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Local social capital and geographical mobility*

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Abstract

In this paper, we attempt to understand the determinants of mobility through introducing the concept of local social capital. Investing in local ties is rational when workers do not expect to move to another region, and reciprocally, once local social capital is accumulated, incentives to move are reduced. We build a model to illustrate several types of complementarities: observationally close individuals may take different paths characterized by high local social capital and low mobility vs. low social capital and high propensity to move. Employment protection reinforces the accumulation of local social capital and thus reduces mobility. Externalities generate multiple equilibria in which mobility and social capital are negatively correlated across equilibria.

European data supports the theory: the South of Europe is characterized by both low mobility and local social capital, while the North of Europe has higher mobility and a more general type of social capital. Within a country and at the individual level, more social capital is associated with lower mobility.

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"[...] 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"

Geographical mobility is one of the signs of a well-performing economy: it reveals the ability to cope with change and to reallocate production factors to where they will be more efficient. In an influential work, 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 and Layard and Nickell, 1999), since residential mobility widely differs across countries.

As an illustration of the above statement, in Europe it appears that 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 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%). 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].

In this paper, we provide an explanation for low mobility in Europe, and why it differs across the European countries, and why it is lower in the South and higher in the North of Europe in particular. Since this explanation lies in geographical mobility costs, we relate mobility costs to local social capital, which affects the cost of moving. Local social capital characterizes the ties that individuals have to their region/area of origin and is therefore partly or fully depreciated upon mobility, leading to a decline in the welfare of movers.

[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 Wasmer et al. (2005) for regional mobility figures.)

In the European Community Household Panel, social capital measures are derived from three questions: the frequency of relations with neighbors, the frequency of contacts with friends and relatives outside the household, and club membership. We then transform the answers to the first two questions into a daily frequency[2] while leaving the last one as a binary variable. We report country averages in Table 1.

With respect to the above questions, there seems to be a North-South divide in the *nature* of social capital: in the South of Europe (and in Ireland too), social capital seems to be more associated with family ties and having friends, and less so with membership in clubs and associations. The opposite holds in the North of Europe, to the extent that being a member of a club (such as a Scrabble or a chess league) can be considered as a general kind of social capital because club members can build new ties in another club in the new city, and this helps them cope with mobility. Conversely, strong family and friendship ties reflect local social capital to a greater extent, thus making mobility more costly. We thus have a potential explanation for differences in mobility across the European countries.

In this paper we will undertake a formal analysis of these intuitions, basing our modeling strategy on recent works on social capital, as surveyed in next section. As a matter of fact, our model emphasizes that the relation between local social capital and mobility has two cause and effect relationships. On the one hand, 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. On the other hand, highly local social capital raises the cost of mobility and in turn reduces incentives to move. Local social capital is actually always negative for mobility, and can be negative for employment, but some other types of social capital can actually raise employment.

In **Section 1**, we first review the ample literature on social capital and emphasize its implicit or explicit geographical dimensions, particularly the aspect called localness. In **Section 2**, we develop a simple theory formalizing those insights, illustrating how various types of social capital have different impacts on mobility and unemployment rates. A key dimension is that social capital increases unemployment if the local dimension of social capital dominates its professional dimensions, that is, if the depreciation of social capital is greater after a geographical

[2] Details on the procedure and questions are given in later sections.

move than after a job loss. In **Section 3**, we explore the determinants of social capital, finding that two local maxima are present in the net returns from local social capital, implying that 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 and prefer to remain at the margin more locally unemployed. We then extend the model and show that if individuals expect their friends to remain in the neighborhood as well, the returns from creating social ties are greater. This social externality creates multiple equilibria and thus potentially reinforces the low mobility of some regions or demographic groups. In **Section 4**, we match theory and the data by providing a panel analysis based on the European Community Household Panel. 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", "Neighbor" 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 "Neighbor" 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", "Neighbor" and "Club").

In our 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.

1 Local social capital: literature review

There are many definitions of social capital. In this section we attempt to define the concept more precisely, based on our own purpose: to link social capital with geographical mobility and employment decisions. Durlauf and Fafchamps (2004) 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 consequential aspects of social capital, focusing on the localness of social capital and its depreciation.

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*".[4] 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, there are studies such as that of Jacobs' (1961) on large American cities, underlining the importance of implicit rules in neighborhoods. A knowledge of those implicit rules allows for the building of trust, and 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.[5]

It is also worth noting however that social capital is not exclusively local, and instead can be built in order to promote mobility. 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. [6] 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.

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

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

[6] 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."

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, e.g. 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.[7]

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. (2008) provides a counterexample, and look more specifically on European countries, emphasizing the potential negative links between social capital and labor markets, and in particular at the fact that jobs obtained through social networks tend to 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) introduces the concept of local capital and applies some of the same intuition we formalize in our model. Another recent paper by Belot and Ermisch (2006) addresses an issue very similar to ours. While they too do not have any formal theories, 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.[8] In a somewhat different context, Spilimbergo and Ubeda (2004a and b) argue that US Black workers are less mobile than Whites due to family ties (2004b) and successfully test this using the PSID survey.

2 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 her 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 the

[7] 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.

[8] 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 fourteen years old, his birth-order, the level of education of his parents and whether s/she grew up in a rural or urban area.

consumption of leisure. Developing a fully developed 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.

2.1 Setup

We consider a typical worker living 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 looses δ_λ friends, or meets with her relative less frequently.[9]

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.[10]

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

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

[10] These two concepts of social capital can easily be compared to the idea of 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 seen as linking "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.

professional association (such as the American Economic Association).

We now 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

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

The labor market is a standard partial equilibrium search set-up. 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 3.2.2, 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 $\overline{w}$ to denote the upper support of those distributions.[11]

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 such a case we can precisely show that the expected value of the wage is for instance $\int_0^{\overline{w}} w d(F_0^n(w))$ or alternatively that $F = F_0^n$ and $G = F_0^p$.[12] In a world where certain regions are depressed and others are booming, on 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.

2.2 Workers' program

In a second period there are four possible choices, as described in equation (1). We can discard the last possibility, given that $U_2 = b + (1-\delta_\lambda)(1-\delta_\pi)S$ (unemployed in B) is always lower

[11] If they are different, we simply extend the c.d.f beyond its support. In both cases we also assume that the lower bound of the support is 0.

[12] Chapter 5 in Ljungqvist and Sargent (2004).

than $b + (1 - \delta_\pi)S$ (unemployed in A). The decision set can thus be summarized as

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

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 and as do decisions by the individual to move or to stay and to accept a job or remain unemployed. See Appendix A.1. 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 Equation (2).

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.[13] 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 local if $\delta_\lambda > \delta_\pi$, that is if more is lost from a regional move than from a job loss.*

When social capital is local, more social capital raises w^{*r} because moving to secure a job in 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

[13] 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.

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.

2.3 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. See Appendix A.1 to learn how these are officially determined

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

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 to 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:

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

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 understand 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 lossδ_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 greater) local social capital; ii) When $\delta_\lambda > \delta_\pi$, w^{*r} increases to $\overline{w}$ (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.

2.4 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.1)

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

We thus obtain:

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 more professional than 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

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

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,

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

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, as 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 scaling up utility but this does not affect the worker's arbitration between the different options.

3 Endogenous social capital

We now make S endogenous and explore its determinants. Thanks to 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 recursively,

in two steps. In the second period, workers take S as predetermined and, after collecting offers decide whether to accept local or foreign offers. In the first period, they anticipate their decisions in the second and decide accordingly how much to invest in social capital.

In the first period, workers maximize 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 ■ 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

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

This is a relatively complex derivation but it can be simplified after integrating by parts. 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 $\delta_\pi > 0$). As 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 Sub-Section.

3.1 Choice of S

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

Assumption 1. $\delta_\lambda > \delta_\pi > 0$.

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

Lemma 2. *Properties of dEU_2/dS. i)*

$$\frac{dEU_2}{dS} = 1 - \delta_\pi P_u - \delta_\lambda P_m > 0;$$

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 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 "neutral 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 Appendix A.3 for an illustration of the last point. The interpretation is simple: except in the case of a "neutral" social capital or a degenerate wage offer distribution, 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).[14]

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 $\widehat{S}$. Equation (13) may be satisfied for more than one value of $\widehat{S}$. To illustrate this, we can draw the left hand side of equation (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,

[14] 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.

such that utility decreases after the last intersection, which is thus a maximum for utility. We represent utility in Figure 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 Figure 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.

Property 1. *When the localness of social capital is exogenous to worker choice (that is, δ_π and δ_λ are given), local social capital is associated, in the cross section of workers, with a low mobility rate. This generates large differences among individuals even though they have similar preferences and initial endowments.*

Now, in a maximum of utility, we have an additional property: 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.

One can therefore describe the impact of mobility on social capital itself, as follows.

Property 2. *For a given optimal choice of S and under the assumption that $\delta_\lambda > \delta_\pi$, any exogenous decrease in expected mobility (e.g., an exogenous negative shift in the attractiveness of region B) increases the social capital level.*

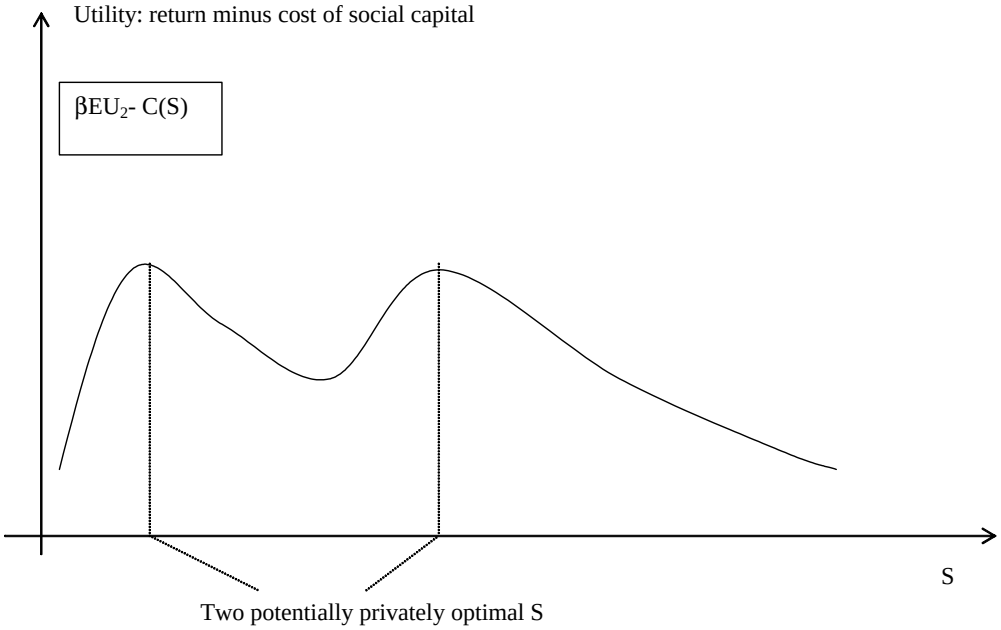

Figure 1: Net utility as a function of social capital: case of multiple extrema

3.2 Extensions

3.2.1 Choice of the composition for S

A natural extension is to consider how agents would *choose* to invest in each type of social capital: local or professional or a combination of both. Now we assume that agents can trade off the two types of social capital in choosing S_π and S_λ separately. 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 Appendix A.4:

- in an interior solution, the agent chooses S_i such that $P_m = P_u$,
- if there is no interior solution, i.e. for instance $P_m > P_u \ \forall S_i$, the agents chooses $S_\pi = \beta(1 - P_u)$ and $S_\lambda = 0$,
- if there is no interior solution, i.e. for instance $P_u > P_m \ \forall S_i$, the agents chooses $S_\lambda = \beta(1 - P_m)$ and $S_\pi = 0$.

Property 3. *When agents can chose the type of social capital they want to invest in, they would preferably choose local capital whenever they expect a low mobility rate compared to the unemployment rate ($P_m < P_u$) ; and the opposite would occur when they anticipate high mobility compared to the unemployment rate ($P_m > P_u$): they chose professional social capital.*

3.2.2 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 induceds in all sort of specific capital, such as job specific skills, sector specific skills, housing, and in our more specific case, local social capital. We will 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:

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

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

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

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

Proposition 4: *Employment protection increases the investment in local social capital. Higher local wages (relative to wages in region B) also increase local social capital, as 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.*

3.2.3 Aggregate externality and multiple equilibria

In the model, we demonstrated a tendency towards multiple local optima for the social capital choices made by individuals, which is different from multiple equilibria, in the sense that observationally close workers may differ dramatically in their choices. Each individual however has a unique global optimum, except in degenerate cases. We now introduce social externalities. At an individual level, in a world of low mobility, it may be even more difficult, to leave one's friends and move to another region (if none of my friends have moved to the city, I won't find any "old friends" there). The opposite occurs in a high mobility world (I am more likely to find these old friends in the new place).[15] In a reduced form, this type of externality can be modeled either through social capital returns or through its cost, each depending on aggregate social capital. Analytically it is slightly more convenient to introduce this externality on the cost side, without any major consequences. This development is coherent with the work of Glaeser et al. (2002), even though their externality is through the social capital returns instead of costs. In contrast, we assume here that the level of social capital in economy S decreases the cost of acquiring social capital for the individual.

Quite naturally the introduction of social externalities will, reinforce complementarity between immobility and localness of social capital discussed above. We can summarize this insight by a final proposition, the proof of which is described in Appendix A.6.

[15] We could also discuss how social norms evolve in relation to mobility. The idea here is that if mobility is low, "old friends" may be more important to individuals than their new friends, and vice-versa in a high mobility world.

Property 5. *There are multiple aggregate equilibria: an equilibrium with low aggregate local social capital implies a higher individual cost of investing in social capital, inducing higher aggregate mobility; and an equilibrium with a high aggregate local social capital reducing the individual cost of investing in social capital, and instead inducing aggregate immobility.*

4 Data

4.1 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), the same widely used data set, mentioned in the introduction. 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 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).[16]

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 "Neighbor": How often do you talk to any of your neighbors?

3. Variable "Friends": 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" 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

[16] In relation to revealed preferences, there is also an argument against the use of trust; as surveyed in Glaeser et al. (2002) and Durlauf and Fafchamps (2004), along with Putnam (2000). They found during a survey interview that for individuals talk about confidence and trust is cheap, while club membership is costly. Further, due to language differences in European countries, responses may be subject to translation bias.

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:

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

where $Z_{i,t}$ is the index value for individual i at time t and $X_{i,t}$ the answer to the question. $I[.]$ is an indicator function that takes value 1 if the expression in brackets is true and 0 if it is not.[17]

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.

4.2 Regressions of mobility, unemployment and local social capital

4.2.1 Short-Run

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

$$\begin{aligned} P_m^{i,t+1} &= \Phi(\pi_m x^{i,t} + \beta_m friendfreq^{i,t} + \gamma_m neibfreq^{i,t} + \phi_m club^{i,t} + \epsilon_m^{i,t+1}), \\ P_u^{i,t+1} &= \Phi(\pi_u x^{i,t} + \beta_u friendfreq^{i,t} + \gamma_u neibfreq^{i,t} + \phi_u club^{i,t} + \epsilon_u^{i,t+1}), \end{aligned}$$

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

[17] 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.

year. $x^{i,t}$ is a vector of exogenous controls: 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 to 25, 26 to 35, 36 to 45, 46 to 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. The variables $friendfreq^{i,t}$ and $neibfreq^{i,t}$ will correspond to our measures of social capital. 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 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 individuals in these three social capital variables. We will also check whether the inclusion of 92 regional effects affects the results. Then we apply various instruments, to control for potential endogeneity and instrument social capital. Although we tried several of them, they generally yielded the same kind of results. A first instrument is individual social capital lag. It is 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 both these types of IV estimations, since each of them has pros and cons. Alternative instruments that we also used are described in Appendix.[18] Finally, we provide fixed effect regressions.

Table 3 summarizes the mobility regressions applied using all specifications discussed above, while the other coefficients are shown in Appendix B.2. in the complete 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, as indicated in the complete tables in the technical Appendix (Tables A-2 and A-3), the number of observations is also reduced by approximately 25%, due to the presence of lags; and when instruments are the regional level of social capital,

[18] 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. The reason for using this procedure is that the standard IV probit procedure in Stata 9 provides the s.e. correction but however does not support clustering and the panel dimension. 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.

due to the fact that 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 "Neighbor" variable has a significant and negative impact on mobility, while the "Club" variable is typically no longer significant. Note also that the other variables included in the complete Tables A-2 and A-3 present reasonable coefficients: 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. Table 3 provides an exhaustive picture, (see also Technical Appendix), displaying individual fixed effect regressions for the mobility equation (bottom right). Not surprisingly, the social capital coefficients turn out to be much less significant, even though the "Neighbor" variable remains quite significant. This indicates that even the —necessarily moderate— time variations in for "Neighbor" social capital for a given individual generates a decline in mobility. Other coefficients displayed include those for which a time variation was observed.

Table 4 provides a summary of *individual unemployment regressions*, showing that the results are relatively stable across specifications, but that interesting changes in sign and significance took place across the social capital measures. The main findings are that "Neighbor" has a positive impact on the unemployment probability, while "Club" has a negative impact, with or without the regional effects. The "Friends" 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.[19] In the Technical Appendix the complete set of Tables A-5 to A-8 list the other coefficients. We also replicated the same specification using fixed effects, with most coefficients showing any significant values.

The Appendix (Tables A-13 to A-16) shows the tests for the validity of the instruments. More specifically, we ran a regression of the dependent variable representing the difference between the mobility variable (or unemployment variable) and the IV regression prediction. The regressors include the instruments and all other exogenous variables. Based on the F-tests it can be seen

[19] The lack of significance for "Friends" can also be explained by a light non-monotonicity of its effect on unemployment. Indeed, where the 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.

that the prediction does not reject exogeneity. However, we do not pretend, based on these regressions, to have a measure of structural coefficients: we only argue that social capital and its local component in particular would deserve full consideration from labor economists.

The magnitude of these effects 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" 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 by a third, while the other two variables cause this risk to increase by approximately one third.

4.2.2 Reverse causality

To examine 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 already tested whether social capital would depend on assigning 0 to the mobility variable $P_m^{i,t}$ if "*the individual was born in the country of current residence and has lived in the same region since birth*", and otherwise assigning 1 to this value. We extend here this specification and regress our measures of local social capital using dummy intervals to represent the number of years since arrival in that region, which is now predetermined. Figure 4 also shows that the amount of social capital accumulated increases according to the time elapsed since the arrival of individuals in the region, again showing that a reverse causal link exists between social capital and migrations.

Unreported additional regressions (see Technical Appendix) provide a linear condition for these effects, Table A-9 for example, while Table A-10 explores the impact of social capital on reservation wages and unemployment duration. The insights are in line with our previous results.

5 Conclusion

Our regressions suggested that social capital has unambiguous effects on individual mobility and adverse effects on individual employment probabilities. The magnitude of the effects was even quite striking. We then discussed how low mobility could be the outcome of self-reinforcing factors. In the present case, investments in local social capital were induced by low mobility and in turn they too became a factor in immobility. We found several examples of complementarity between high local social capital and low mobility rate.

The implications of this paper on the unemployment debate can be summarized as follows. Unemployment in Europe is usually 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.[20] 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. Our paper suggests that in the literature mentioned above, the factors causing unemployment are the same as those leading to accumulation of local social capital. . Our theory is not necessarily a new attempt to explain high unemployment: local social capital is simply complementary to other explanations.

Our theory does however have potential regarding its high persistence. Local social capital may indeed act as a bottleneck, preventing mobility, implying that it attempts to handle unemployment by changing factors exogenous to increased mobility and hence may fail in the event that some type of vicious circle involving immobility and high local social capital occurs. If local social capital forms a bottleneck and prevents access to higher mobility, deregulating labor markets may simply increase inequality and the informal economy share, but will not necessarily increase mobility a great deal.

In other words, if mobility is self-reinforced, it may not be enough to remove the immobility-friendly institutions. An efficient reform of the labor markets should instead combine traditional reforms and develop incentives to increase mobility. Again referring to the example of the Rotary

[20] 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.

Club's emergence in the US, we may suggest that encouraging mobility through social channels may be an interesting policy that local authorities could use to attract migrants from other regions.

Achieving this goal requires an understanding of what led to successful reforms in certain European countries and not others, a puzzle that has recently been discussed a great deal. We would like to suggest that a partial answer might be the following: differences in unemployment across European countries may be related to intra-European differences in attitudes towards social capital. Can we really explain country differences in aggregate unemployment? Although this lies beyond of the scope of this paper, David et al. (2008b) report country-level regressions inspired by Layard-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 and thus we can confirm the fruitfulness of the concept.[21]

[21] and as many recent works have shown, Algan and Cahuc (2007) Calvo and Jackson (2006), Calvo and Zenou (2005), Cahuc and Fontaine (2009).

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Appendix

A Theory Appendix

A.1 Decisions of the agent at a given S and determination of P_m, P_u, P_w

A.1.1 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

$$\begin{aligned} U_2 &= b+(1-\delta_\pi)S \\ \text{if } b+(1-\delta_\pi)S &> w+S > w^*+(1-\delta_\lambda)S \text{ or } b+(1-\delta_\pi)S > w^*+(1-\delta_\lambda)S > w+S \\ U_2 &= w+S \\ \text{if } w+S &> b+(1-\delta_\pi)S > w^*+(1-\delta_\lambda)S \text{ or } w+S > w^*+(1-\delta_\lambda)S > b+(1-\delta_\pi)S \\ U_2 &= w^*+(1-\delta_\lambda)S \\ \text{if } w^*+(1-\delta_\lambda)S &> w+S > b+(1-\delta_\pi)S \text{ or } w^*+(1-\delta_\lambda)S > b+(1-\delta_\pi)S > w+S. \end{aligned}$$

A.1.2 Determination of P_m

The probability of moving is formally

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

and can be shown to be equal to

$$P_m = \int_0^{\overline{w}}\int_0^{\overline{w}} I\left[w^*+(1-\delta_\lambda)S > w+S\right] I\left[w^*+(1-\delta_\lambda)S > b+(1-\delta_\pi)S\right] dG\left(w^*\right) dF\left(w\right),$$

or

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

which gives equation (5).

A.1.3 Determination of P_u

P_u writes formally as

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

We have

$$P_u = \int_0^{\overline{w}}\int_0^{\overline{w}} I\left[b+(1-\delta_\pi)S > w+S\right] I\left[b+(1-\delta_\pi)S > w^*+(1-\delta_\lambda)S\right] dG\left(w^*\right) dF\left(w\right),$$

or

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

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 equation (8) and thus to Proposition 2.

A.1.4 Determination of P_w

The local employment probability is formally

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

and can be shown to be equal to

$$P_w = \int_0^{\overline{w}} \int_0^{\overline{w}} I\left[w + S > b + (1 - \delta_\pi)S\right] I\left[w + S > w^* + (1 - \delta_\lambda)S\right] dG\left(w^*\right) dF\left(w\right),$$

or

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

which gives equation (9).

A.2 Proof of equation (12)

Proof. One derives now the value of EU_2 in detailing the different cases:

$$EU_2 = \int_0^{\bar{w}} \int_0^{\bar{w}} \left\{ \begin{array}{c} (b + (1 - \delta_\pi)S)\, I\left[b - \delta_\pi S > w\right] I\left[b + (1 - \delta_\pi)S > w^* + (1 - \delta_\lambda)S\right] + \\ (w + S) I\left[w + \delta_\pi S) > b\right] I\left[w + S > w^* + (1 - \delta_\lambda)S\right] + \\ (w^* + (1 - \delta_\lambda)S) I\left[w^* + (1 - \delta_\lambda)S > b + (1 - \delta_\pi)S\right] I\left[w^* + (1 - \delta_\lambda)S > w + S\right] \end{array} \right\} dF(w) dG(w^*).$$

Extending the cumulative distribution function above its support, i.e. $\forall w, w^* > \overline{w} \Rightarrow F(w) = G(w^*) = 1$ and $f(w) = g(w^*) = 0$, this expression rewrites as

$$\begin{aligned} EU_2 &= (b + (1 - \delta_\pi)S)\, F(w^r) G(w^{*r}) \\ &\quad + \int_{w^r}^{\bar{w}} (w + S) G(w + \delta_\lambda S) dF(w) \\ &\quad + \int_{w^{*r}}^{\bar{w}} [w^* + (1 - \delta_\lambda)S] F(w^* - \delta_\lambda S) dG(w^*). \end{aligned}$$

Pose $S' = \delta_\lambda S$ and note that $w^{*r} = w^r + S'$, we can rewrite it as

$$\begin{aligned} EU_2 &= (b + (1 - \delta_\pi)S)\, F(w^r) G(w^{*r}) \\ &\quad + \int_{w^r}^{\bar{w}} (w + S) G(w + S') dF(w) \\ &\quad + \int_{w^{*r}}^{\bar{w}} [w^* + (1 - \delta_\lambda)S] F(w^* - S') dG(w^*). \end{aligned}$$

A variable change is useful: pose $z = w^* - S'$, we have

$$\begin{aligned} EU_2 &= (b + (1 - \delta_\pi)S)\, F(w^r) G(w^{*r}) \\ &\quad + \int_{w^r}^{\bar{w}} (w + S) G(w + S') f(w) dw \\ &\quad + \int_{w^r}^{\bar{w} - S'} (z + S) F(z) g(z + S') dz. \end{aligned} \tag{A4}$$

Note that

$$\int_{w^r}^{\bar{w} - S'} (z + S) F(z) g(z + S') dz = \int_{w^r}^{\bar{w}} (z + S) F(z) g(z + S') dz - \int_{\bar{w} - S'}^{\bar{w}} (z + S) F(z) g(z + S') dz,$$

and, in the second term, $z + S' > \bar{w}$ thus, $g(z + S') \equiv 0$. The integrals in (A4) can thus be simplified as

$$\begin{aligned} EU_2 &= (b + (1 - \delta_\pi)S)\, F(w^r)G(w^{*r}) \\ &\quad + \int_{w^r}^{\bar{w}} (w + S)d[G(w + S')F(w)]dw. \end{aligned} \tag{A5}$$

Note also that $w^r + S = b + (1 - \delta_\pi)S$, hence there is a simplification here. Let us integrate (A5) by part. We have

$$\int_{w^r}^{\bar{w}} (w + S)d[G(w + S')F(w)]dw = \bar{w} + S - (w^r + S)G(w^{*r})F(w^r) - \int_{w^r}^{\bar{w}} F(w)G(w + S')dw,$$

which immediately implies

$$EU_2 = \bar{w} + S - \int_{w^r}^{\bar{w}} F(w)G(w + S')dw,$$

or

$$EU_2 = \bar{w} + S - \int_{b-\delta_\pi S}^{\bar{w}} G(z + \delta_\lambda S)F(z)dz. \tag{A6}$$

Deriving with respect to S leads to

$$\frac{\partial EU_2}{\partial S} = 1 - \delta_\pi G(w^{*r})F(w^r) - \delta_\lambda \int_{w^r}^{\bar{w}} g(z + \delta_\lambda S)F(z)dz.$$

■

A.3 Properties of EU_2

A.3.1 First order derivative

Deriving equation (12), we have

$$\frac{dEU_2}{dS} = 1 - \delta_\pi G(w^{*r})F(w^r) - \delta_\lambda \int_{w^r}^{\bar{w}} g(z + \delta_\lambda S)F(z)dz. \tag{A7}$$

Then, we can rewrite P_m after a change of variable:

$$\begin{aligned} P_m &= \int_{w^{r*}}^{\overline{w}} F(z - \delta_\lambda S)g(z)dz \\ &= \int_{w^{*r}-\delta_\lambda S}^{\overline{w}-\delta_\lambda S} F(z')g(z' + \delta_\lambda S)dz', \end{aligned}$$

with $z' = z - \delta_\lambda S$. Since $w^{*r} - \delta_\lambda S = w^r$ and $g(z' + \delta_\lambda S) \equiv 0$ for all $z' > g\overline{w} - \delta_\lambda S$, the last term of equation (A7) precisely corresponds to $\delta_\lambda P_m$. Hence, equation (13).

A.3.2 Second order derivative

Replacing dP_m/dS and dP_u/dS as calculated in Section 2 into (A7), we have:

$$\begin{aligned} d^2EU_2/dS^2 &= -\delta_\lambda(\delta_\pi - \delta_\lambda)F(w^r)g(w^{*r}) + {\delta_\lambda}^2 \int_{w^{*r}}^{\overline{w}} f(z - \delta_\lambda S)g(z)dz \\ &\quad -\delta_\pi[-\delta_\pi f(w^r)G(w^{*r}) + F(w^r)g(w^{*r})(\delta_\lambda - \delta_\pi)]. \end{aligned}$$

Rearranging terms, we obtain

$$d^2EU_2/dS^2 = F(w^r)g(w^{*r})(\delta_\pi - \delta_\lambda)^2 + \delta_\pi^2 f(w^r)G(w^{*r}) + {\delta_\lambda}^2 \int_{w^{*r}}^{\overline{w}} f(z - \delta_\lambda S)g(z)dz, \tag{A8}$$

which is strictly positive unless $\delta_\pi = \delta_\lambda = 0$.

A.3.3 Third order derivative

Deriving (A8), we have then, after rearranging terms,

$$\begin{aligned} d^3EU_2/dS^3 &= g'(w^{*r})F(w^r)(\delta_\lambda-\delta_\pi)^3+(\delta_\pi-\delta_\lambda)^2\delta_\lambda f(w^r)g(w^{*r}) \\ &\quad -{\delta_\lambda}^3\int_{w^{*r}}^{\overline{w}} f'(z-\delta_\lambda S)g(z)dz-{\delta_\pi}^3 f'(w^r)G(w^{*r}). \end{aligned}$$

Again, this is equal to zero when $\delta_\pi=\delta_\lambda=0$. The sign is ambiguous.

A.4 Proofs of Section 3.2.1

With different types of social capital, a new expression for equation (12) can be obtained solving

$$EU_2=\int_0^{\bar{w}}\int_0^{\bar{w}}\left\{\begin{array}{l}(b+S_\lambda)I\left[b-S_\pi>w\right]I\left[b+S_\lambda)>w^*+S_\pi\right]+\\(w+S_\lambda+S_\pi)I\left[w+S_\pi>b\right]I\left[w+S_\lambda>w^*\right]+\\(w^*+S_\pi)I\left[w^*+S_\pi>b+S_\lambda\right]I\left[w^*>w+S_\lambda\right]\end{array}\right\}dF(w)dG(w^*).$$

Following the same steps presented in the appendix to get equation (12), it rewrites

$$EU_2=\bar{w}+S_\pi+S_\lambda-\int_{w^{*r}}^{\bar{w}}G(z+S_\lambda)F(z)dz.$$

Hence the first order conditions: under $S_i\geq 0$, the first order conditions on S_i are, for $i=\pi;\lambda$:

$$S_\lambda\left[\frac{\partial C}{\partial S_\lambda}-\beta(1-P_m)\right] = 0 \quad \text{(A9)}$$

$$S_\pi\left[\frac{\partial C}{\partial S_\pi}-\beta(1-P_u)\right] = 0 \quad \text{(A10)}$$

where

$$\begin{aligned} P_m &= \int_{w^{*r}}^{\bar{w}}F(z-S_\lambda)g(z)dz \\ P_u &= G(w^{*r})F(w^r) \end{aligned}$$

with

$$\begin{aligned} \frac{\partial P_m}{\partial S_\lambda} &= -\int_{w^{*r}}^{\bar{w}}F(z-S_\lambda)g(z)dz-F(w^r)g(w^{*r})<0 \text{ and } \frac{\partial P_m}{\partial S_\pi}=F(w^r)g(w^{*r})>0 \\ \frac{\partial P_u}{\partial S_\lambda} &= F(w^r)g(w^{*r})>0 \text{ and } \frac{\partial P_u}{\partial S\pi}=-F(w^r)g(w^{*r})-f(w^r)G(w^{*r})<0 \end{aligned}$$

Under quadratic cost functions as discussed in the text, we can then see that for (A9) and (A10) to be simultaneously true, that there must be a corner solutions where either S_λ or S_π is zero, or that, when both are strictly positive, that $P_m=P_u$.

A.5 Proof for employment protection

The first order condition will be, using (13):

$$\begin{aligned} C'(S) &= \tau\left[1-\delta_\lambda P_m(b,\delta_\pi,\delta_\lambda)-\delta_\pi P_u(b,\delta_\pi,\delta_\lambda)\right]+(1-\tau)\left[1-P_m(w_1,0,\delta_\lambda)\right] \quad \text{(A11)} \\ &= (1-\tau)\left[1-\delta_\lambda\int_{w^r}^{\bar{w}}g(z+S)F(z)dz-\delta_\pi G(w^{*r})F(w^r)\right] \\ &\quad +\tau\left[1-\int_{w_1}^{\bar{w}}g(z+S)F(z)dz\right]. \end{aligned}$$

It is easy to verify that the quantity in the right hand side increases with τ, featuring that the returns to local social capital are higher, the higher the likelihood to remain employed in the same local job. As a consequence, as τ increases, $C'(S)$ increases, meaning that the optimal level of social capital $\widehat{S}$ invested is higher. In the same vein, the expression above is increasing in w_1: the higher the initial wage, the higher $\widehat{S}$. Finally, the interaction between the two is also positive: $d^2\widehat{S}/Sw_1d\tau > 0$.

A.6 Proof for social externalities

For simplicity, we assume again that $1-\delta_\pi$ and $1-\delta_\lambda$ are technologically given, and now that $C(S)$ becomes $C(S,\overline{S})$ and multiplicative separability property such that: $C(S,\overline{S}) = C_0(S)\sigma(\overline{S})$. We still assume that $C_0(S)$ is increasing and convex and adds that $\sigma(\overline{S})$ is decreasing and convex:

$$dC(S,\overline{S})/dS = C_0^{'}(S)\sigma(\overline{S}) > 0 \text{ and } d^2C(S,\overline{S})/dS^2 = C_0^{''}(S)\sigma(\overline{S}) > 0,$$
$$dC(S,\overline{S})/d\overline{S} = C_0(S)\sigma^{'}(\overline{S}) < 0; \text{ and } d^2C(S,\overline{S})/d\overline{S}^2 = C_0(S)\sigma^{''}(\overline{S}) > 0,$$
$$d^2C(S,\overline{S})/dSd\overline{S} = d^2C(S,\overline{S})/d\overline{S}dS = C_0^{'}(S)\sigma^{'}(\overline{S}) < 0.$$

We will also assume that: $\lim_{s\to+\infty} C_0^{''}(S) > 0, \lim_{\overline{s}\to+\infty} \sigma^{'}(\overline{S}) = 0$. Furthermore, it is useful to note that $\lim_{s\to+\infty} \frac{d^2EU_2}{dS^2} = 0$ and $\lim_{s\to+\infty} \frac{d^3EU_2}{dS^3} < 0$.

As for individuals, $\overline{S}$ is given. The first order condition for their investment in human capital becomes:

$$\frac{dC(S,\overline{S})}{dS} = C_0'(S)\sigma(\overline{S}) = \beta\frac{dEU_2}{dS}. \tag{A12}$$

This allows to rewrite a relationship between $\widehat{S}^*$, the privately optimal level of social capital in presence of externalities and $\overline{S}$:

$$\widehat{S}^* = \widehat{S}^*(\overline{S}).$$

Assuming that $\overline{S}$ is the average level of social capital and a symmetric equilibrium (all agents are identical and choose the same level of social capital at their optimum), the equilibrium value of S is obtained by the intersection of the 45 degree line in the $(\overline{S},S)-locus$ with the curve $\widehat{S}^*(\overline{S})$. To characterize $\widehat{S}^*(\overline{S})$, let rewrite equation (A12) as:

$$\mathcal{F}(S,\overline{S}) = C_0'(S)\sigma(\overline{S}) - \beta\frac{dEU_2}{dS} = 0.$$

Using the implicit function theorem for $\frac{d\mathcal{F}}{dS} \neq 0$, we have:

$$\frac{d\widehat{S}^*(\overline{S})}{d\overline{S}} = -\frac{\frac{d\mathcal{F}(\widehat{S}^*,\overline{S})}{d\overline{S}}}{\frac{d\mathcal{F}(\widehat{S}^*,\overline{S})}{dS}} = -\frac{C_0'(S)\sigma'(\overline{S})}{C_0''(S)\sigma(\overline{S}) - \frac{d^2EU_2}{dS^2}} > 0, \tag{A13}$$

i.e. $\widehat{S}^*(\overline{S})$ has a positive slope.

Remark that the first order condition implies the equality between $C_0'(S)\sigma(\overline{S})$, the marginal cost of investing in social capital and $\beta\frac{dEU_2}{dS}$, its time-discounted marginal return. For this first order condition to be a maximum, the necessary condition is: $C_0^{''}(S)\sigma(\overline{S}) > \beta\frac{d^2EU_2}{dS^2}$. Otherwise, this intersection would represent a minimum rather than a maximum. This implies that the denominator of equation (A13) is necessarily positive for any optimal choice of an individual excepted if the marginal cost is tangent to the marginal return. We do not treat this particular point as it is not our main concern.

To ease the analysis, we will assume again a quadratic functional form for $C_0(S)$ such that $C_0^{'}(S) = S$ and $\sigma(\overline{S}) = \overline{S}^{-\gamma}$ where $\gamma > 0$. In this case, it is then possible to show that $\lim_{\overline{s}\to+\infty} \frac{d\widehat{S}^*(\overline{S})}{d\overline{S}} = 0$. This suggests

that (at least for a minimal value of $\overline{S}$) $\widehat{S}^*(\overline{S})$ is concave (since it has a positive slope and an horizontal asymptote).

Since $\widehat{S}^*(\overline{S})$ is an increasing function in $\overline{S}$ and has an horizontal asymptote, there is necessarily one intersection at least between $\widehat{S}^*(\overline{S})$ and the 45° line in the $(\overline{S}, S) - locus$. Unfortunately, it is difficult (without additional strong assumptions on the distribution function of the model) to determine the convexity of $\widehat{S}^*(\overline{S})$ (the expression of the implicit second order derivative is given in Appendix). Therefore, we prefer to present several possible shapes for $\widehat{S}^*(\overline{S})$ as represented in figures 2 and 3.

Proposition A-5. *There exists, at least, one stable equilibrium value of S in presence of externalities.*

Proof. The proof requires to treat several different cases.

- Let start by assuming that $\frac{d^3EU_2}{dS^3} < 0 \; \forall S \in IR_0^+$. i.e. $\frac{dEU_2}{dS}$ is strictly concave. In this case, $\widehat{S}^*(\overline{S})$ is a function $\forall S \in IR_0^+$. Two cases have to be analyzed: First, suppose that $C_0'(S)\sigma(\overline{S}) > \frac{dEU_2}{dS}$ for $S \to 0$. In this case, we necessarily have a corner solution (corresponding to a local maximum) and we may have other interior solution(s). Note that the corner solution is unstable. Second, suppose that $C_0'(S)\sigma(\overline{S}) > \frac{dEU_2}{dS}$ for $S \to 0$. We do not have corner solution, but we must have an interior solution: Since $\lim_{\overline{s}\to 0} \widehat{S}^*(\overline{S}) > 0$ and $\lim_{\overline{s}\to +\infty} \frac{d\widehat{S}^*(\overline{S})}{d\overline{S}} = 0$, we must have, at least, one intersection between $\widehat{S}^*(\overline{S})$ and the 45 degree line.
- Suppose now that $\frac{dEU_2}{dS}$ is not strictly concave ($\frac{d^3EU_2}{dS^3} \geq 0$). In this case, $\widehat{S}^*(\overline{S})$ may be a correspondence rather than a function. As before, as long as $C_0'(S)\sigma(\overline{S}) > \frac{dEU_2}{dS}$ for $S \to 0$, we have (at least) a corner solution (unstable). We should also have another interior solution (stable) but we may have more. To better understand how this correspondence is shaped, it is instructive to look at Figure (2) and (3). The end of this proof is presented for $C_0'(S)\sigma(\overline{S}) < \frac{dEU_2}{dS}$ when $S \to 0$. In this situation, $\widehat{S}^*(\overline{S})$ may be a correspondence, but with a positive slope. Let $\overline{S}_1$ be the tangency point between $C_0'(S)\sigma(\overline{S})$ and $\frac{dEU_2}{dS}$. When $S \in (0, \overline{S}_1)$, if the correspondence crosses the 45 degree line, we have a stable equilibrium. If it does not cross it, let us consider the second part of this correspondence, that is for $S \in (0, \overline{S}_2)$, $\overline{S}_2$ being the tangency point between $C_0'(S)\sigma(\overline{S})$ and $\frac{dEU_2}{dS}$, for the highest level of S. This second part is necessarily higher (in terms of the level of S) and $\overline{S}_2 < \overline{S}_1$. Since $\widehat{S}^*(\overline{S})$ has an horizontal asymptote, we necessarily have an intersection between with the 45 degree line when the first part of the correspondence does not have intersection.

■

This reinforces the type of complementarity already discussed in the benchmark model: indeed, we had *multiple maxima* for individuals agents: one with low mobility & high local social capital vs. another one with high mobility & low local social capital.[22]

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.

[22] This multiplicity of equilibria was also investigated by Spilimbergo and Ubeda (2004a) in a study of migration and social environment.

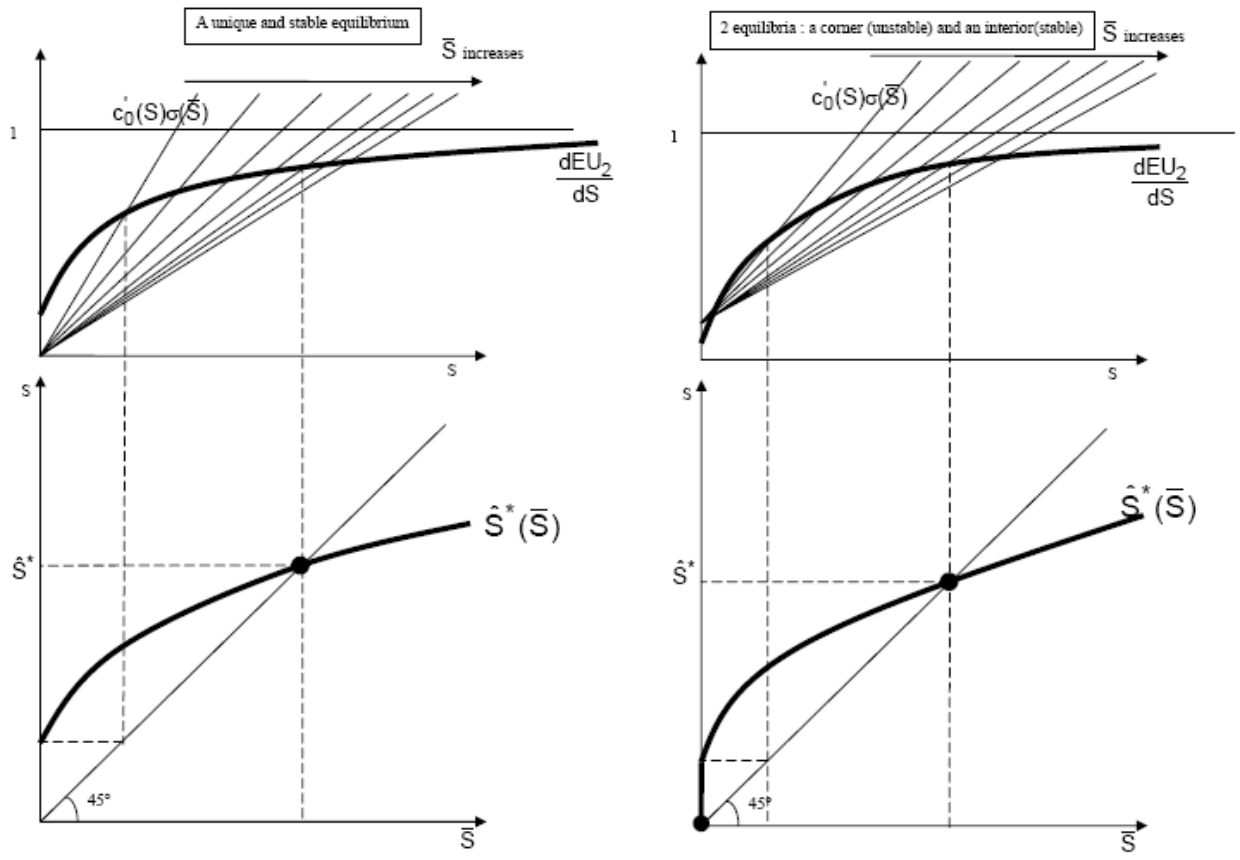


Figure 2: Case when $\widehat{S}^*(\overline{S})$ is a continuous function (unique extremum for S). Unique vs. multiple equilibria.

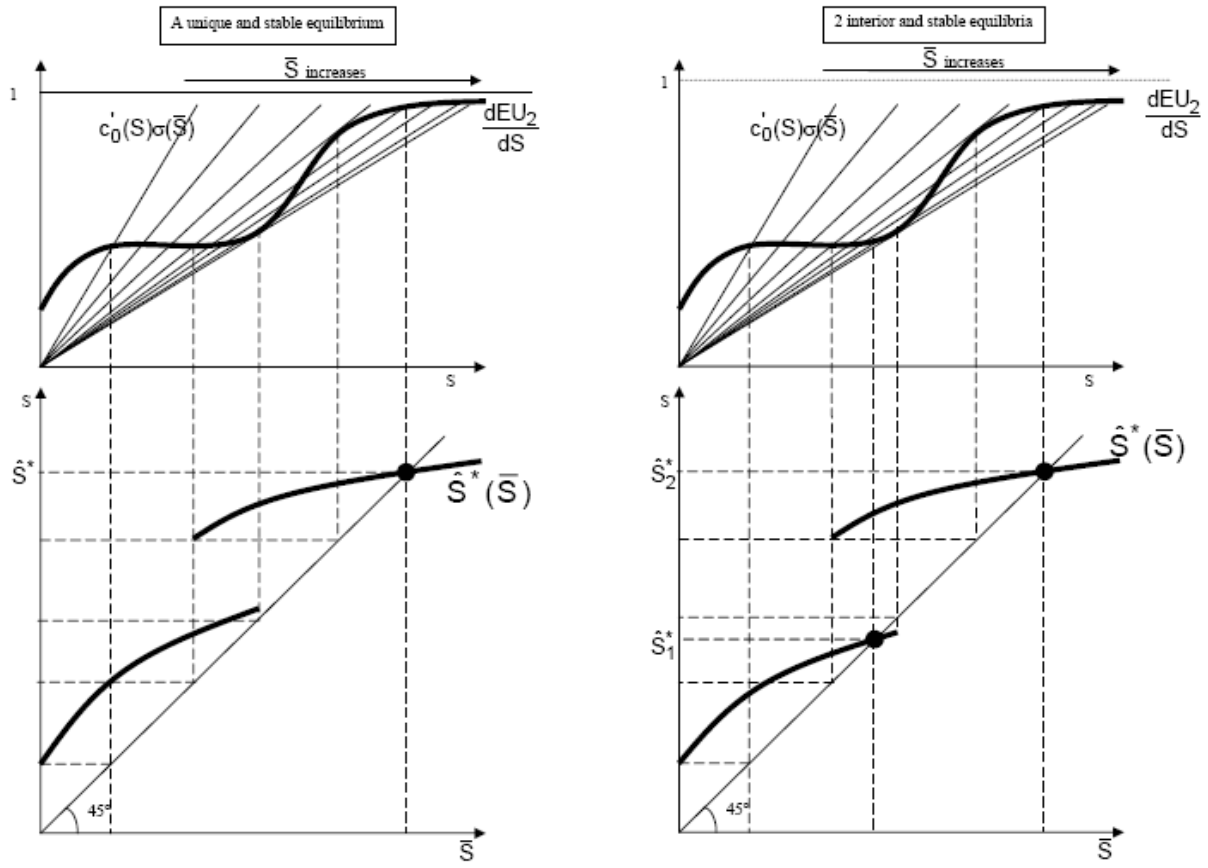


Figure 3: Case when $\widehat{S}^*(\overline{S})$ is a correspondence (multiple extrema for individual S). Unique vs. multiple equilibria

- 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.
- 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. (2005).
- 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 intruments. The two most convincing instruments are:

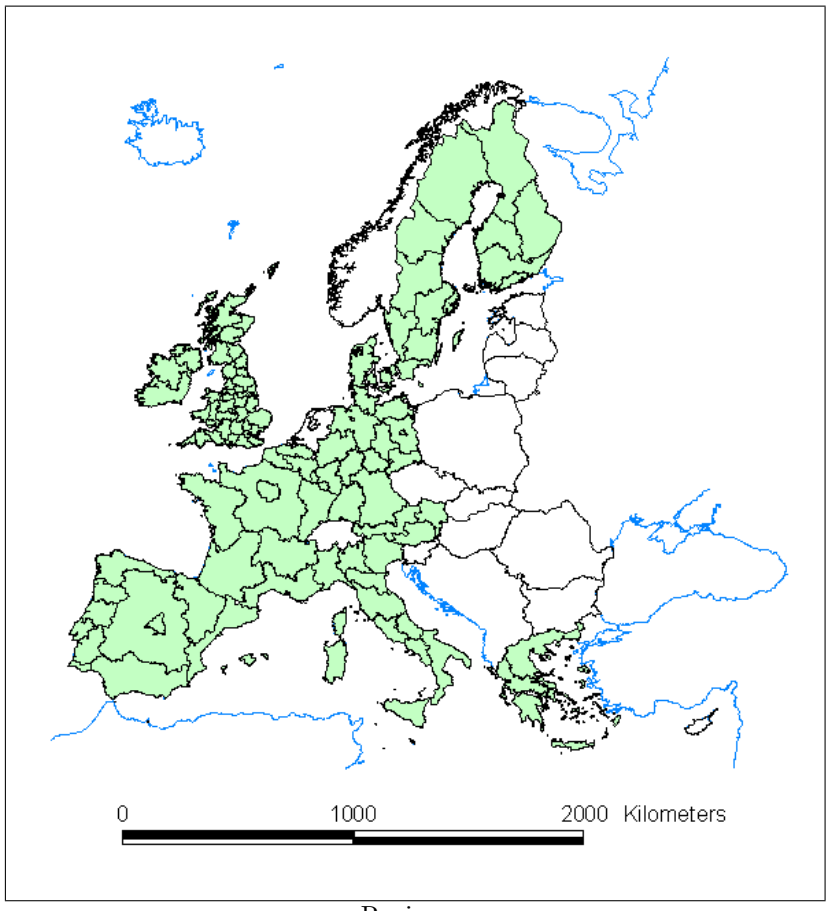
a) the average level of social capital in the region where the individual lives: it is clearly exogenous to the individuals and fairly correlated to individual's social capital. We have however made several other attempts.

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.

B.3 Regions



Regions

B.4 Additional Results (for Technical Appendix).

In the first part of Table A-10, we analyze the effect of social capital on a variable reflecting whether individuals have experienced long term unemployment. The idea is to test whether social capital can be powerful enough to significantly reduce the risk of long spells of unemployment: connected people may be able to obtain a new job immediately after a layoff. For that, we restrict the sample to people looking for a job, not working or working less than 15 hours a week. We find that only the "Club" variable has a negative impact on having been unemployed at a time, while the other social capital variables have no effect.

A second test is to determine, for currently employed individuals, whether social capital reduced the probability of having experienced a spell of unemployment before the current job. The idea is similar to the previous one: connected people may move easily from job-to-job. The effect of "Club" is still strong and negative, while now, we find marginally positive impact of the "Neighbor" variable.

In the second part of Table A-9, we regress the number of months of unemployment before the current job on our social capital variables and the usual controls.[23]. To these usual controls, we add a set of

[23]Note that here, we do not have any right-censoring problem since we know the exact number of months of unemployment prior to re-employment, contrary to a classical duration analysis where we would observe transitions between different stats instead. In addition, the sample is restricted to persons that are "normally working" at

time controls, not at the time of the survey, but at the time of entrance in the previous job. That is, if an individual is interviewed in 1996 and has been employed in the current job for six years, that individual is attributed a time dummy (y90=1), in order to control for the economic cycle at the time of job search. Columns (1) to (3) only consider the length of unemployment of those having experienced some unemployment (log specification) while Columns (4) to (6) also include those having faced no unemployment. We find that belonging to a club is generally associated with shorter unemployment spells, and that the neighboor variable is marginally positively significant.

Finally, we also tried similar regressions with a measure of the reservation wage but found them disappointing, probably due to measurement error and do not report them here.

However, our conclusions from these additional regressions is that social capital has positive impact on employability when it is not local, and has a negative or nul impact when it is local, which is in line with the previous results in this paper and the theoretical results in David et al. (2008).

the time of the survey, i.e. working more than 15 hours per week, and that started their current job at the earliest 2 years before they joined the survey.

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