ties that individuals have to their region/area of origin, and is therefore partly or fully depreciated upon mobility. In contrast, being a member of a club (such as a Scrabble or a chess league) can be considered as less local and more general kind of social capital: club members can build new ties in another club in a new city, and this may even help them cope with mobility.

We argue in this paper that the concept of local social capital provides a convenient and parsimonious explanation to cross-country variations in geographical mobility rates in Europe, and in particular why it is lower in the South and higher in the North of Europe. Further, we illustrate how various types of social capital

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[1] More specifically, this figure is 19.2% in Belgium, 12.7% in Portugal and 16.8% in Austria. In Spain this number is slightly higher (23.5%) but the regions there are smaller. In these four countries the average rate is 18.1%, as opposed to Belgium for instance, since Belgium has three regions. See Brunello et al. (2007) for regional mobility figures.

[2] Details on the procedure and questions are given in Section 5.

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doi:10.1016/j.jue.2010.04.003

Table 1
Aggregate social capital.

Country	Friendfreq	Neibfreq	Club
Nordic countries and the UK			
Denmark	0.43	0.418	0.621
Finland	0.459	0.523	0.525
Sweden	0.436	na	0.694
UK	0.576	0.280	0.627
Western Europe			
Austria	0.358	0.463	0.495
Belgium	0.410	0.390	0.394
Germany	0.147	na	0.328
Ireland	0.789	0.620	0.487
Luxembourg	0.448	0.473	0.410
Netherlands	0.420	0.367	0.480
Southern Europe			
Greece	0.695	0.808	0.121
Italy	0.576	0.547	0.238
Portugal	0.478	0.666	0.215
Spain	0.740	0.681	0.285
Correlation with			
Friendfreq	1	0.61	−0.22
Neibfreq	0.61	1	−0.79
Club	−0.22	−0.79	1

Notes: The table displays the average value of the social capital measures by country for the active population. Dimension: daily frequency of contacts with friends and relatives (friendfreq), with neighbors (neibfreq), or average club membershib (club). Sample period is 1994–2001, except Finland (1996–2001), Sweden (1997–2001), Austria (1995–2001) and Luxembourg (1994). "na" refers to non-available data. See Section 5 for more details on the methodology used to construct these indexes.

have different impacts on mobility and unemployment rates. The reciprocal is also true, since the anticipation of mobility affects social capital investments, as mentioned in Glaeser et al. (2002). If individuals perceive themselves as being strongly attached to a village, a township or a region, they will invest in local social capital, because the returns from these local ties are high.

Understanding the determinants of geographical mobility matters as it reflects economies' ability to cope with change and to reallocate production factors to where they will be more efficient, and ultimately to raise the aggregate employment rate. In particular, an influential work by Bertola and Ichino (1995) documented the inability of European workers to move to more dynamic regions. According to these authors, this occurs because of wage and income compression, thus lowering the returns from mobility. Low mobility and wage compressing labor market institutions have indeed been central in many explanations of unemployment in Europe (see Layard et al., 1991; Layard and Nickell, 1999), since residential mobility widely differs across countries. In this paper we enrich these theories using the concept of local social capital.

In Section 2, we first review the literature on social capital and emphasize its implicit or explicit geographical dimensions. In Section 3 we develop a simple partial equilibrium job search model with geographical mobility decisions, given the level of social capital. We show that more social capital always reduces mobility with ambiguous effects on unemployment: social capital increases unemployment only if it depreciates more after geographical mobility than after job loss. In Section 4, we explore the determinants of social capital. We find that ex ante observationally close individuals may behave very differently: some will not invest a great deal in local social capital and will thus be more mobile and better employed, while others will invest more in local social capital, remain immobile and unemployed, but enjoy the returns to their social capital.

In Section 5, we match theory and the data by providing a panel analysis based on the ECHP. Using probit, IV and fixed effects, we establish a few stable relations within the data, notably: (1) Individuals endowed with more local social capital as described by the variables "Friends/relatives", "Neighbors" or "Club" are less likely to move to another region. (2) Individuals endowed with more local social capital such as that described by the variables "Friends" or "Neighbors" are more likely to become unemployed. (3) By contrast, individuals who are members of a club are less likely to become unemployed. (4) In all three dimensions measured, workers in a region not that of their birth have less social capital ("Friends/relatives", "Neighbors" and "Club").

In the conclusion, we further explore the explanatory power of social capital on aggregate unemployment, and conclude that more work on this issue is needed, given the concept's potential. Finally we argue that, as a result of these two *self-reinforcing* causalities and this externality, local social capital is a binding factor: even in the presence of strong economic incentives to migrate, such as regional unemployment differentials, individuals may prefer to live on welfare and enjoy local social capital.

2. Local social capital: selected literature review

There are many definitions of social capital. In this section, we attempt to define the concept in relation to our own purpose: to link social capital with geographical mobility and employment decisions. Durlauf and Fafchamps (2005) distinguish between two different definitions of social capital: (1) "outcome-oriented" definitions and particularly the importance of group externalities caused by the existence of social capital; (2) definitions focusing on the nature of relations and the interdependence of individuals embodied in social capital, such as "shared trust, norms and values". The former results more from the existence of social capital, and the latter its nature. Here, along the lines of Glaeser et al. (2002),[3] we deal with the consequences of social capital, focusing on the localness of social capital and its depreciation.[4]

The depreciation of social capital is not a new idea: Coleman (1990) in particular clearly expressed the idea that social capital can depreciate if there is no investment to renew it. "*Social relationships die out if not maintained; expectations and obligations wither over time; and norms depend on regular communication*".[5] Although there is no explicit spatial dimension here, a simple cost–benefit analysis suggests that being further away (geographically) increases the maintenance cost of social capital and is associated with lower stock in equilibrium.

The localness is also implicit in many works. Even before the term "social capital" was introduced, studies such as that of Jacobs' (1961) on large American cities, underlined the importance of implicit rules in neighborhoods: a knowledge of those implicit rules allows for the building of trust. She showed that social ties are especially stronger in older neighborhoods. This work is one of the earliest in which the geographical dimension of social capital is stressed: social ties as defined here cannot be moved from one place to another. Schiff (1992) argued that higher mobility could be detrimental to welfare, due to an excessive depletion of social capital.[6]

It is also worth noting however that social capital is not exclusively local, and instead can be built in order to promote mobility.

[3] Glaeser et al. (2002) notably argue that "social capital declines with expected mobility" and confirm this prediction with an expected probability score based on demographics.

[4] Our definition of social capital obviously belongs to the second set of definitions proposed by Durlauf and Fafchamps. Indeed, we define the social capital according to its local characteristics.

[5] See Coleman (1990, p. 321).

[6] See also Schiff (2002) for a similar argument in a trade context and sound conclusions regarding both trade and immigration policies.

A very good example is the development of Rotary Clubs in the beginning of the 20th century in the US. They were originally designed to reproduce the social environment of professionals enjoyed when moved from one place to the other, and were precisely intended to provide a substitute to local social capital.[7] Another example comes from the literature on development: Winters et al. (2001) analyze the effect networks have on the choice to migrate from Mexico to the United States, finding that there could be a positive link between social capital and migration, especially since networks provide information on where to move.

The labor literature emphasizes the following mechanism: social capital conveys information and leads to an improvement in the quality of matches made between employers and employees. For instance, Calvó-Armengol and Jackson (2004) propose a theoretical framework in which they assume that the probability of finding a new job depends on the social network of the agent.[8]

It is interesting to note that most works surveyed emphasize the positive role of social capital on labor market performance, while in this paper we tend to emphasize certain negative channels. Bentolila et al. (2010) provides a counterexample, and looks more specifically at European countries, emphasizing the potential negative links between social capital and labor markets. In particular, they argue that jobs obtained through social networks have a wage discount, distorting choices towards inefficiency. See also David et al. (2008a) for a more complete literature review.

In an insightful empirical paper based on PSID data in the US, Kan (2007) uses the concept of local capital and applies some of the same intuition we formalize in our model. Our paper is more devoted to labor markets and unemployment than Kan's paper, and our paper is focussed on cross-country differences in social capital while they focus on the US. Another recent paper by Belot and Ermisch (2006) addresses an issue very similar to ours. While they too do not have any formal theory contrary to us, they do have very good data on social capital (although for a single country, the UK), and this in particular allows them to explore two aspects of the strength of social ties: location of the closest friends and frequency of contacts. Their results actually emphasize the importance of the first factor.[9] These conclusions are also reached in a recent paper by Dahl and Sorenson (2010). In their paper, the authors find that skilled workers such as engineers and technical workers have very strong preferences for living close to family and friends. In a somewhat different context, Spilimbergo and Ubeda (2004a,b) argue that US Black workers are less mobile than Whites due to family ties (2004b) and successfully test this using the PSID survey. Finally, a recent and subsequent paper by Alesina et al. (2009) emphasizes the role of family values on geographical mobility. The two papers are similar and distinct. Our work is both more general since it involves both family values and friendship ties as a determinant of mobility and does not focus on family values only. In turn, Alesina et al. (2009) have an interesting set of instruments based on the origin of migrants in the US and show that US residents originating from a country with strong family values still move less a century after their family migrated. They also endogenize labor market institutions and family values, where in this paper we treat as exogenous labor market institutions and endogenize the equivalent of their family values (family ties) and more generally all types of social capital.

3. Model

In this model, we describe the maximization program for an individual who invests in social capital, assuming in particular that an individual's stock of social capital directly increases utility, with no social externality. There are several channels through which more social capital increases ex-ante utility, such as insurance, information flows or the complementarity with leisure. Developing a model along these dimensions is beyond the scope of our theory, given that we are already focusing on other dimensions, such as localness of social capital and mobility decisions.

3.1. Setup

We consider a typical worker living over two periods. There are two Regions A and B. Without any loss of generality, we assume the worker is born in Region A, and lives and works there in period 1. We assume she is endowed with S units of social capital. If she leaves Region A, then her social capital is depreciated and she only retains a fraction of it. This is the localness property of social capital. Let us use δ_λ to denote the depreciation rate, which describes the degree of localness of social capital. We may consider, for instance, that by leaving her native region, she loses δ_λ friends, or meets with her relative less frequently.[10]

We also consider that social capital is to some extent professional: this is a second dimension of social capital that will be of some use in our analysis. This dimension does in fact have a first-order impact on job acceptance decisions, in the sense that when one loses a job, a few social connections are lost as well. To symmetrically process the localness and the "professionalness" of social capital, we use δ_π to denote the depreciation rate of social capital when the agent is unemployed in the second period.[11]

Hence, the set of parameters $(\delta_\lambda, \delta_\pi)$ allows us to describe various types of social capital, with values assigned as follows. For instance, social capital associated with being a member of an association that is both local and professional (e.g., the association of textile engineers in a given region, such as the North of France) would imply that $\delta_\lambda = 1$ and $\delta_\pi = 1$; social capital of being in a local sport club (e.g., a local soccer club) or having friends in the same neighborhood would imply that $\delta_\lambda = 1$ and $\delta_\pi = 0$; social capital of being a member of a country-wide association (e.g., Scrabble, chess) would imply that $\delta_\lambda = 0$ and $\delta_\pi = 0$; and finally social capital of member of a country-wide professional association (such as the

[7] We would like to thank Robert Putnam for this relevant example. The statement on the Rotary Club web page reads "The world's first service club, the Rotary Club of Chicago, Illinois, USA, was formed on 23 February, 1905 by Paul P. Harris, an attorney who wished to recapture in a professional club the same friendly spirit he had felt in the small towns of his youth. The name "Rotary" derived from the early practice of rotating meetings among members' offices."

[8] See also Granovetter (1995) on how social capital improves welfare through the creation of an efficient network comprising social ties that allows for better expectations; Ioannides and Loury (2004) on how networks affect labor-market outcomes and inequality; Montgomery (1991) on the importance of referrals to outcomes on the labor market.

[9] The dataset used by Belot and Ermisch (2006) allows them to explore other instruments to describe the environment in which the individual spent his/her childhood. They consider the number of biological siblings in the household when the individual was 14 years old, his birth-order, the level of education of his parents and whether s/he grew up in a rural or urban area.

[10] Through focusing on a definition similar to ours, Glaeser et al. (2002) show that the amount of an individual's social capital negatively depends on the probability of leaving her community. Data from the General Social Survey support this conclusion. More particularly, they build an expected mobility measure and find a strong negative correlation with social capital measures. Home ownership is instead positively correlated with social capital. Other papers follow a similar framework, such as Belot and Ermisch (2006), Bräuninger (2002), Kan (2007) and Spilimbergo and Ubeda (2004a,b).

[11] Our two concepts of social capital are linked with weak and strong ties sometimes mentioned in the literature on labor markets and social networks. According to Calvó-Armengol et al. (2007) for example, strong ties are those connecting "members of the same family or very close friends" and weak ties as "a transitory social encounter between two persons". Although it may not be immediately clear why we introduce these two social capital dimensions, it will become evident that this is a necessary distinction when rationalizing the empirical results, especially in terms of the effect that social capital has on unemployment probability.

American Economic Association) would imply that $\delta_\lambda = 0$ and $\delta_\pi = 1$.[12]

We assume that social capital increases utility linearly. Let Ω_2 be the income of the individual in the second period, and to simplify, we assume that utility in second period U_2 is

$$U_2 = \begin{cases} \Omega_2 + S & \text{if the worker is employed in Region A} \\ \Omega_2 + (1-\delta_\pi)S & \text{if the worker is non-employed in Region A} \\ \Omega_2 + (1-\delta_\lambda)S & \text{if the worker is employed in Region B} \\ \Omega_2 + (1-\delta_\lambda)(1-\delta_\pi)S & \text{if the worker is non-employed in Region B} \end{cases}. \tag{1}$$

The labor market is a standard partial equilibrium search setup. If workers are unemployed, we assume they receive an income $\Omega_2 = b$ interpreted as unemployment benefits or leisure independent of social capital. If employed, their income is their wage w. To simplify the description, jobs last one period, though this assumption is relaxed in Section 4.2.2, where we investigate the role of more stable employment relationships and of employment protection. The wage is random: in the beginning of the second period, workers receive one job offer with a wage w from a cumulated distribution F in Region A and one job offer with a wage w^* from a cumulated distribution G in Region B (f and g are the associated densities). The random draws are uncorrelated, and we use $\bar{w}$ to denote the upper support of those distributions. For both distributions, we also assume that the lower bound of the support is 0.

As an illustration, in a world where all regions are symmetric and have the same labor market conditions, it might be considered that $G > F$ (first order stochastic dominance) would reflect the fact that workers have more local contacts and thus receive better local offers. It might be interesting to rationalize, for instance, that workers receive multiple independent offers of quantity n and p with $n > p$, from a common distribution F_0. In this case, we can precisely show that the expected value of the wage is for instance $\int_0^{\bar{w}} w d(F_0^n(w))$ or alternatively that $F = F_0^n$ and $G = F_0^p$.[13] In a world where certain regions are depressed and others are booming, for the main part of the support, we would however assume $F > G$. For our results, we see no need to order the distributions at all.

3.2. Workers' program

In a second period, all individuals have to prospect for a job. There are four possible choices, as described in Eq. (1): staying in the home region and remaining unemployed; moving and remaining unemployed; staying and accepting the local wage offer; moving and accepting the foreign job offer. We can discard the second possibility, given that $U_2 = b + (1-\delta_\lambda)(1-\delta_\pi)S$ (unemployed in B) is always lower than $b + (1-\delta_\pi)S$ (unemployed in A). The decision set can thus be summarized as

$$U_2(S) = \max\{b + (1-\delta_\pi)S, w + S, w^* + (1-\delta_\lambda)S\}, \tag{2}$$

where the max operator reflects the optimal mobility/job acceptance decisions, which are the joint decisions explored in the next section. Offers from inside and outside the region occur simultaneously, as do decisions by the individual to move or to stay and to accept a job or remain unemployed (see Appendix A). In particular for the individual's decision tree: the worker compares her (best) local offer w, her best foreign offer w^* and her outside option b, as indicated in Eq. (2).

[12] Here, social capital is defined by a particular geographical depreciation and particular professional depreciation considered as parameters. In Section 4.2.1, we relax this assumption and investigate the case where an agent can invest in two types of social capital, one local and the other professional and show that the assumptions of the benchmark case have no consequence.

[13] Chapter 6 in Ljunqvist and Sargent (2004).

At this stage, we introduce two useful notations that will show up subsequently in many equations:

$$w^r = b - \delta_\pi S. \tag{3}$$

$$w^{*r} = b + (\delta_\lambda - \delta_\pi)S. \tag{4}$$

The quantity w^r may be interpreted as the reservation wage for an offer in Region A: it is the local wage that makes the agent indifferent to accepting or rejecting the job offer. It increases in b and decreases in social capital: a higher S increases the acceptance rate in Region A. This brings about the possibility of a positive impact of S on employment: the worker has more to lose in rejecting a job offer if this would decrease its utility through the loss of social capital $\delta_\pi S$. Similarly, w^{r*} is interpreted as a reservation wage for Region B offers: the worker balances out staying unemployed and enjoying b, but sacrificing $\delta_\pi S$ units of social capital, or moving and obtaining a job in B but sacrificing $\delta_\lambda S$ units of social capital.[14] The interesting conflict arising from the impact that S has on job acceptance and on mobility can be signed out if we introduce a definition of local social capital.

Definition. Social capital is said to be relatively local if $\delta_\lambda > \delta_\pi$, that is, if more is lost from a regional move than from a job loss. It is said to be relatively professional if instead $\delta_\pi > \delta_\lambda$, while it is said to be neutral if there is equality between the two parameters.

When social capital is *relatively* local, more social capital raises w^{*r} because moving to secure a job in Region B generates more social capital losses than it saves in professional social capital. Social capital in this case reduces the acceptance rate of offers and consequently geographical mobility. Here we obtain a mechanism that may have either a positive or a negative impact of S on unemployment, depending on the localness of social capital.

The fact that relative depreciation rates have an effect on the sign attached to the impact of social capital on unemployment justifies our decision to consider both social capital dimensions, since it helps rationalize the empirical results.

3.3. Geographical mobility and social capital

The ex-ante probability of moving is denoted by P_m and depends on the distribution of wage offers in each region. Note that for the sake of simplicity draws in F and G are not correlated. Appendix A. shows that

$$P_m = \int_{w^{r*}}^{\bar{w}} F(z - \delta_\lambda S) g(z)\, dz. \tag{5}$$

For a worker to be mobile, there must be a wage offer in Region B above her reservation wage w^{r*} (hence the integral between w^{r*} and the upper support of wage offers) and a local wage offer that is sufficiently low compared with the current offer z net of depreciated social capital if the worker moves, hence the term $F(z - \delta_\lambda S)$ representing the fraction of such low local offers.

It thus becomes useful to examine how this probability varies with S. To do so we obtain:

$$\frac{dP_m}{dS} = (\delta_\pi - \delta_\lambda) F(w^r) g(w^{*r}) - \delta_\lambda \int_{w^{*r}}^{\bar{w}} f(z - \delta_\lambda S) g(z)\, dz. \tag{6}$$

The second term is easy to interpret: it is always negative, a higher S means a higher loss of social capital in the event of geographical mobility and thus reduces the number of acceptable offers in Region B, except in the extreme case $\delta_\lambda = 0$ where social capital has no local dimension. The first term can be interpreted more subtly. To under-

[14] Note here that the decisions to accept and to move are simultaneous. These intuitions, albeit correct, must be studied in the more a complex setup where all offers take place simultaneously.

stand this, imagine a marginal worker receiving a local offer below w^r in Region A and a marginal offer w^{*r} in Region B. She is indifferent to the two options (moving or remaining unemployed). We know the amount δ_π of social capital she loses in rejecting both offers, and the amount δ_λ of social capital if she accepts the offer in Region B. So, giving her one more unit of social capital makes her more likely at the margin to remaining in Region A if the loss δ_λ is greater than the loss δ_π, e.g., $\delta_\pi - \delta_\lambda < 0$.

Proposition 1. *Effect of social capital on the mobility rate.*

(i) A sufficient condition for mobility to decline with S is that $\delta_\lambda > \delta_\pi$, i.e., in the case of relatively local social capital;
(ii) when $\delta_\lambda > \delta_\pi$, w^{*r} increases to $\bar{w}$ (possibly equal to $+\infty$) as $S \to +\infty$ and thus the mobility rate approaches zero;
(iii) a sufficient condition for mobility to increase with S is that $\delta_\lambda = 0$ and $\delta_\pi > 0$ (non-local but professional social capital).

For the first part of the proposition, the intuition is as follows: $\delta_\lambda > \delta_\pi$ characterizes a type of social capital such as friendship or neighborhood relations: social capital depreciates more when the worker moves than when unemployed. In this case, as social capital increases, incentives to move disappear and hence mobility declines. The second part of the proposition provides a result on the limit of the mobility rate as social capital approaches infinity. The last part of the proposition corresponds to the reverse case: when social capital is not local at all but is to some extent a professional one, then a higher level of social capital increases the incentive to move as workers prefer a job outside rather than no job inside the region. Overall, this proposition illustrates that the nature of social capital (localness or professionalness) is crucial when analyzing its effect on mobility.

3.4. Employment, unemployment and social capital

The model also suggests various other relations between employment status and social capital. More particularly it considers the probability of being unemployed, as given by:

$$P_u = F(w^r)G(w^{*r}). \tag{7}$$

The interpretation of (7) is easy: workers are unemployed if they receive two offers below their reservation wage. The impact of social capital is thus straightforward: we obtain (see also Appendix A)

$$\frac{dP_u}{dS} = -\delta_\pi f(w^r)G(w^{*r}) + F(w^r)g(w^{*r})(\delta_\lambda - \delta_\pi), \tag{8}$$

which leads straightforward to:

Proposition 2. *Effect of S on unemployment.*

(i) A sufficient condition for social capital to raise unemployment is $\delta_\pi = 0$;
(ii) another condition is that G is small and F is large at values w^{*r} and w^r and that social capital is local $\delta_\lambda > \delta_\pi$;
(iii) when $\delta_\pi > 0$, $w^r \to 0$ when $S \to +\infty$ and thus unemployment rate approaches zero;
(iv) a sufficient condition for social capital to reduce unemployment instead is $\delta_\pi > \delta_\lambda$, i.e., when social capital is relatively professional (as opposed to relatively local);
(v) in the general case, the effect is ambiguous.

As argued above, the first part states that social capital moderates wage claims if it depreciates upon unemployment. When $\delta_\pi = 0$, the only impact of social capital is that it reduces mobility due to localness. When G is large and F is small at the values w^{*r} and w^r, this means that there are few good offers in Region B and many good offers in Region A: in this case, the effect of localness dominates the effect of professional social capital depreciation. The other parts of this proposition are derived through applying the same logic.

Finally, the probability of finding a job in the local region is

$$P_w = \int_{w^r}^{\bar{w}} G(z + \delta_\lambda S)f(z)\,dz. \tag{9}$$

The interpretation is similar to that of the probability of moving: for a worker to find a local job, the wage must be greater than the local reservation wage (hence the integral between w^r and the upper support for the distribution of wages) and the wage offers in Region B must be low compared to the local wage offer given the local social capital depreciation in the event of a move to B (hence the term $G(z + \delta_\lambda S)$ represents the fraction of such low offers). In addition, we have:

Proposition 3. *Local employment probability is always increased by social capital except if $\delta_\lambda = \delta_\pi = 0$, in which case the probability is unaffected by S.*

Indeed,

$$\frac{dP_w}{dS} = \delta_\pi G(w^{*r})f(w^r) + \delta_\lambda \int_{w^r}^{\bar{w}} g(w + \delta_\lambda S)f(w)\,dw.$$

As before, the interpretation is easy: the first term represents the effect of one additional unit of social capital for a worker receiving an offer w^r, and with an offer w^* below w^{*r}. She accepts the local offer even more so, since her social capital becomes depreciated. The second term is zero if $\delta_\lambda = 0$ and positive; otherwise it reflects the supplementary gain obtained by accepting a local offer when being away in Region B depreciates her social capital. When $\delta_\pi = \delta_\lambda = 0$, S is just a scaling-up utility, but this does not affect the worker's arbitration between the different options.

4. Endogenous social capital

We now make S endogenous and explore its determinants. Given the assumption that jobs last one period, the decision to invest in social capital in the first period is independent of activity status (employed, unemployed) in the first period. We can thus describe the decisions in two steps. In the second period, the worker takes S as predetermined and, after collecting offers decide whether to accept local or foreign offers. In the first period, she anticipates their decisions in the second and decides accordingly how much to invest in social capital.

In the first period, the worker maximizes U_1 defined ex-ante as a first period utility, which is given by:

$$U_1 = \max_S \{\Omega_1 - C(S) + \beta EU_2(S)\}, \tag{10}$$

where β is a discount factor and the cost of investing in social capital S is $C(S)$ with $C'(S) > 0$, $C''(S) > 0$. The key issue is thus to determine the quantity

$$EU_2 = \int_0^{\bar{w}} \int_0^{\bar{w}} \times \max\{b + 1 - \delta_\pi S, w + S, w^* + (1 - \delta_\lambda)S\}\,dF(w)\,dG(w^*). \tag{11}$$

This is a relatively complex derivation but it can be simplified after integrating by parts. The Online Appendix A.2 in fact shows that the expected utility of agents given optimal choices is expressed by the following lemma:

Lemma 1. *Property of EU_2*

$$EU_2 = \bar{w} + S - \int_{w^r}^{\bar{w}} G(z + \delta_\lambda S)F(z)\,dz. \tag{12}$$

In the above formula, the impact of social capital on the expected utility is threefold. There is a positive direct effect on utility through the linear term $\bar{w} + S$. There is a second effect expressed as $G(z + \delta_\lambda S)$ under the integral: more capital can be lost upon mobility. Lastly there is a negative effect expressed through the integral's boundaries (recall that w^r is decreasing in S whenever $\delta_\pi > 0$). Since we will show that these two last effects arise from the fact that social capital reduces mobility and job acceptance, then we can link the marginal effect of S to the various probabilities calculated above. This is done in the next subsection.

4.1. Choice of S

First we make the assumption that social capital is *relatively* local, i.e., it depreciates more following a regional move than after a job loss. From now on this will be considered the benchmark case. In equations:

Assumption 1. Relatively *local social capital:* $\delta_\lambda > \delta_\pi > 0$.

This yields some useful properties of $\frac{dEU_2}{dS}$.

Lemma 2. *Properties of* dEU_2/dS.

(i) $\dfrac{dEU_2}{dS} = 1 - \delta_\pi P_u - \delta_\lambda P_m > 0$;

(ii) *under Assumption 1, we obtain* $dEU_2/dS \to 1$ *when* $S \to +\infty$;

(iii) d^2EU_2/dS^2 *is strictly positive so that* dEU_2/dS *strictly increases, except when either* $\delta_\pi = \delta_\lambda = 0$ *or* $f = g = 0$. *In these two cases, the second derivative is zero.*

The key point is the first one. The marginal effect that S has on expected utility can conveniently be rewritten using (7) and (9): the return to social capital is always strictly positive. A marginal increase in S increases utility by 1, minus the probability of moving (in which case a share δ_λ is depreciated), minus the probability of remaining unemployed locally (in which case a fraction δ_π of social capital is depreciated). In the degenerate case $\delta_\pi = \delta_\lambda = 0$, the marginal return to social capital is constant, equal to 1. The second point results from calculating the limits of P_m and P_u for extreme values of S established earlier in Propositions 1 and 2. See Online Appendix A.3 for an illustration of the last point. The interpretation is simple: except in degenerate cases, utility is convex in social capital. Convexity arises when distributions are not degenerate because, by raising social capital, the individual can afford to reject more offers and thus optimize its mobility/acceptance strategy (in other words, she is better off because she has greater outside options).[15]

Let $\widehat{S}$ be the social capital level satisfying the first-order condition defined by:

$$C'(\widehat{S}) = \beta(1 - \delta_\pi P_u - \delta_\lambda P_m), \tag{13}$$

where P_u and P_m also depend on $\widehat{S}$. Eq. (13) may be satisfied for more than one value of $\widehat{S}$. To illustrate this, we can draw the left-hand side of Eq. (13), which is an increasing function of S and the right-hand side which is convex. The two curves may intersect several times, or not at all. We only know that for large values of S, the right-hand side converges to 1, while, with a quadratic cost function, the left-hand side, the marginal cost, approaches infinity, such that utility decreases after the last intersection, which is thus a maximum for utility.

We represent utility in Fig. 1 in one of the "multiple intersections" cases. In such cases, there is usually a well-defined global maximum (either the first or the second maximum), and the individual optimally chooses one or the other. The point we want to make is that a small difference between two individuals, due perhaps to marginal differences in their cost functions, may lead to very different observations of their behavior. In Fig. 1, the agent would choose a low degree of local social capital and hence ex-ante would be relatively mobile. Imagine now that the marginal cost of investing is decreased by a tiny amount: then, the bimodal curve changes, say in a counter-clockwise rotation (due to $C(S)$ and is reduced relatively more for larger values of S), and thus the second local maximum becomes a global maximum. This individual is thus more likely to be immobile and invest a lot more in social capital. Hence, there is a first instance of complementarities between local social capital and mobility.

Our model also displays an additional type of complementarity: any exogenous decrease in expected mobility (e.g., an exogenous negative shift in the attractiveness of Region B) increases the social capital level; this in turn reinforces the negative impact on mobility. This can be seen from the first-order condition (13): the convexity of costs C with respect to S implies that the investment in social capital will be larger when the right-hand side of (13) is greater, i.e., when both risks of depreciation P_u and P_m (i.e., unemployment and mobility) are lower and when the rates of depreciation are lower (that is, δ_π and δ_λ are lower). Again, if $\delta_\pi = 0$, the unemployment risk plays no role on the choice of S, while the more δ_λ approaches 0, the lower the impact of P_m on the choice of S.

4.2. Extensions

4.2.1. Choice of the composition of S

A natural extension is to consider how the agent would *choose* to invest in each type of social capital: local or professional or a combination of both. Now we assume that the agent can trade off the two types of social capital in choosing S_π and S_λ separately, where S_π does not depreciate if the individual moves to the other region and remains employed, but fully depreciates if she is non-employed, while S_λ fully depreciates after a move to the other region but does not depreciate if the individual is non-employed in the same region. We also assume that the second period utilities are given by

$$U_2 = \begin{cases} \Omega_2 + S_\pi + S_\lambda & \text{if the worker is employed in Region A} \\ \Omega_2 + S_\lambda & \text{if the worker is non-employed in Region A} \\ \Omega_2 + S_\pi & \text{if the worker is employed in Region B} \\ \Omega_2 & \text{if the worker is non-employed in Region B} \end{cases}.$$

In other words, instead of choosing the total social capital level whose depreciation rates are exogenous, the worker can choose her desired amount of professional (S_π) and local (S_λ) social capital. We then rewrite the program of agents as:

$$\max_{S_\pi, S_\lambda} \{\Omega_1 - C(S_\pi, S_\lambda) + \beta EU_2(S_\pi, S_\lambda)\}$$

Using a simple symmetric, quadratic cost function such as: $C(S_\lambda, S_\pi) = \frac{(S_\lambda + S_\pi)^2}{2}$ leads to particularly simple solutions: an interior and two corner solutions, the proof of which is shown in Online Appendix A.4. This is summarized in Proposition 4.

Proposition 4. *When agents can choose different types of social capital they want to invest in, where types are defined by different depreciation rates (local and professional), we have:*

[15] See Appendix A.3 for the calculation of the quantity d^3EU_2/dS^3. As a special case, when both f' and g' are uniformly negative on their support, a widely used property in contract theory and known as the CRDC (concavity of the distribution function condition), it is possible to sign the four terms adding up to d^3EU_2/dS^3 but three are positive and one is negative, so in general we cannot sign this quantity.

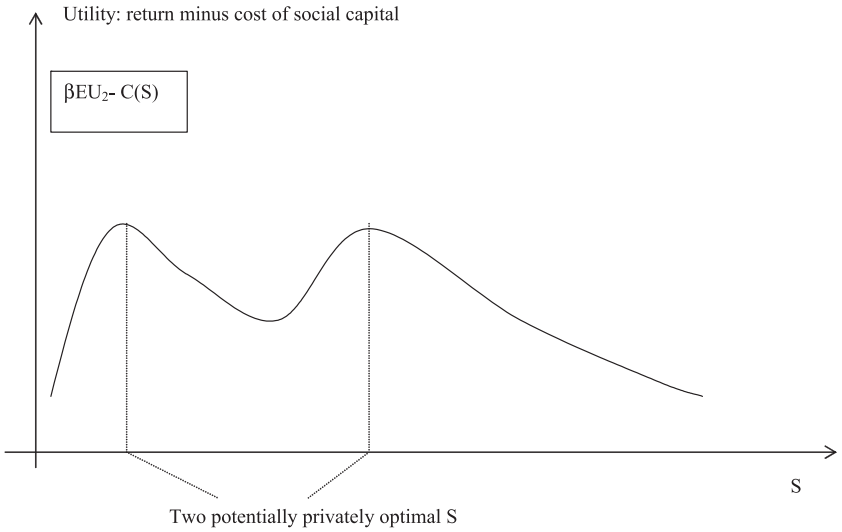

Fig. 1. Net utility as a function of social capital: case of multiple extrema.

- if $P_m > P_u$, we are at a corner solution: agents chooses $S_\pi = \beta(1 - P_u)$ and $S_\lambda = 0$,
- if $P_m < P_u$, we are at a corner solution:the agents chooses $S_\lambda = \beta(1 - P_m)$ and $S_\pi = 0$,
- at an interior solution, the agent chooses S_i, $i = \pi,\lambda$, such that $P_m = P_u$.

In words: agents preferably choose local capital whenever they expect a low mobility rate compared with the unemployment rate ($P_m < P_u$); and the opposite would occur when they anticipate high mobility compared with the unemployment rate ($P_m > P_u$): they chose professional social capital.

There is therefore a complementarity between the choice of the type of social capital and mobility decisions. Notice that, in this proposition, the probabilities of moving and being unemployed themselves depend on the stocks of professional and local social capital: we need to check ex-post that the ranking of P_m and P_u are consistent with their values given the corner solution for S_i, $i = \pi$, λ.

4.2.2. Employment protection

In the European context an interesting extension would be the effect of employment protection legislation. By increasing the expected duration of jobs, investment would be induced in all sorts of specific capital, such as job-specific skills, sector-specific skills, housing, and in our more specific case, local social capital. We thus explore this mechanism here.

We assume that at the end of period 1, workers remain employed with probability τ, which can then be thought of as an index of employment protection. The previous analysis was thus simply the case $\tau = 0$. There are two cases to consider however: unemployed workers in period 1 are not affected, and make the same optimal choice $\widehat{S}$ as that determined before in the first order condition (13). Consider now an employee with wage w_1 in the first period. In the beginning of the second period, she may lose her job with probability $1 - \tau$ and then face the same choice as before: draw a set of wage offers w, w^* and then maximize the mobility/job acceptance decisions:

$$U_2(S) = \max\{b + (1 - \delta_\pi)S, w + S, w^* + (1 - \delta_\lambda)S\}. \quad (14)$$

Alternatively, she may have the option of keeping her initial job with wage w_1, and face the following alternative with probability τ:

$$U_2(S) = \max\{w_1 + S, w + S, w^* + (1 - \delta_\lambda)S\}. \quad (15)$$

In other words, denoting the utility in case of a layoff by $U_2(S, b, \delta_\pi, \delta_\lambda)$, and in case of no-layoff as $U_2(S, w_1, 0, \delta_\lambda)$, ($b$ is replaced by w_1 and δ_π by 0), the program in the first period is now:

$$\max_S -C(S) + (1 - \tau)U_2(S, b, \delta_\pi, \delta_\lambda) + \tau U_2(S, w_1, 0, \delta_\lambda).$$

Based on the first order condition on S derived in Online Appendix A.5, we thus obtain the following implications.

Proposition 5. *Employment protection increases the investment in local social capital. Higher local wages (relative to wages in Region B) also increase local social capital, since workers are more likely to stay in Region A. Finally, the two effects interact complementarily: the higher the marginal effect of employment protection on social capital, the higher the local wages.*

In a previous version of this work,[16] we also explored the role of aggregate externalities. In that version, we assumed that the cost of investing in social capital was a decreasing function of the aggregate stock of social capital. The idea was that it is easier to make friends in a friendly environment. Allowing for aggregate externalities leads to multiple aggregate equilibria: one equilibirum is characterized by high mobility, low unemployment and low stock of social capital, while the other equilibrium displays low mobility, high unemployment and high stock of social capital. This section remains available in the Online Appendix.

5. Data

5.1. Descriptive statistics

Here we attempt to find an empirical counterpart to the concept of local social capital. We base our analysis on the European Community Household Panel Survey (ECHP), which is a survey based on a standardized questionnaire that involves annual interviewing of a representative panel of individuals in 15 European countries[17] for the 1994–2001 period. In our context, it is particularly useful because it surveys various dimensions of an individual's social life and social capital. For reasons argued in the literature review, we focus more on association membership and the frequency of social

[16] See David et al. (2008).

[17] The list of countries is the following: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and the United Kingdom.

contacts with friends and neighbors than on trust. The former are presumably more closely associated with the concept of localness, which we have in mind (a soccer club is local, but chess or Scrabble associations usually involve country-wide ties).[18]

More precisely, the social capital measures are derived from the three following questions in the ECHP survey:

1. Variable "Club": Are you a member of any club, such as a sport or entertainment club, a local or neighborhood group, a party, etc.?
2. Variable "Neighbors": How often do you talk to any of your neighbors?
3. Variable "Friends/relatives": How often do you meet friends or relatives not living with you, whether here at home or elsewhere?

Questions 2 and 3 correspond precisely to a social capital type that is clearly local. The "Friends/relatives" question may refer in part to professional social capital (that is, capital that depreciates when the individual is unemployed). The "Club" question may refer to less local social capital. Even though phrased to suggest non-professional social capital, it may be professional if associations are professional ones, although we have no direct evidence in one sense or the other.

The answer to the first question is yes/no and is attributed the value 1 or 0. The answer to the last two questions defines a frequency for a discrete support value, set as follows: (1) on most days; (2) once or twice a week; (3) once or twice a month; (4) less often than once a month; (5) never. In order to simplify the results presented, we built the following index measure:

$$Z_{i,t} = I[X_{i,t} = 1] + I[X_{i,t} = 2].\frac{2}{7} + I[X_{i,t} = 3].\frac{2}{30} + I[X_{i,t} = 4].\frac{1}{60} + I[X_{i,t} = 5].0,$$

where $Z_{i,t}$ is the index value for individual i at time t and $X_{i,t}$ the answer to the question. $I[\cdot]$ is an indicator function that takes value 1 if the expression in brackets is true and 0 if it is not.[19]

The top part of Table 2 summarizes the relevant statistics. The means of the social capital variables are 0.49 and 0.44, respectively, and the standard deviations approximately 0.4. Club membership is 37.4%. Our sample is restricted to the economically active population and will have 90% employed and 10% unemployed over the period. Other demographic statistics are summarized in the bottom part of Table 2. Note that we also estimated an employment equation (instead of unemployment) for the larger sample of 26–55 year old individuals—thus including non-participants—but found no qualitative difference. As a result we displayed only the mobility and the unemployment results.

Table 2
Summary statistics.

Variable	Observations	Mean	Std. Dev.	Min	Max
Friends/relatives	566,281	0.488	0.41	0	1
Neighbors	566,281	0.438	0.43	0	1
Club	500,053	0.374	0.48	0	1
Geographic mobility	441,024	0.007	0.08	0	1
Male	566,281	0.57	0.49	0	1
Female	566,281	0.43	0.49	0	1
Rent-free accommodation	560,878	0.034	0.18	0	1
Owner	560,878	0.716	0.45	0	1
Tenant with rent	560,878	0.251	0.43	0	1
Age category 16–25	566,281	0.154	0.36	0	1
Age category 26–35	566,281	0.284	0.45	0	1
Age category 36–45	566,281	0.260	0.44	0	1
Age category 46–55	566,281	0.210	0.41	0	1
Age category 56–65	566,281	0.930	0.29	0	1
Years of education	566,281	10.5	5.53	0	25
Employed	566,281	0.901	0.3	0	1
Unemployed	566,281	0.099	0.3	0	1
Living alone	566,281	0.089	0.29	0	1
Two members in household	566,281	0.199	0.4	0	1
Three members in household	566,281	0.223	0.42	0	1
Four members in household	566,281	0.282	0.45	0	1
Five members in household	566,281	0.207	0.41	0	1
Separated	552,771	0.014	0.12	0	1
Divorced	552,771	0.047	0.21	0	1
Widowed	552,771	0.014	0.12	0	1
Never married	552,771	0.338	0.47	0	1

Notes: The summary statistics are calculated from the ECHP data over the period 1994–2001. Fourteen EU countries are considered: Denmark, Netherlands, Belgium, Luxembourg, Ireland, Italy, Greece, Spain, Portugal, Austria, Finland, Sweden, Germany, and UK. The sample is restricted to the active population.

5.2. Empirical strategy

The mechanisms we want to highlight can be uncovered through estimating the following equations:

$$P_m^{i,t+1} = \Phi(\pi_m x^{i,t} + \beta_m friendsrelativesfreq^{i,t} + \gamma_m neibfreq^{i,t} + \phi_m club^{i,t} + \epsilon_m^{i,t+1}),$$

$$P_u^{i,t+1} = \Phi(\pi_u x^{i,t} + \beta_u friendsrelativesfreq^{i,t} + \gamma_u neibfreq^{i,t} + \phi_u club^{i,t} + \epsilon_u^{i,t+1}),$$

where Φ is the normal distribution, $P_m^{i,t+1}$ and $P_u^{i,t+1}$ are, respectively, the probabilities of moving to another area and of being unemployed for individual i in period $t+1$, the time period being a year. $x^{i,t}$ is a vector of exogenous controls, namely sex (1 if female, 0 if male), house tenure (categorical variable stating whether the individual is owner of his house, whether she rents it or has it for free), age category (16–25, 26–35, 36–45, 46–55 and 56+), number of years of education, a dummy variable for unemployment, household size (1, 2, 3, 4 or 5 and more persons), marital status (married, separated, divorced, widowed or never married) and time effects and $\epsilon_m^{i,t+1}$ and $\epsilon_u^{i,t+1}$ are individual shocks; as a robustness check, we will also include a fixed effect in those shocks. Finally, the variables $friendsrelativesfreq^{i,t}$ and $neibfreq^{i,t}$ correspond to our measures of local social capital, while $club^{i,t}$ is club membership, as defined previously. We interpret "Club" as another measure of social capital, which is not necessarily local, but that may help understand the role played by "Neighbors" and "Friends/relatives". Hence, we are interested in the sign and significance of β_m, γ_m, ϕ_m, β_u, γ_u or ϕ_u and the magnitude of their impact.

In a first set of regressions, we will consider social capital measures as exogenous and run simple probit regressions. We introduce the various measures of social capital separately or together, because there could be some positive correlation across

[18] There is also a general argument against the use of trust; as surveyed in Glaeser et al. (2002) and Durlauf and Fafchamps (2005), along with Putnam (2000), due to misreporting. Club membership is verifiable and since it is costly, a logic of revealed preferences can apply. In contrast, during a survey interview, individuals talk about confidence and trust is cheap. Further, due to language differences in European countries, responses may be subject to translation bias.

[19] We tried a few other specifications, one including the log of this variable (but we needed to arbitrarily replace the zero with, either 1/365 or half of this number), which improved the significance of coefficients at the cost of introducing a certain arbitrariness. To detect non-monotonicity we also tried assigning dummy variables to the five possible answers. For the impact of social capital on mobility, we did not find any non-monotonicity and thus decided to retain a simple, linear specification throughout.

Table 3
Summary of the results for inter-area mobility.

	Probit	Probit	Probit	Probit	Probit	Probit	Probit	Probit
Friends/relatives	−0.139			−0.104	−0.115			−0.079
	(5.06)**			(3.54)**	(3.94)**			(2.51)*
Neighbors		−0.149		−0.125		−0.159		−0.141
		(5.48)**		(4.29)**		(5.44)**		(4.46)**
Club			−0.063	−0.059			−0.059	−0.055
			(3.08)**	(2.85)**			(2.59)**	(2.40)*
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	No	No	No	No
Region Dummies	No	No	No	No	Yes	Yes	Yes	Yes
Observations	403,568	403,568	385,403	385,403	357,122	357,122	339,086	339,086
	IVprobit1	IVprobit1	IVprobit1	IVprobit1	IVprobit1	IVprobit1	IVprobit1	I Vprobit1
Friends/relatives	−0.481			−0.378	−0.436			−0.330
	(5.64)**			(3.65)**	(4.85)**			(3.00)**
Neighbors		−0.136		−0.001		−0.132		−0.013
		(2.24)*		(0.01)		(1.97)*		(0.15)
Club			−0.034	−0.010			−0.016	0.008
			(0.74)	(0.21)			(0.31)	(0.16)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	No	No	No	No
Region dummies	No	No	No	No	Yes	Yes	Yes	Yes
Observations	323,246	323,246	299,625	299,625	286,579	286,579	262,824	262,824
	IVprobit2	IVprobit2	IVprobit2	IVprobit2	Fixed effect	Fixed effect	Fixed effect	Fixed effect
Friends/relatives	−0.043			0.370	0.048			0.106
	(0.23)			(1.88)	(0.63)			(1.23)
Neighbors		−0.196		−0.310		−0.291		−0.345
		(2.17)*		(2.74)**		(3.57)**		(3.84)**
Club			−0.447	−0.629			−0.082	−0.077
			(0.95)	(1.35)			(1.12)	(1.05)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	No	No	No	No
Region dummies	No	No	No	No	No	No	No	No
Observations	403,568	403,568	385,403	385,403	12,013	12,013	9717	9717

Notes: As additional explanatory variables, the above regressions include sex, house tenure, age categories, years of education, a dummy for unemployment, household size, marital status. For the first set of IV estimations (IVprobit1), social capital is instrumented by its lag. For the second set of IV estimations (IVprobit2), social capital is instrumented by the regional average of social capital. "Fixed effect" refers to logit fixed-effect specifications. See the Technical Appendix available on the webpage for more detailed results. Robust *z* statistics in parentheses.

* Significant at 5%.

** Significant at 1%.

individuals in these three social capital variables. We also check whether the inclusion of 92 regional effects affects the results.

Next, we apply instrumental variable techniques to control for potential endogeneity. We try several instruments, generally yielding the same kind of results. A first instrument is individual social capital lag. It is a strong instrument and highly correlated with contemporaneous social capital, but can be criticized for not removing all endogeneity. A second type of instrument is the average social capital in the region. It is more likely to be exogenous, but could be weaker, that is less correlated with an individual's contemporaneous social capital. We will report IV estimates with both types of IV estimations, as well as fixed effect regressions as a final robustness check. A discussion of a further set of alternative instruments is provided in Appendix B.[20]

5.3. Mobility, unemployment and social capital

5.3.1. Mobility

Table 3 summarizes the mobility regressions using all specifications discussed above, while the other coefficients are shown in Online Appendix (Tables A-1 to A-4). Generally speaking, all three variables used to measure social capital have negative and significant effects on mobility. In IV regressions, the number of observations is also reduced by approximately 25% for each of the instruments: either because of lags or because the region of residence is sometimes missing. The estimates have thus lost some efficiency, but generally speaking the coefficients remain negative and usually significant. In particular, the "Neighbors" variable has a significant and negative impact on mobility, while the "Club" variable is typically no longer significant. The coefficients of other variables, mainly demographic ones, are reported in Online Appendix (Tables A-2 and A-3). They make sense: women are less mobile, as are house owners, older people, large families and married individuals. The unemployed are not significantly more mobile, but the educated are clearly much more so.

Finally, Table 3 also displays individual fixed effect regressions for the mobility equation (bottom right), as robustness check. Not surprisingly given that the variation is now *within*, the social capital coefficients turn out to be much less significant as compared with the regressions without individual fixed effects. Even though, the "Neighbors" variable remains significant: even the—necessarily moderate—time variations in "Neighbors" social capital for a given individual generates a decline in mobility.

5.3.2. Unemployment

Table 4 provides *individual unemployment regressions*, showing that the results are relatively stable across specifications, but that interesting changes in sign and significance take place across the

[20] Technically, in all IV regressions, we follow a two-stage procedure: we first regress the social capital measures on the instruments, and use the projection as regressors in probit regressions. The IV regressions we present therefore have biased standard errors. We are thus left with two alternatives; either we choose to correct for the bias in s.e. due to IV or correct for the bias due to individual clustering due to the panel dimension. Here we choose to correct for clustering, mostly because the correction procedure implementation proposed by Wooldridge (2002) for IV correction would actually lead the s.e. being lower than with the uncorrected s.e. as shown in the IV tables. The s.e. displayed here thus form an upper bound for the "true" s.e.

Table 4
Summary of the results for individual unemployment.

	Probit	Probit	Probit	Probit	Probit	Probit	Probit	Probit
Friends/relatives	0.005			0.005	−0.004			−0.003
	(0.39)			(0.38)	(0.27)			(0.18)
Neighbors		0.052		0.061		0.045		0.058
		(4.04)**		(4.53)**		(3.23)**		(3.90)**
Club			−0.131	−0.133			−0.135	−0.137
			(11.74)**	(11.87)**			(10.57)**	(10.67)**
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	No	No	No	No
Region dummies	No	No	No	No	Yes	Yes	Yes	Yes
Observations	413,599	413,599	381,493	381,493	360,291	360,291	328,309	328,309
	IVprobit1	IVprobit1	IVprobit1	IVprobit1	IVprobit1	IVprobit1	IVprobit1	I Vprobit1
Friends/relatives	0.112			0.096	0.088			0.071
	(2.74)**			(2.00)*	(1.95)			(1.34)
Neighbors		0.163		0.165		0.149		0.163
		(5.40)**		(4.59)**		(4.35)**		(4.03)**
Club			−0.259	−0.271			−0.245	−0.257
			(10.89)**	(11.24)**			(9.19)**	(9.49)**
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	No	No	No	No
Region dummies	No	No	No	No	Yes	Yes	Yes	Yes
Observations	330,051	330,051	295,933	295,933	289,239	289,239	255,280	255,280
	IVprobit2	IVprobit2	IVprobit2	IVprobit2	Fixed effect	Fixed effect	Fixed effect	Fixed effect
Friends/relatives	0.312			0.287	−0.009			0.000
	(3.75)**			(3.20)**	(0.28)			(0.00)
Neighbors		0.227		0.182		0.035		0.043
		(3.83)**		(2.32)*		(1.04)		(1.21)
Club			−1.787	−1.648			0.061	0.061
			(11.14)**	(10.61)**			(1.99)*	(1.96)*
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	No	No	No	No
Region dummies	No	No	No	No	No	No	No	No
Observations	413,599	413,599	381,493	381,493	58,364	58,364	54,266	54,266

Notes: As additional explanatory variables, the above regressions include sex, house tenure, age categories, years of education, a dummy for unemployment, household size, marital status. For the first set of IV estimations (IVprobit1), social capital is instrumented by its lag. For the second set of IV estimations (IVprobit2), social capital is instrumented by the regional average of social capital. "Fixed effect" refers to logit fixed-effect specifications. See the Technical Appendix available on the webpage for more detailed results. Robust z statistics in parentheses.
* Significant at 5%.
** Significant at 1%.

social capital measures. The main findings are that "Neighbors" has a positive impact on the unemployment probability, while "Club" has a negative impact, with or without the regional effects. The "Friends/relatives" variable is generally not significant or marginally positive, except in the last set of IV regressions when instruments are social capital at the regional level.[21] Online Appendix (Tables A-5 to A-8) list the other coefficients. Again, we replicated the same specification using fixed effects as a robustness check.

5.3.3. Validity of the instruments and further checks

The Online Appendix (Tables A-13 to A-16) shows the tests for the validity of the instruments. More specifically, we define a variable μ_{it} calculated as the difference between the mobility variable (or alternatively the unemployment variable) and the prediction of an IV regression. We then regress this variable μ_{it} on the instruments and all other exogenous variables. Based on F-tests that show the insignificance of the exogenous variables in the latter regression, we can conclude to exogeneity.[22] We finally tried several specifications with both individual fixed effect and IVs, but there is definitely too little within variance in instruments to get any effects: we reach the limits of the database. Not that the effects we attempt to identify are not there, but the time series dimensions of ECHP are too small.

5.3.4. Summary

The magnitude of the effects of the benchmark regressions[23] is displayed in Table 5, resulting from calculations on the conditional mobility rate and the conditional unemployment rate for two groups of individuals in the sample (say, an Italian male, owner, 36–45 years old, etc. and a Dutch woman, tenant paying rent, 26–35 years old, etc.). In the absence of social capital (all social capital variables were set to zero), the mobility rates are 0.10% and 4.99%, while unemployment rates are 5.45% and 7.06%, respectively. Next we consider the impact of the maximum amount of social capital (1 for "Club" and the highest possible frequency of visits of friends and neighbors). The variable "Friends/relatives" has the largest impact on mobility, reducing the mobility rate to almost zero for the Italian male and by two-thirds for the Dutch woman. The impact of social capital on unemployment is more ambiguous. For "Club" the unemployment risk is reduced

[21] The lack of significance for "Friends/relatives" can also be explained by a light non-monotonicity of its effect on unemployment. Indeed, individuals having a very low or very high frequency of visits to friends are those with the highest unemployment rates, while individuals with an intermediate frequency have lower rates. In the next section, to make some sense of the non-monotonicity, we would need to introduce additional ingredients in the theory exposed, particularly the search and network effects described by Granovetter (1995). See for example the series of papers written by Calvó-Armengol (2004), Calvó-Armengol and Jackson (2004) or Calvó-Armengol and Zenou (2005). In our paper, we will not explore this interesting issue any further, but rather leave it for future research.

[22] We also ran the same tests with linear IV regressions (instead of probit). We also find the exogeneity of the instruments.

[23] The summary of the results with alternative regressions such as IVs, non-IVs or fixed effects are not reported but available from authors on request.

Table 5
Probabilities of moving and being unemployed: examples.

	Probability of →	Moving (%)	Unemployment (%)
Italian man, owner, 36–45 years old, married, living with someone, year 2000	No social capital	0.10	5.45
	If friends and relatives, every day	−0.07	+0.73
	If neighbors, every day	−0.00	+1.30
	if club	−0.00	−1.69
Fraction of mobility reduced by the maximum combination of social capital		−75	
Fraction of unemployment added by the maximum combination of friends and neighbors			+40
Dutch woman, tenant with rent, 26–35 years old, never married, living alone, year 1996	No social capital	4.99	7.06
	If friends and relatives, every day	−2.84	+1.02
	If neighbors, every day	−0.00	+1.84
	If club	−0.10	−2.28
Fraction of mobility reduced by the maximum combination of social capital		−58	
Fraction of unemployment added by the maximum combination of friends and neighbors			+44

Note: The above probabilities are computed from the fitted values of the instrumental variable probit regression (IVprobit1) from Tables 3 and 4 with country dummies and all social capital measures introduced as regressors.

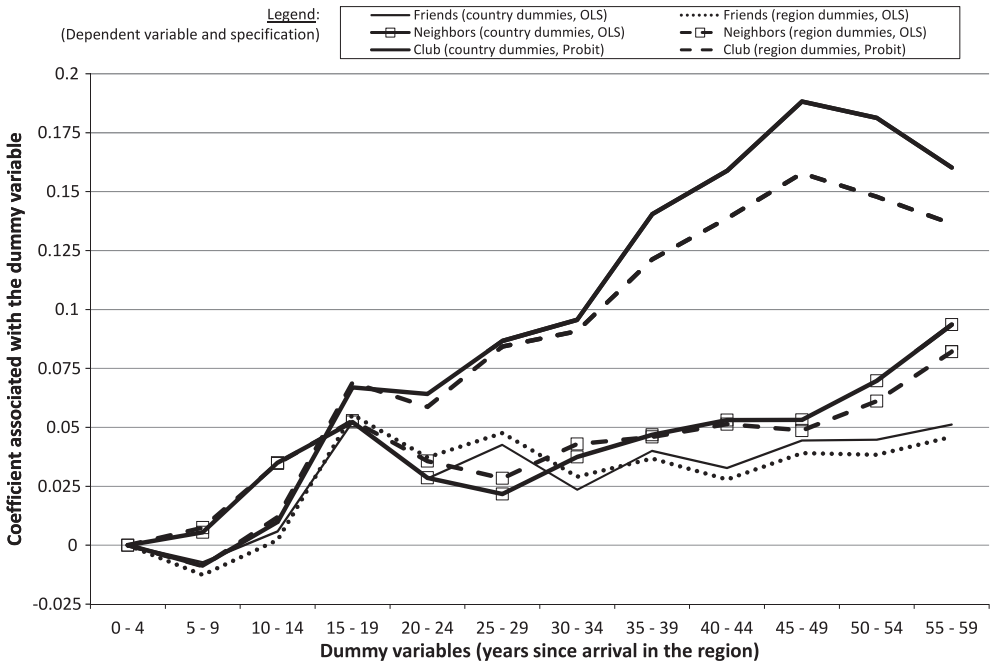

Fig. 2. Impact of seniority in the region on social capital.

by a third, while the other two variables cause this risk to increase by approximately one-third.

5.4. Social capital and regional migration

The results from the preceding section suggest that the stock of local social capital reduces mobility. According to the theory, expected mobility should be associated with less social capital.

To examine this reverse causality, i.e., the fact that individuals forecast future mobility episodes and endogenously determine their level of social capital, we explore how social capital might depend on long-run mobility. In David et al. (2008b), we tested whether social capital depends on previous episode of mobility. We showed that, if the individual was not born in the country of current residence, or if he has not lived in the same region since birth, it leads to a huge discount in social capital. We have extended here this specification and have regressed our measures of local social capital on the number of years since arrival in that region, which is now predetermined.[24] It appears that our three measures of social capital increase with the number of years since arrival in the region. Fig. 2 shows these relationships between the amount of social capital accumulated and the time elapsed since the arrival of individuals in the region,[25] again showing that a reverse causal link exists between social capital and migrations.

6. Conclusion

In this paper, we discuss the fact that low mobility is the outcome of self-reinforcing factors: investments in local social capital are induced by low mobility and in turn they become a factor of immobility. We exhibit several examples of complementarity between high local social capital and low mobility rate. Data analysis supports the theory. *Local* social capital has unambiguous negative effects on individual geographical mobility, while it increases individual unemployment probabilities. The magnitude of the effects is quite striking.

The implications of this paper on the unemployment debate can be summarized as follows. Unemployment in Europe is usually

[24] These results are available in the Online Appendix (Table A-9).

[25] For this figure, we group the number of years since arrival in the region by five years (0–4, 5–9, 10–14, etc.) and use a dummy for each group. This procedure allows to capture a non-linear effect of the past mobility on the investment in social capital.

thought to be the result of various market imperfections (unemployment compensation, employment protection, good market imperfections; wage compression), with all variables negatively affecting mobility as well.[26] Our paper shows that in the literature mentioned above, the factors causing unemployment are the same as those leading to accumulation of local social capital.

Our theory indicates that local social capital is complementary to other explanations of high European unemployment and this has consequences regarding its persistence. Local social capital may indeed act as a bottleneck, preventing mobility. Attempts to handle unemployment by changing labor market institutions may fail given vicious circle involving immobility and high local social capital. Deregulating labor markets may simply increase inequality, but will not necessarily increase mobility a great deal. An efficient reform of the labor markets should instead combine traditional reforms and develop incentives to increase mobility, through social channels: the example of the Rotary Club given in introduction is an interesting policy that local authorities could use to attract migrants from other regions.

In conclusion, we would like to suggest that differences in unemployment across European countries are related to intra-European differences in attitudes towards social capital. David et al. (2008b) report country-level regressions inspired by Layard and Nickell (1999). More particularly, they show that at the country level the log of unemployment is strongly and positively linked to social capital. We leave this for future work and simply conclude that social capital is an interesting avenue to explore.[27]

Acknowledgments

We would like to thank the three anonymous referees, William Strange (the Editor), Yann Algan, Fabrice Collard, Catherine Dehon, Robert Ellickson, Patrick Fève, Pietro Garibaldi, Marjorie Gassner, Jennifer Hunt, Franck Portier, Robert Putnam, Vincenzo Verardi, Yves Zenou and various seminars participants for their helpful comments and suggestions, particularly the Paris School of Economics, Universidad Autonoma de Barcelona, IUI in Stockholm, Toulouse School of Economics, ECARES, Warwick and the European Symposium in Labor Economics (CEPR-IZA). Alexandre Janiak thanks Fondecyt for financial support (Project No. 11080251). Etienne Wasmer thanks the ANR (projet Blanc Discri-Segre) for financial support.

Appendix A. Theory appendix: decisions of the agent at a given S and determination of P_m, P_u, P_w

This Appendix summarizes the proofs. Complete proofs are available in Online Appendix A.1.

Decision tree

There are three main possible cases for an agent, in order: remaining non-employed, accepting a local offer, and finally accepting an offer in Region B: we have thus

$U_2 = b + (1-\delta_\pi)S$

if $b + (1-\delta_\pi)S > w + S > w^* + (1-\delta_\lambda)S$ or $b + (1-\delta_\pi)S > w^* + (1-\delta_\lambda)S > w + S$

$U_2 = w + S$

if $w + S > b + (1-\delta_\pi)S > w^* + (1-\delta_\lambda)S$ or $w + S > w^* + (1-\delta_\lambda)S > b + (1-\delta_\pi)S$

$U_2 = w^* + (1-\delta_\lambda)S$

if $w^* + (1-\delta_\lambda)S > w + S > b + (1-\delta_\pi)S$ or $w^* + (1-\delta_\lambda)S > b + (1-\delta_\pi)S > w + S$.

Determination of P_m

The probability of moving is formally

$$P_m = P[\{w^* + (1-\delta_\lambda)S > w + S\} \cap \{w^* + (1-\delta_\lambda)S > b + (1-\delta_\pi)S\}], \tag{A1}$$

and can be shown to be equal to

$$P_m = \int_{w^{r*}}^{\bar{w}} F(z - \delta_\lambda S) g(z)\, dz.$$

which gives Eq. (5).

Determination of P_u

P_u writes formally as

$$P_u = P[\{b + (1-\delta_\pi)S > w + S\} \cap \{b + (1-\delta_\pi)S > w^* + (1-\delta_\lambda)S\}]. \tag{A2}$$

and can be shown to yield

$$P_u = \int_0^{\bar{w}} I[w^r > w] G(w^{*r})\, dF(w) = F(w^r) G(w^{*r}).$$

Deriving, we have:

$$\frac{dP_u}{dS} = f(w^r) G(w^{*r}) \frac{\partial w^r}{\partial S} + F(w^r) g(w^{*r}) \frac{\partial w^{*r}}{\partial S},$$

which leads to Eq. (8) and thus to Proposition 2.

Determination of P_w

The local employment probability is formally

$$P_w = P[\{w + S > b + (1-\delta_\pi)S\} \cap \{w + S > w^* + (1-\delta_\lambda)S\}], \tag{A3}$$

and can be shown to be equal to

$$P_w = \int_0^{\bar{w}} I[w > w^r] G(w + \delta_\lambda S)\, dF(w),$$

which gives Eq. (9).

Appendix B. Data appendix

B.1. Variables description

- Mobility: variable taking value 1 if the household has been in the current dwelling for less than 12 months.
- House tenure: in the survey, this variable refers to the following question: Does your household own this dwelling or do you rent it? The possible answers are (1) owner, (2) tenant/subtenant, paying rent (including when rent recovered from housing benefit) and (3) accommodation is provided rent-free.

[26] Generous unemployment compensation increases the relative return of staying in a local depressed area. Strong employment protection increases incentives to invest in local skills as job duration is anticipated to be much higher, thus reducing mobility; it increases the incentives to invest in job-specific skills and thus reduces job-to-job mobility; a decent amount of market imperfections and particularly obstacles to job creations in booming regions/sectors reduce the return from mobility in depressed regions; and wage compression reduces the returns from moving to booming regions. See Hassler et al. (2000, 2005), Ljunqvist and Sargent (1998, 2002), Bertola and Ichino (1995), Wasmer (2006) and Bertola and Rogerson (1997) for more on these alternative or complementary explanations.

[27] As many recent works have shown, Algan and Cahuc (2007), Calvó-Armengol and Jackson (2006), Calvó-Armengol and Zenou (2005), Cahuc and Fontaine (2009).

- Age category: we grouped individuals into four categories: 16–24, 16–34, 35–54, and 55–64.
- Education: in the survey, this variable refers to the following question: Age when the Highest Level of General or Higher Education was Completed. The possible answers are numbers between 9 and 75. To correct for potential bias we followed the procedure proposed in Wasmer et al. (forthcoming).
- Household size: in the survey, this variable refers to the following question: Household Size (Total Number of Household Members at Present). The possible answers are numbers between 1 and 96. We grouped the answers into five categories: 1, 2, 3, 4 and 5+.
- Marital status: in the survey, this variable refers to the following question: Present Marital Status. The possible answers are (1) Married, (2) Separated, (3) Divorced, (4) Widowed, (5) Never married.
- Regional dummies: in the survey, this variable refers to the following question: Region in which the Household is Presently Situated. The classification followed for this question is the NUTS2 AGGREGATES from the European Commission, which considers comparable regions with a population comprised between 800 000 and 3 millions inhabitants. For more information, please refer to the following web site: http://ec.europa.eu/comm/eurostat/ramon/nuts. Note also that some countries like the Netherlands have not filled this question.

B.2. Description of the instruments

As explained in the text, we tried several instruments. The two most convincing instruments are:

(a) the average level of social capital in the region where the individual lives: it is clearly exogenous to the individuals and fairly correlated to individual's social capital. We have however made several other attempts.
(b) lags of individuals' social capital.

Additional instruments relate to the regional vote and turnout in elections. In particular, we considered regional turnout at parliamentary elections. The intuition is that higher turnout is the sign of higher social cohesion, hence more social capital. Exogeneity in the unemployment/mobility equation is insured by the fact that we choose lagged turnout, that is, the last election before year 1990 in each available country. The data are missing for Austria, Greece and France. Unfortunately, correlation with our measures of social capital was poor, resulting in important loss of efficiency.

A second set of additional instruments can be found in the anthropological analysis of family structures. Todd (1990), a well known demographer and anthropologist, has argued that such structures are extremely stable over the pace of centuries, and can be categorized in four or five groups, based on the balance of authority (nuclear vs. "souche", that is, patriarcal) and of the type transmission of land and wealth (equalitarian, each offspring getting an equal share, or inequalitarian, the elder getting the largest share). Combining these two criteria leads, according to Todd, to a map of regions in Europe where in each region, one type of the four possible family structure is dominant, with sometimes several types coexisting. Spilimbergo and Ubeda (2004b) used similar instruments for their US study. In attributing a number for each category of structure, we build an instrument for social capital which is used in individual regressions. It appears to be very correlated with our measures of social capital. With this set of instruments, the results are robust for the mobility equation. However, for the unemployment equation results were not consistent across specifications.

Appendix C. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.jue.2010.04.003.

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