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The legacy of history for economic development: the case of Putnam's social capital

by G. de Blasio and G. Nuzzo

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THE LEGACY OF HISTORY FOR ECONOMIC DEVELOPMENT: THE CASE OF PUTNAM'S SOCIAL CAPITAL

by Guido de Blasio[*] and Giorgio Nuzzo[**]

Abstract

Putnam (1993) argues that (i) central and northern Italy has developed faster than southern Italy because the former is better endowed with social capital; and (ii) that the endowments of social capital across Italy have been highly persistent over the centuries. This paper provides an empirical investigation of Putnam's case. To evaluate the relevance of social capital we present a test based on worker productivity, entrepreneurship, and female labour market participation. Using as instruments regional differences in civic involvement in the late nineteenth century and local systems of government in the middle ages, we show that social capital does have economic effects.

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1. Introduction[1]

One of the most fascinating topics in contemporary economics concerns the role of history. Is history important for the economic performance of countries and regions? Will the effects of history ultimately fade out or will they constrain economies in the long run?

The new institutionalism view suggests that history is important because it shapes institutions and institutions shape the economy. For instance, La Porta et al. (1999) argue that being colonized by the British Empire rather than by other countries had a profound effect on the legal system and through that on the economies concerned. Acemoglu et al. (2001 and 2002) show that mortality rates among early European colonialists explain the types of institutions adopted, which have persisted to the present. Thus, current differences in development can be traced back to the colonial origins of the institutions. Banerjee and Iyer (2005) show that differences in the institutions set up by the British to collect land revenue in India lead to sustained differences in economic performance.

Although the economists' emphasis has been so far on formal rules, the concept of institutions is wider. Institutions include both formal rules, such as constitutions, laws, and property rights, and informal constraints, such as sanctions, taboos, customs, traditions, and codes of conduct. For instance, North (1991: 97) defines institutions as "the humanly devised constraints that structure political, economic and social interaction" and argues that informal constraints matter: "We need to know much more about culturally derived norms of behavior and how they interact with formal rules to get better answers (...). We are just beginning the serious study of institutions" (North, 1990: 140). Similarly, Glaeser et al.

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(2004) underscore that countries differ in their stocks of human and social capital and institutional outcomes depend to a large extent on these endowments.

In this paper, we attempt to investigate the importance of history for economic performance by studying the role of informal constraints. We focus on one of the most widely quoted instances of informal rules, namely the concept of social capital proposed by Putnam (1993). This concept refers to trust, reciprocity, and habits of co-operation that are shared among members of a local community.[2] Putnam's theory can be summarized by two propositions. First, central and northern Italy has developed faster than southern Italy because it was better endowed with social capital. Second, the endowments of social capital across Italian regions have been highly persistent over the centuries. In particular, it was the local political regimes in place in the middle ages that shaped the degree of local civic commitment that persisted through the centuries. By studying the importance of social capital for economic performance in the context of the Italian regions, our study thus provides an empirical investigation of Putnam's theory.[3]

Besides its historical importance, focusing on the case of Italy also has additional advantages. First, studying the variation of informal institutions within the same country, under the same set of formal institutions, it enables us to assess the relative importance of informal constraints versus formal rules (Diankov et al., 2003). Moreover, focusing on within-country variations helps to avoid some of the omitted variable problems associated with cross-countries studies (see, for instance, Temple, 2002). Finally, since we estimate the effect of social capital by using a microeconomic unit of observation as the dependent variable, the potential problem of reverse causality, which is prevalent in the empirical literature on institutions and development, is minimized (see: Isham and Kaufman, 1999).

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[2] In this paper the term "social capital" is used in the meaning indicated by Putnam (1993). Clearly, this is not the only possible meaning of the word, as the literature on the definitions of social capital is voluminous. See, for a survey, Durlauf and Fafchamps (2006).

[3] The importance of informal constraints for the development of Italy was also underlined by Banfield (1958) in *The Moral Basis of a Backward Society*. Supported by the results of in-the-field research on the residents of a small village near Potenza (fictionally called Montegrano), Banfield concludes that "extreme poverty and backwardness is to be explained largely … by the inability of the villagers to act together for their common good or, indeed, for any end transcending the immediate material interest of the nuclear family" (Banfield, 1958: 38).

To evaluate the relevance of social capital, we start by regressing current economic performance on current social capital. The latter is proxied by Putnam's (1993) measure of political participation, which refers to voter turnout in referenda. Our test is based on three individual outcomes that are key for the underdevelopment of the south of Italy: labour productivity, entrepreneurship, and female labour market participation. These activities represent aspects of economic performance for which there are clear-cut theoretical predictions as to the positive impact of social capital. For instance, low levels of labour productivity in the south could depend on social norms that encourage shirking (Ichino and Maggi, 2000). They could also reflect the impact of low social capital on the credit market (Guiso et al., 2004), local government performance (Putnam, 1993), and the functioning of the judiciary (World Bank, 2005). Similarly, low rates of entrepreneurship could be the result of a culture that discourages risk-taking (Alesina et al., 2001). Linear regressions show that there is a positive correlation between the endowments of social capital at the local level and the three outcomes after controlling for individual characteristics. However, there are a number of reasons for not interpreting linear regression results as causal. There could be a substantial measurement error since the social capital measure could correspond poorly with the social capital that matters in practice. This would create attenuation bias. Moreover, there could be omitted geographical characteristics along with endogeneity problems.

To solve these problems, we exploit Putnam's conjecture on the origins of social capital to derive a possible source of exogenous variation for current social capital.

We start by using the regional data on social capital collected by Putnam (1993) for the period following the unification of Italy in 1870. These indicators refer to two aspects of civic traditions, namely the turnout in the few relatively open elections before Fascism brought authoritarian rule to Italy and the density of local associations. There is a strong (first-stage) relationship between nineteenth-century variables and current social capital. Our two-stage least square estimates show that the component of social capital explained by history is positively correlated with the three individual outcomes. This is true even after controlling for nineteenth-century population density and contemporaneous education, which according to Tabellini (2005) helps to disentangle the effect of the historical variables from that of unobserved determinants of current performance. The exclusion restriction implied by our approach is that, conditional on the controls included in the regression, the measures of

social capital a hundred years ago have no effect on individual economic outcomes today, other than through the persistence of social capital. We use over-identification tests to detect whether this exclusion restriction is reasonable and find no evidence for a direct effect of nineteenth-century social capital endowments on the three individual outcomes. As to the economic magnitude, the role of social capital is large but not implausible. Our estimates imply that moving from the average southern province to the average province in the centre and north would increase labour productivity by 12 per cent, the likelihood of becoming an entrepreneur by 4 per cent, and the probability of a woman of participating in the labour market by 13 per cent. We also find that two-stage least square estimates are larger than those from linear regression. By using an alternative contemporary measure of social capital as instrument we check whether the measurement error in social capital is of the right order of magnitude to explain the difference between linear and two-stage least square results. We find that this is indeed the case.

Next, we use data on the local systems of government in early medieval Italy. This amounts to pushing Putnam's conjecture as far as it can go. Putnam (1993) argues that the differences in social capital endowments today are plainly traceable from the systems of government prevailing at the beginning of the fourteenth century. Local communities that featured a higher degree of republicanism in middle ages turn out, at the end of the twentieth century, to be those most endowed with social capital. We rely on historical sources to classify today's Italian provinces according to the political regimes prevailing at the beginning of the fourteenth century. We identify four regimes, corresponding to differing degrees of republicanism and autocracy: the communes, the heartland of republicanism; the *signorie,* former communal republics fallen prey to signorial rule by the beginning of the fourteenth century; the Papal State, characterized by a mixture of feudalism, tyranny, and republicanism; and the Kingdom of Sicily, marked by the highest degree of autocracy. In this case, the exclusion restriction implied by our approach is that, conditional on the controls included in the regression, the measures of local political regimes seven hundred years (!) ago have no effect on individual economic outcomes today, other than through social capital persistence. While the results of this experiment should be viewed with caution because the mapping of contemporary Italian provinces into mediaeval areas can only be imperfect, the results are encouraging. We find a strong (first-stage) relationship between fourteenth-

century political variables and current endowments of social capital. Our two-stage least square estimates show that the component of social capital explained by mediaeval local political systems is positively correlated with entrepreneurship and female labour market participation. However, as to the effect on worker productivity, the over-identification test does not allow us to reach a conclusion.

Empirically, our work is linked to a number of other attempts to uncover the economic relevance of Putnam's theory. Putnam himself, jointly with Helliwell, provided a first empirical investigation in 1995. Using cross-region growth regressions, they show that income convergence is faster for regions with relatively high levels of social capital. However, aggregate data might suffer from substantial shortcomings: the extent of trust may be correlated with other aspects of the regions that are omitted from the growth regressions (see also Durlauf and Fafchamps, 2006). In an attempt to provide more informative empirical work, recent papers have shifted to micro data. Ichino and Maggi (2000) use individual data on absenteeism and misconduct episodes for a single Italian bank and conclude that workers born in the south are more likely to behave dishonestly. Even though they do not use any measure of social capital, they explicitly refer to Putnam's thesis to justify their results. Guiso et al. (2004) use household micro data to show that measures of civic engagement help explain the variation in financial practices across Italian regions. Similarly to Ichino and Maggi (2000) and Guiso et al. (2004), this paper studies the impact of social capital by using micro data. However, in contrast with Ichino and Maggi (2000), we use data that are representative of the Italian population at large; and unlike Guiso et al. (2004) we look at the real and not the financial effects of social capital. Crucially, in contrast with all previous studies we refer to Putnam's theory on the origins of social capital to identify a source of exogenous variation in social capital.

The paper is structured as follows. Section 2 motivates the use of our dependent variable, describes the data, and presents linear regression estimates of individual economic outcomes on social capital. Section 3 explains the two-stage least square results. Section 4 concludes.

2. The Effect of Social Capital: OLS and LPM Estimates

2.1 Dependent Variables

Our aim is to understand whether social capital makes a difference in explaining the varying prosperity of areas of Italy. At the same time, we hope to shed some light on the mechanisms through which social capital affects economic performance. We focus on three main aspects (the dependent variables in our investigation): worker productivity, entrepreneurship, and female participation in the labour market. These aspects provide a natural and attractive territory to analyze the effects of social capital on economic activity. First, for each of them there are clear-cut theoretical predictions as to the positive impact of social capital.[4] Second, they represent some of the key features of Italy's dual development process.

In Italy, geographical divergences in workers' productivity are pronounced. While nation-wide labour productivity is not far from the OECD average (see, for example, IMF, 2002), the gap in the south is about 20 per cent (see: Mauro et al., 1999).[5] We estimate the effect of social capital on individual productivity by exploiting a Mincerian wage-equation augmented with a local social capital term. In Appendix 1 we present a simple model that provides a theoretical justification of the approach followed here. The model shows that in equilibrium competitive firms will be happy to pay higher wages in areas with higher social capital endowments. As to the channels through which social capital impacts on firms' TFP, our approach provides reduced-form estimates. Therefore, it accommodates a number of potential explanations. In this vein, a reduced labour productivity could be due to social norms that encourage shirking (Ichino and Maggi, 2000). Moreover, it could reflect the impact of low social capital on the credit market (Guiso et al., 2004), the performance of local government (Putnam, 1993), and the functioning of the judiciary (World Bank, 2005). Additionally, the higher reliance on personal networking in job search in low-trust areas may help to damp down wages (see: Pistaferri, 1999).

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[4] As recognized by Arrow (1972: 357): "Virtually every commercial transaction has within itself an element of trust, certainly any transaction conducted over a period of time. It can be plausibly argued that much of the economic backwardness in the world can be explained by the lack of mutual confidence".

[5] See also Castronuovo (1992). According to Chiades et al. (2000) and Aiello and Scoppa (2001) this figure could well be on the conservative side.

The Italian economy relies more than those of other OECD countries on small business activity.[6] The distribution of firms across regions is far from uniform: Italian firms are concentrated in the centre and north of Italy. Again, a lack of trust can adversely affect entrepreneurship through a number of channels. While it is not easy to overstate the role of the credit market, local government and the judiciary, there may be also additional channels. To the extent that social capital promotes a better protection of property rights and deters crime, it stimulates business initiatives (Mauro, 1995 and Hall and Jones, 1999). According to Alesina et al. (2001), the south of Italy is an area where the prevailing "culture" discourages private activity and entrepreneurship.

Female non-participation is essentially a southern issue: the participation rate for southern women is 35 per cent, more than 15 percentage points below the average for the north and less than half that for men in the south. Low-trust communities have social norms against working women. According to Putnam (1993: 175), in the south of Italy the pervasiveness of strong family ties comes at the expense of the networks of civic engagement that feature in the northern regions. In these traditional families, the concept of a male breadwinner prevails. This echoes Banfield's amoral familism archetype: in daily life in Montegrano there was little room for women to entertain professional aspirations beyond housekeeping, child-care, and, if necessary, making a heavy contribution to the family farm. The importance of cultural factors in explaining the gender gap in labour force participation has recently been highlighted by Antecol (2000); while Algan and Cahuc (2003) study the impact of religion, perhaps a peculiar type of informal norm, on female participation.

2.2 Data and Descriptive Statistics

Our main data source is the Survey of Household Income and Wealth (SHIW). This survey is conducted every two years by the Bank of Italy on a representative sample of about 8,000 households (see Brandolini and Cannari, 1994, for details). The SHIW collects individual data on demographics and economic behaviour, such as age, sex, marital status, number of children, wages, work status, schooling, work experience, branch of activity,

[6] According to Eurostat, in 2000 the average firm size in Italy was equal to 3.6 employees, representing the smallest size among European countries.

household net wealth. The confidential version of the SHIW we use makes available data on the province of residence. This information allows us to augment our individual-data regressions with the variables defined at local level, such as social capital. Since 1993 the survey has maintained the same structure and therefore we pool data from the last four waves (1993, 1995, 1998, 2000).

Table 1a reports summary statistics for the variables used throughout the paper. Panel A in Table 1a describes the three individual economic outcomes that are the dependent variables in our regressions. Worker productivity is measured by the log of hourly wages for a sample of 23,097 employees. Entrepreneurship is an indicator variable equal to one if the individual is the sole proprietor of a business, member of a family business, or active shareholder/partner, for a sample of 14,694 household heads. Female participation is an indicator variable for working-age women employed or actively looking for work (the female sample includes 14,070 observations). Appendix 3 provides a detailed description of each variable. Panel B in Table 1a provides descriptive statistics for the main SHIW variables used in the paper.

Panel C and Panel D in Table 1a describe the variables defined at the local level. Table 1b presents the correlation matrix. Our (main) measure of social capital is the average provincial electoral referenda turnout for the six referenda held before the 1990s. Each referendum invited citizens to express their views on a controversial issue: the choice between republic and monarchy (1946); the legalization of divorce (1974) and abortion (1981), hunting (1987); the use of nuclear power (1987); the scope of public security regulations (1978, 1981). As explained by Putnam (1993: 93-94), referendum turnout captures well civic engagement: “the primary motivation of the referendum voter is concern for public issues” (Putnam, 1993: 93). In particular, there are two reasons to prefer referendum turnout to general election turnout. First, in Italy until recent years it was a legal duty to participate in general elections but not in referenda. Thus, very likely many Italians went to the polls irrespective of their sense of civic duty. Second, voting in general elections can lead to personal patronage benefits. It might be an opportunity to obtain immediate personal benefits; that is, an “exchange” and not a measure of civic involvement. In this paper, we use the measure of referenda turnout calculated at the provincial level by Guiso et al. (2004). Referendum turnout captures well north-south differences: the average

referendum turnout amounts to 85.5 per cent in the 59 central and northern provinces and 72.7 per cent in the 40 southern provinces.[7]

2.3 Ordinary Least Squares and Linear Probability Model Regressions

Table 2 reports ordinary least squares (OLS) and linear probability model (LPM) regressions for the three individual economic activities. We will investigate the role of social capital by running regressions of the form:

$$(1) \qquad y_{ipt} = \text{constant} + \alpha t + \beta\, SC_p + X_{it}\,\gamma + Z_p\,\delta + \varepsilon_{ipt}$$

where y_{ipt} is our outcome of interest for individual i in province p and year t, αt is a year fixed effect, SC_p is the measure of social capital in province p, X_{it} are control variables defined at the individual level, and Z_p are control variables defined at the geographical level. The coefficient of interest throughout the paper is β, the effect of social capital on economic outcomes. Note that we do not include province fixed effects, since SC_p is fixed for province p over time. However, we do adjust our standard errors for within-province correlation (see: Moulton, 1990).

For each dependent variable, the first column shows the results obtained by regressing it on social capital, a minimal set of individual controls (age or experience, years of schooling, sex, marital status, number of children), and the year fixed effects. Social capital enters significantly and with the expected positive sign for all the three economic activities.[8]

Clearly, these results are hardly convincing. While high-trust areas are almost exclusively located in the centre and north of the country, this area differs from the south in many respects, such as geography, infrastructure, access to markets, etc. Thus, social capital can pick up differences between the centre and north and the south that just happen to be

[7] Because of data availability (see Appendix 3), our sample includes 99 of the 103 provinces that span the national territory.

[8] As for the individual controls, they enter with a similar sign and statistical significance to that found in the previous literature. See, for instance, Dalmazzo and de Blasio (2006a) and Colussi (1997) on worker productivity; Barca and Cannari (1997) and Alesina et al. (2001) on entrepreneurship; del Boca et al. (2000) on female participation.

correlated with it. To correct for this, we introduce in the second column for each dependent variable a dummy for individuals residing in the south.[9] The consequences of this inclusion are noticeable. The role of social capital is now not statistically different from zero for worker productivity, while the effect on female participation is reduced by a third. Entrepreneurship represents an exception, as the magnitude of the effect of social capital remains constant.

Next, we control our results with respect to the inclusion of additional variables at the individual level. These variables are also from the SHIW dataset. Regarding the controls to be included, we follow the previous literature. For worker productivity, we include nine dummies to pin down the branch of activity for which the individual works, seven dummies for the employee's work status, and seven dummies that divide employment per firm in size classes (see the Appendix for details). These controls are intended to take care of industry, status and firm-size differentials, which are substantial in the case of Italy (see, for instance, Mauro et al., 1999, Cannari and D'Alessio, 1995, and Colussi, 1997). Dummies for the father's work status are included in the equation for entrepreneurship, as in Alesina et al. (2001). This captures the strong intergenerational links that characterize occupational choices in Italy (see also Checchi et al., 1999). Following Altonji and Blank (1999), we introduce the familiar net wealth (and its square) along with a dummy that takes on the value of one if the mother is not employed in the specification for female participation (see also Algan and Cahuc, 2003). All the additional individual controls enter with high significance and with the signs predicted by the theory (not reported in Tables). By including these additional controls, the effect of social capital remains positive and strongly correlated with any of the individual outcome variables.[10]

There are, however, a number of important reasons for not interpreting the results in Table 2 as casual. First, the social capital variable could be measured with error and, more importantly, it could correspond poorly with the true social capital that matters in practice;

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[9] Throughout the paper, we report results with the dummy for south. Results do not change if more disaggregated (5 macro-regions) dummies are used.

[10] For the sake of brevity, we report only a selection of the robustness tests performed. For instance, we included the local female unemployment rate in the equation for female participation and a measure of local financial development in the equation for entrepreneurship. Our results were suitably confirmed.

that is, the cluster of "trust, norms and networks that can improve the efficiency of society" (Putnam, 2003: 167). This creates attenuation and may bias the linear estimates downwards. Second, rich areas may be able to afford or prefer greater sense of civic duty. This reverse causality problem introduces positive bias in the linear estimates.[11] Third, there are many omitted determinants of individual outcomes that will naturally be correlated with social capital. The omitted variable inconsistency also generates an upward bias. All of these problems could be solved if we had an instrument for social capital. Such an instrument must be an important factor in accounting for the variation in social capital that we observe, but have no direct effect on individual economic performance.

3. The Effect of Social Capital: IV Results

3.1 The Historical Origins of Social Capital

Putnam traces the roots of civic community from the middle ages. At that time, the Italian peninsula had four different systems of government, corresponding to differing degrees of republicanism and autocracy. First, in northern and central Italy there was a form of self-government, known as communal republicanism, based on horizontal collaboration among citizens. As Hyde (1973: 57) puts it, "communes …were primarily concerned with the protection of their members and their common interests". Political participation was high: "men were able to take part in determining, largely by persuasion, the laws and decisions governing their lives" (Lane, 1966: 535). Second, farther north there were the erstwhile republican areas that by 1300 were ruled by the *Signori* and in which mediaeval republican tradition had proved somewhat weaker. Third, the regions surrounding Rome were part of the Papal State, characterized by a mixture of feudalism, tyranny and republicanism. Finally, the southern territory belonged to the Kingdom of Sicily, the most autocratic regime. Of course, the Norman regime in the south was exceptionally advanced, both economically and administratively,[12] but the social and political arrangements were

[11] However, by using a microeconomic unit of observation as dependent variable, the scope for endogeneity is minimized (see: Isham and Kaufman (1999)).

[12] For instance, the first codification of administrative law (1231) and the foundation of the first state university (1224) in Europe took place under Frederick II.

those of an despotic government: barons had full feudal rights, ruler's decision could not be questioned, and a network of central and local officials answering only to the king was in power in the towns.[13]

In Putnam's view, the local political regimes in place in the middle ages shaped the degree of local civic commitment that persisted throughout the centuries.[14] In Section 3.4, we illustrate an experiment that exploits mediaeval local political regimes as a source of exogenous variation for social capital. In Section 3.2 we focus on the period at the end of the nineteenth century. The time after the unification of Italy was one of great ferment in community life. Stimulated by similar trends in the rest of Europe, there was a surge in social solidarity that promoted the "principle of association". Associations and mutual aid societies developed, which provided on a voluntary basis a wide range of social benefits to their members (unemployment benefits, medical and life insurance, school financing etc.). The period also saw the birth of mass political movements, both socialist and catholic. We rely on two regional measures of civic traditions collected by Putnam (1993: 148-151): the turnout in the few relatively open elections before Fascism brought authoritarian rule to Italy and the density of local associations. These variables are the measures we use to find a source of exogenous variation for social capital. As for the persistence of social capital, two features of these variables should be noted. First, the measures are correlated with the local system of government in place in the middle ages (see Section 3.4). Second, they represent significant determinants of the average provincial electoral referendum turnout, which is our measure of current social capital. This last relationship will represent the first stage in our instrumental variable approach.

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[13] See also the De Long and Shleifer (1993) classification of western government, according to which Frederick II's regime falls into the absolutist category, while the Venetian and Florentine republics are the best examples of city-state based non-absolutist government.

[14] According to Putnam, despotism survived until Frederick's death: "Although southern Italy in the next seven centuries was to be the subject of much bitter contention between various foreign dynasties (especially Spain and France), [the] hierarchic structure would endure essentially unchanged" (Putnam, 1993: 124). On the other hand, "despite the eclipse of communal republicanism … after the fourteenth century, in the nineteenth century … [one] could detect the continuing regional differences of culture and social structure that had appeared in the medieval era seven centuries earlier" (Putnam, 1993: 136).

3.2 2SLS Results with Nineteenth-Century Instruments

Two-stage least square (2SLS) estimates of equation (1) are presented in Table 3. Social capital, SC_p, is treated as endogenous, and instrumented by the nineteenth-century variables. The identification assumption implied by our approach is that, conditional on the controls included in the regression, the measures of social capital a hundred years ago have no effect on individual economic outcomes today, other than through the persistence of social capital. Panel A of Table 3 reports 2SLS estimates of the coefficient of interest, β from equation (1), and Panel B gives the corresponding first stages.

For each dependent variable, the first two specifications used in Table 3 replicate those illustrated in Table 2. Therefore, specifications (1), (4) and (7) replicate respectively specifications (2), (5) and (8) of Table 2; while specifications (2), (5) and (8) replicate respectively specifications (3), (6) and (9) of Table 2.[15] All covariates that are included in the second stage (age or experience, years of schooling, sex, marital status, number of children, dummy for south, and additional controls) are also included in the first stage. Covariates, however, are not reported to save space. The last column for each dependent variable (that is, columns 3, 6 and 9) reports the results from a specification that includes nineteenth-century urbanization and contemporaneous education. According to Tabellini (2005), including these two variables helps to disentangle the effect of the historical variables from that of unobserved determinants of current performance. In particular, nineteenth-century population density proxies for the economic development of the local area (see also Acemoglu et al., 2002) at about the same point in time as the historical instrument for social capital. This will minimize the risk that the component of social capital explained by history is indeed capturing standard neoclassical convergence. By the same token, controlling for contemporaneous education avoids the risk that our estimates will pick up the effect of a rising secular trend in schooling.

For any of the three individual economic outcomes, there is a strong first-stage relationship between nineteenth-century variables and social capital. The first-stage R-

[15] Again, standard errors are clustered at the province level. However, since the nineteenth-century measures of social capital are available at the regional level, we also computed standard error corrected for within-region correlation with no modification of our results.

squared is always over 80 per cent and the instruments are jointly highly significant (the p-value of the F-statistic is always equal to zero in the first four decimals).[16] Note that population density is negatively and significantly correlated with social capital. This supports the identification assumption as current social capital does not reflect economic development at the end of the nineteenth century. Turning to the 2SLS estimates, with the exception of entrepreneurship, all the IV coefficients are considerably larger than their OLS and LPM counterparts. This suggests that measurement error in the social capital variable that creates attenuation bias is likely to be more important than reverse causality and omitted variable biases. The standard errors for the IV estimates are also larger than the Table 2 counterparts, but social capital still enters at a reasonable levels of statistical significance. Note also that the role of population density and human capital in the second stage is considerably reduced.

We also investigate the validity of our exclusion restriction by using over-identification tests (see Wooldbrige, 2002, for general reference and Acemoglu, Johnson, and Robinson, 2001, for the use of this test in a context very similar to ours). The over-identification test presumes that one of the instruments, say turnout, is truly exogenous, and tests for the exogeneity of the other, associations in our case. The over-identification test will reject the validity of our approach if at least one of the instruments has a direct effect on the dependent variable (i.e. one of the instruments is correlated with the error term in equation 1).[17] However, since this test may not lead to a rejection if all instruments are invalid but still highly correlated with each other, the results have to be interpreted with caution.[18] As can be seen from the reported Hensen J-statistic p-values in Table 3, the data support the over-identifying restriction implied by our approach. There is no evidence that nineteenth-century variables have a direct effect – or an effect working through a variable other than social capital – on the three individual economic activities.

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[16] To check for the potential bias caused by many weakly correlated instruments we also estimate the same equations using a single instrument, the first principal component from the two nineteenth-century variables. The results are very similar to the IV estimates using the two instruments together (but slightly less precise since they use less variation).

[17] Another cause for rejection could be that the coefficient for social capital in equation (1) is not constant.

[18] It could also be that the test has low power to detect endogeneity of some of the instruments (Wooldridge, 2002).

Do the 2SLS estimates imply that social capital can explain a significant fraction of the variability of the individual outcomes? Our estimates of Table 3 imply that social capital has a large but not implausible effect. According to our results, moving from the average southern province to the average northern province would have large effects on economic activity. It would increase labour productivity by 12 percentage points, increase the probability of being an entrepreneur by 4 percentage points, and increase the probability for a woman of participating in the labour market by 13 percentage points.

3.3 2SLS Results with Contemporary Instruments

We can check whether the difference between the OLS/LPM results and the 2SLS is due to measurement error in the social capital variable by making use of alternative contemporary measures of social capital. As explained by Woolbridge (2000), using these measures as instruments for the referendum turnout would resolve the measurement error, but not the endogeneity/omitted variable problem. Our previous results for worker productivity and female participation suggest that the difference between OLS/LPM and 2SLS results is driven by the attenuation bias. If this is the case, then the 2SLS results obtained by using contemporary instruments should be higher than those obtained by using the nineteenth-century instruments. On the other hand, 2SLS estimates for entrepreneurship are roughly in line with those from linear regression, suggesting that the net bias from omitted variable, endogeneity and measurement is of limited magnitude. So we would expect that instrumenting with contemporary alternative measures of social capital will deliver estimates that are once again in the same range.[19]

To carry out this exercise we make use of an additional measure of social capital: blood donation. The variable denotes the number of (16 oz) blood bags collected (per 1,000 inhabitants) in 1995 by AVIS, the Italian association of voluntary blood donors. Blood donation, which aims to capture solidarity and altruism, also comes from Guiso et al. (2004). As they explain, blood collection by AVIS is very representative of the whole of blood

[19] In principle it is also possible that a large endogeneity bias is offset by a large measurement error. We show that this is not the case, as it would result in contemporary instruments 2SLS estimates being higher than those from nineteenth-century instrument 2SLS.

donations in the country and it is not affected by the geographical differences in the quality of medical infrastructures.

Table 4 shows the results of the 2SLS estimates using blood donation as instrument for social capital. As expected, this alternative measure of social capital is highly correlated with referendum turnout. The first-stage R-squared ranges is always over 80 per cent. For both worker productivity and female participation, the estimates of social capital are always of the right order of magnitude to explain the difference between the OLS/LPM estimates of Table 2 and the 2SLS estimates of Table 3. They are higher than the estimates obtained by using the nineteenth-century instruments. This supports the idea that OLS/LPM estimates are downward biased because of measurement error, while endogeneity/omitted variable positive biases play a minor role. In contrast, the estimates for entrepreneurship are not higher than those from linear regression and nineteenth-century instrument 2SLS.

3.4 2SLS Results with Fourteenth-Century Instruments

In this section we use data on the local systems of government in early mediaeval Italy This amounts to pushing Putnam's conjecture as far as it can go. We rely on historical sources to classify today's Italian provinces according to the political regimes prevailing at the beginning of the fourteenth century. We use the historical sources quoted by Putnam (1993: 134): Barraclough and Stone (1989), Hyde (1973), and Larner (1980). In addition, we use the map "L'Italia intorno al 1300" made available by an online provider of historical maps (*www.sapere.it/tca/minisite/storia/atlantestorico*).

We are able to classify contemporary Italian provinces in 5 groups: (1) the communal republics, the heartland of republicanism; (2) the *Signorie*, former communal republics fallen prey to signorial rule by the beginning of the fourteenth century; (3) the Papal State, characterized by a mixture of feudalism, tyranny and republicanism; and (4) the Kingdom of Sicily, which had the highest degree of autocracy. We also add a residual category for the current areas of Italy that were peripheral areas and, at the beginning of the fourteenth century, politically closer to foreign nations than to Italian local states. In this vein, the residual category includes Sardinia, Western Piedmont and Trentino, which at that time were

closer to Spain, France and Germany, respectively. Appendix II lists the current Italian provinces classified according their fourteenth century political regime.

We note that the mapping of contemporary Italian provinces into mediaeval territories can only be imperfect. We attribute to the entire province the regime that was in place in the provincial capital in the middle ages. This method has two shortcomings. First, it fails to take into account that contemporary borders are different from mediaeval borders. For instance, the area included in the contemporary province of Florence is different from that of the Communal Republic of Florence.[20] Second, for the communal republics and the *Signorie*, the high degree of civic participation was mainly an urban feature. Therefore, it might be not appropriate to conjecture that the countryside shared the same degree of republicanism of the urban centre.

In Table 5 we present the results of the 2SLS estimates using as instruments a series of dummies for the fourteenth-century local political systems. The exclusion restriction implied in this case is that, conditional on the controls included in the regression, the measures of local political regimes seven hundred years ago have no effect on individual economic outcomes today, other than through the persistence of social capital. Notwithstanding the caveats of the mapping procedure, the results are intriguing. We find a strong (first-stage) relationship between fourteenth-century political variables and current endowments of social capital. The first-stage R-squared is always over 80 per cent and the instruments are jointly highly significant (the p-value of the F-statistic is always equal to zero in the first four decimals). Our estimates support Putnam's argument: compared with communal republics (which represent the omitted category in our regression), all the remaining dummies for mediaeval political regimes are negatively correlated with current endowments of social capital. As expected, the difference is limited for the *Signorie*, more pronounced for the Papal State, and fairly large for the southern provinces once part of the Kingdom of Sicily. Finally, the difference for the residual peripheral areas is at an intermediate level. Our 2SLS estimates show that the component of social capital explained by mediaeval local political systems is positively correlated with entrepreneurship and female participation. Compared

[20] However, one might think that since the area of contemporary provinces reflects local historical developments this inaccuracy should not be very great.

with the 2SLS results with nineteenth-century variable as instruments, the point estimates are higher for the former economic outcome and lower for the latter; while the over-identification tests support the validity of our exclusion restriction. As to the effect on worker productivity, our results are inconclusive. The over-identification tests do not allow us to find any support for causality running from the local endowments of social capital to wages.

4. Concluding Remarks

When Robert Putnam published "Making Democracy Work" in 1993, scholars and observers immediately ranked the book as a major step forward. According to The Economist, the book was a "great work of social science…alongside de Tocqueville, Pareto and Weber".[21] After more than ten years, one can safely say that the assessment by The Economist was by no means overstated. A stream of research has originated from Putnam's book: social capital now represents one of the most popular metaphors in current social science research. Beyond making the case for social capital, "Making Democracy Work" provides also a more subtle contribution. As Durlauf and Fafchamps (2006) recognize, the task of estimating the effect of social capital on economic performance relies critically on the possibility of isolating exogenous sources of variation in social capital. In other words, because the problem of endogeneity is endemic, it is very difficult to make the point that social capital is relevant if no explanation is offered for what determines social capital. From this perspective, Putnam's book made a seminal contribution because, in addition to popularizing the concept of informal norms, it provided a theory of the determinants of social capital.

In this paper we exploit Putnam's theory on the historical origins of social capital to identify a source of exogenous differences in social capital. It is useful to point out that these results do not imply that informal norms today are predetermined by the mediaeval political experience and cannot be changed. Indeed, for our empirical approach to work, we do not

[21] This is reported on the cover of Putnam's book.

need past social capital to be the only, or even the main, cause of variation in social capital. All we need is for it to be a source of exogenous variation.

We estimate large effects of social capital on individual economic performances using the historical data on the origin of social capital as the source of variation. We also document that this relationship is robust to a number of econometric checks and controls for environmental and individual variables that might be correlated with social capital. Our exclusion restriction implies that, conditional on the controls included in the regression, the historical variables have no effect on individual economic outcomes today, other than through social capital persistence. The plausibility of our identification strategy is open to debate. Our exclusion restriction would be weakened if historical social capital depended in a systematic way on other characteristics of the local area. Putnam (1993) argues that this does not seem to be the case, since civic differences between Italian regions have been far more stable than economic differences over almost a millennium. In the paper, we show that econometric tests do not enable us to reject the exclusion restriction.

Still, questions remain. It remains to be uncovered why social capital impacts on development in some periods but not in others. For instance, the north-south economic gap reversed its direction in several periods. The Norman kingdom was almost as advanced as the north but then the development of communal republicanism stimulated the northern economy; then, because of external shocks, the supremacy of the north disappeared again in the fifteenth century. For the period after unification to which our data refers, there was no correlation between social capital and the economic well-being of the regions. Then, in the second half of the twentieth century social capital became a powerful source of economic prosperity. On these matters, North (1990) suggests that as a market economy develops the scope for social capital to reduce transaction cost increases, since greater specialization increases the number of transitions between strangers both over time and across space. On related grounds, differences in social capital endowments could matter more when new technologies that require investments from a broad cross-section of the society become available, along the lines proposed by Acemoglu et al. (2002).

As pointed out by North (1991), the question of the respective roles of informal constraints and formal rules remains crucial to uncover the role of history in economic performance: “What is it about informal constraints that gives (the institutions) such a

pervasive influence upon the long-run character of the economy? What is the relationship between formal and informal constraints? How does an economy develop the informal constraints that make individuals constrain their behavior so that they make political and judicial systems effective forces to third party enforcement?" (North, 1991: 111). From this perspective, our results provide evidence that informal constraints matter: differences in trust, reciprocity, and habits of co-operation lead to large differences in economic outcomes across areas characterized by identical formal institutions. Moreover, the econometric strength of our results is comparable with that of the literature on the relevance of formal institutions, which relies on similar assumptions and similar tests. Still, we believe there is a long way to go before a final answer to North's question can be attempted. The extent to which informal norms are being shaped by past institutions or the latter have adapted to pre-existent endowments of social capital remains a challenging topic for further research.

Table 1a

DESCRIPTIVE STATISTICS

	Observations	Mean	Standard deviation	Min	Max
Panel A. SHIW Dataset: Dependent variables					
Worker productivity	23,097	2.47	0.41	1.16	3.64
Entrepreneurship	14,694	0.10	0.29	0	1
Female participation	14,070	0.49	0.49	0	1
Panel B. SHIW Dataset: Other selected variables					
Years of schooling	23,097	10.90	3.96	2	20
Experience	23,097	22.23	11.99	14	57
Age	14,694	44.37	9.58	19	88
Dummy if female	23,097	0.39	0.47	0	1
Dummy if married	23,097	0.66	0.49	0	1
Number of children	14,070	0.65	0.87	0	6
Dummy for south	23,097	0.30	0.46	0	1
Panel C. Variables defined at the provincial level					
Social capital	99	0.80	0.08	0.62	0.92
Blood donation	99	0.29	0.20	0.01	1.05
Human capital	99	7,28	0,46	6,32	8,62
Population density	99	4,72	0,63	3,19	6,99
Panel D. Variables defined at the regional level					
Turnout	20	0.19	1.09	-1.87	2.26
Associations	20	0.01	0.01	0	0.03

Notes: See the Appendix I for more detailed variable definitions and sources.

Table 1b

CORRELATION MATRIX FOR THE VARIABLES DEFINED AT THE GEOGRAPHICAL LEVEL

	Social capital	**Blood donation**	**Human capital**	**Population density**	**Turnout**	**Associations**
Social capital	1	0.70	0.77	0.07	0.67	0.76
Blood donation		1	0.63	-0.14	0.57	0.38
Human capital			1	0.08	0.80	0.50
Population density				1	-0.08	-0.35
Turnout					1	0.21
Associations						1

Notes: Correlation coefficients are calculated at the regional level. For the variables defined at the provincial level of Panel C in Table 1a, we use their regional average. See the Appendix for more detailed variable definitions and sources.

Table 2

OLS AND LPM REGRESSIONS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent variable	**Worker productivity**			**Entrepreneurship**			**Female participation**		
Social capital	0.332***	0.077	0.153	0.244***	0.289***	0.261***	0.798***	0.485*	0.368
	(0.073)	*(0.124)*	*(0.100)*	*(0.041)*	*(0.092)*	*(0.088)*	*(0.108)*	*(0.249)*	*(0.235)*
Years of schooling	0.060***	0.060***	0.036***	-0.005***	-0.005***	-0.006***	0.043***	0.043***	0.042***
	(0.001)	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*	*(0.002)*	*(0.003)*	*(0.002)*
Experience/ Age	0.029***	0.029***	0.021***	-0.014***	-0.014***	-0.013***	0.024***	0.024***	0.024***
	(0.001)	*(0.001)*	*(0.001)*	*(0.003)*	*(0.003)*	*(0.003)*	*(0.004)*	*(0.004)*	*(0.004)*
Experience/ Age squared (×100)	-0.034***	-0.034***	-0.025***	0.018***	0.017***	0.017***	-0.037***	-0.037***	-0.036***
	(0.002)	*(0.002)*	*(0.002)*	*(0.003)*	*(0.003)*	*(0.003)*	*(0.005)*	*(0.005)*	*(0.005)*
Dummy if female	-0.088***	-0.088***	-0.080***	-0.029***	-0.029***	-0.029***			
	(0.007)	*(0.007)*	*(0.005)*	*(0.007)*	*(0.007)*	*(0.008)*			
Dummy if married	0.087***	0.087***	0.072***						
	(0.009)	*(0.009)*	*(0.007)*						
Number of children							-0.045***	-0.045***	-0.042***
							(0.008)	*(0.007)*	*(0.007)*
Dummy for south		-0.052**	-0.041**		0.009	-0.003		-0.064	-0.042
		(0.021)	*(0.018)*		*(0.017)*	*(0.017)*		*(0.047)*	(0.042)
Additional controls	NO	NO	YES	NO	NO	YES	NO	NO	YES
R-squared	0.40	0.40	0.48	0.24	0.25	0.37	0.23	0.23	0.24
Obs.	23,097	23,097	23,097	14,694	14,694	14,694	14,070	14,070	14,070

Notes: The White robust standard errors reported in parentheses are corrected for the potential clustering of the residuals at the provincial level. Regressions include calendar year dummies. Experience instead of age is used only for worker productivity. Additional controls include: industry dummies, work status dummies, and firm size dummies for worker productivity; father's work status dummies for entrepreneurship; and family net wealth, family net wealth squared, and a dummy if the mother was not employed for female participation. See the Appendix for more detailed variable definitions and sources. Regressions are weighted to population proportions. *** (**) [*] denotes significance at the 1% (5%) [10%] level.

Table 3

2SLS REGRESSIONS WITH NINETEENTH CENTURY VARIABLES AS INSTRUMENTS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent variable	Worker productivity			Entrepreneurship			Female participation		
Panel A: Two stages least squares									
Social capital	0.893***	0.904***	0.895***	0.323	0.299	0.327*	1.208***	1.022***	1.040***
	(0.339)	(0.290)	(0.270)	(0.223)	(0.204)	(0.176)	(0.426)	(0.393)	(0.364)
Population density			0.002			-0.010*			0.002
			(0.013)			(0.067)			(0.012)
Human capital			0.028			-0.008			-0.031
			(0.019)			(0.008)			(0.026)
Test of over-identification (10)	0.15	0.19	0.23	0.12	0.12	0.30	0.37	0.44	0.56
Panel B: First stage for social capital									
Turnout	0.019***	0.019***	0.021***	0.020***	0.020***	0.022***	0.020***	0.020***	0.022***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Associations	4.465***	4.458***	4.111***	4.117***	4.109**	3.710***	3.879**	3.797**	3.306**
	(1.466)	(1.459)	(1.268)	(1.574)	(1.571)	(1.381)	(1.728)	(1.712)	(1.500)
Population density			-0.014*			-0.015*			-0.016**
			(0.007)			(0.007)			(0.007)
Human capital			0.002			0.003			0.002
			(0.007)			(0.007)			(0.008)
R-squared	0.84	0.84	0.85	0.84	0.85	0.85	0.83	0.83	0.85
Test of joint significance of the instruments (11)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Dummy for south	YES	YES	YES	YES	YES	YES	YES	YES	YES
Additional controls	NO	YES	YES	NO	YES	YES	NO	YES	YES
Obs.	23,097	23,097	23,097	14,694	14,694	14,694	14,070	14,070	14,070

Notes: The White robust standard errors reported in parentheses are corrected for the potential clustering of the residuals at the provincial level. Regressions include calendar year dummies. Specifications (1), (4) and (7) replicate respectively specifications (2), (5) and (8) of Table 2; specifications (2), (5) and (8) replicate respectively specifications (3), (6) and (9) of Table 2; specifications (3), (6) and (9) augment respectively specifications (3), (6) and (9) of Table 2 with population density and human capital. Note (10) Hensen J Statistics: p-value. - (11) F statistics: p value. All covariates that are included in the second stage are also included in the first stage. Covariates are not reported to save space. Panel A reports the two stage least squares estimates, instrumenting for social capital using nineteenth-century variables; Panel B reports the corresponding first stage. See the Appendix for more detailed variable definitions and sources. Regressions are weighted to population proportions. *** (**) [*] denotes significance at the 1% (5%) [10%] level.

Table 4

2SLS REGRESSIONS WITH BLOOD DONATION AS INSTRUMENT

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent variable	**Worker productivity**			**Entrepreneurship**			**Female participation**		
				Panel A: Two stages least squares					
Social capital	1.326**	1.087**	1.125**	0.246	0.169	0.171	1.556*	1.309*	1.253*
	(0.655)	(0.522)	(0.515)	(0.325)	(0.308)	(0.287)	(0.851)	(0.786)	(0.734)
Population density			0.004			-0.012**			0.005
			(0.015)			(0.006)			(0.015)
Human capital			0.027			-0.007			-0.033
			(0.017)			(0.009)			(0.026)
				Panel B: First stage for social capital					
Blood donation	0.778***	0.773***	0.788***	0.808***	0.806***	0.826***	0.786***	0.769***	0.787***
	(0.204)	(0.202)	(0.201)	(0.214)	(0.214)	(0.213)	(0.217)	(0.215)	(0.213)
Population density			-0.012			-0.014			-0.015
			(0.010)			(0.010)			(0.009)
Human capital			0.007			0.009			0.010
			(0.010)			(0.011)			(0.011)
R-squared	0.81	0.81	0.82	0.81	0.81	0.82	0.81	0.81	0.83
Test of joint significance of the instruments (F-statistic: p-value)	0.0002	0.0003	0.0002	0.0003	0.0003	0.0002	0.0005	0.0006	0.0004
Dummy for south	YES	YES	YES	YES	YES	YES	YES	YES	YES
Additional controls	NO	YES	YES	NO	YES	YES	NO	YES	YES
Observations	23,097	23,097	23,097	14,694	14,694	14,694	14,070	14,070	14,070

Notes: The White robust standard errors reported in parentheses are corrected for the potential clustering of the residuals at the provincial level. Regressions include calendar year dummies. Specifications (1), (4) and (7) replicate respectively specifications (2), (5) and (8) of Table 2; specifications (2), (5) and (8) replicates respectively specifications (3), (6) and (9) of Table 2; specifications (3), (6) and (9) augment respectively specifications (3), (6) and (9) of Table 2 with population density and human capital. All covariates that are included in the second stage are also included in the first stage. Covariates are not reported to save space. Panel A reports the two stage least squares estimates, instrumenting for social capital using blood donation; Panel B reports the corresponding first stage. See the Appendix for more detailed variable definitions and sources. Regressions are weighted to population proportions. *** (**) [*] denotes significance at the 1% (5%) [10%] level.

Table 5

2SLS REGRESSIONS WITH FOURTEENTH CENTURY VARIABLES AS INSTRUMENTS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent var.	Worker productivity			Entrepreneurship			Female participation		
	Panel A: Two stages least squares								
Social capital	0.204	0.427	0.573*	0.670**	0.615**	0.525**	0.843	0.710	0.701
	(0.399)	(0.366)	(0.341)	(0.290)	(0.271)	(0.251)	(0.625)	(0.569)	(0.470)
Population density			-0.002			-0.008			-0.003
			(0.013)			(0.007)			(0.012)
Human capital			0.029			-0.009			-0.028
			(0.020)			(0.008)			(0.028)
Test of Over-identification (10)	0.01	0.01	0.02	0.32	0.30	0.59	0.70	0.66	0.48
	Panel B: First stage for social capital								
Ex-communal republics	-0.022**	-0.023***	-0.020**	-0.020**	-0.020**	-0.017	-0.021**	-0.020**	-0.017
	(0.009)	(0.008)	(0.009)	(0.009)	(0.009)	(0.010)	(0.009)	(0.008)	(0.010)
Papal State	-0.036***	-0.036***	-0.043***	-0.034***	-0.034***	-0.042***	-0.035***	-0.034***	-0.043***
	(0.011)	(0.011)	(0.012)	(0.012)	(0.012)	(0.013)	(0.012)	(0.011)	(0.12)
Kingdom of Sicily	-0.086***	-0.086***	-0.065***	-0.086***	-0.086***	-0.064***	-0.089***	-0.088***	-0.064***
	(0.021)	(0.021)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.021)
Peripheral areas	-0.053***	-0.053***	-0.061***	-0.051***	-0.051***	-0.060***	-0.052***	-0.051***	-0.060***
	(0.006)	(0.006)	(0.009)	(0.007)	(0.007)	(0.010)	(0.007)	(0.006)	(0.010)
Population dens.			-0.018*			-0.019*			-0.020**
			(0.010)			(0.010)			(0.009)
Human capital			0.014			0.015			0.016
			(0.011)			(0.012)			(0.012)
R-squared	0.82	0.82	0.83	0.82	0.82	0.83	0.82	0.82	0.84
Test of joint significance of the instruments (11)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Dum. for south	YES	YES	YES	YES	YES	YES	YES	YES	YES
Additional controls	NO	YES	YES	NO	YES	YES	NO	YES	YES
Obs.	23,097	23,097	23,097	14,694	14,694	14,694	14,070	14,070	14,070

Notes: The White robust standard errors reported in parentheses are corrected for the potential clustering of the residuals at the provincial level. Regressions include calendar year dummies. Specifications (1), (4) and (7) replicate respectively specifications (2), (5) and (8) of Table 2; specifications (2), (5) and (8) replicates respectively specifications (3), (6) and (9) of Table 2; specifications (3), (6) and (9) augment respectively specifications (3), (6) and (9) of Table 2 with population density and human capital. - (10) Hensen J Statistics: p-value. - (11) F statistics: p value. All covariates that are included in the second stage are also included in the first stage. Covariates are not reported to save space. Panel A reports the two stage least squares estimates, instrumenting for social capital using fourteenth-century variables; Panel B reports the corresponding first stage. See the Appendix for more detailed variable definitions and sources. Regressions are weighted to population proportions. *** (**) [*] denotes significance at the 1% (5%) [10%] level.

Appendix I
Theoretical background for the augmented Mincerian wage-equation

In what follows we sketch a simple model that generates a Mincerian wage-equation "augmented" with a local social capital term. The framework is borrowed from Dalmazzo and de Blasio (2006b) and is similar to Rauch (1993), Acemoglu and Angrist (2000). Like Moretti (2004), it treats each area j (with j=1,…,J) as a competitive economy that produces a single output y traded on the global market at a price equal to one. We assume a constant-returns-to-scale Cobb-Douglas technology that employs capital, K, and effective units of labour, L. The typical firm operating in area j has the following production function:

(a1) $$y = A(SC_j) \, . \, K^{1-\alpha} \, . \, L^{\alpha}$$

with $0<\alpha<1$. The term A(SCj), a function of local social capital SCj, captures the effects of social capital spillovers on productivity in area j, and we assume that $d\,A(SCj)/dSCj \geq 0$. Thus, A(SCj) measures the productivity advantage enjoyed by a firm operating in area j. Effective units of labour are defined as $L = \Sigma\, s(hi)$ for i=1 to N, with s'(hi) >0; the firm hires N workers and each worker i supplies s units of effective labour. The effectiveness s of worker i is increasing with his individual education, hi. In each area j, the competitive price of a unit of effective labour is denoted by ω_j. Capital is rented on the global market at rate r.

Given the local level of social capital SC_j, each competitive firm in area j maximizes profit, $\pi = y - r\,K - \omega_j\,L$ by choosing (K,L). The first-order conditions for this maximum problem are:

(a2) $$(\delta\pi/\delta K) = (1-\alpha).\, A(SC_j) \, . \, K^{-\alpha} \, . \, L^{\alpha} - r = 0$$

(a3) $$(\delta\pi/\delta L) = \alpha.\, A(SCj) \, . \, K^{1-\alpha} \, . \, L^{\alpha-1} - \omega_j = 0$$

By using (a1), expressions (a2) and (a3) can be manipulated into $K = (1-\alpha)\, y / r$ and $L = \alpha\, y / \omega_j$, respectively. By substituting these expressions for (*K*,*L*) back into the production function (a1), we obtain the equilibrium value of ω_j, the local price of an effective unit of labour:

(a4) $$\omega_j, = \mu\,[\,A(SCj)]^{1/\alpha}$$

where $\mu = [\alpha((1-\alpha)/r) \, . \, \exp((1-\alpha)/\alpha)]$. Notice that $d\,\omega_j / dSC_j \geq 0$: a higher level of social capital will raise the price of an effective unit of labour in the area considered. Moreover, by substituting the equilibrium expressions for (*K*,*L*) into the profit expression π, it can be immediately verified that each firm will make zero profit in equilibrium. As a consequence, firms have no incentive to move across areas.

The wage received by individual *i* in area *j*, denoted by w_{ij}, is simply equal to $\omega_j \times s(h_i)$. Thus, taking logs:

(a5) $$\log w_{ij} = \log \mu + \log s(h_i) + (1/\alpha) \log A(SC_j)$$

Similarly to Moretti (2004, p.178), we suppose that the logs of effective labour *s* and the production externality $A(SC_j)$ are linear functions of individual education and local human capital, respectively. Thus, it holds that:

(a6) $$\log s(h_i) = \phi + \beta \, . \, h_i, \qquad \beta>0$$

and

(a7) $$\log A(SC_j) = \theta + \gamma \, . \, SC_j \, , \qquad \gamma \geq 0$$

By substituting (a6) and (a7) into expression (a5), we finally obtain a Mincerian wage-equation augmented with a local social capital term:

(a8) $$\log w_{ij} = \kappa + \beta \, . \, h_i + \eta \, . \, SC_j$$

where the constant κ is equal to $[\log \mu + \phi + (\theta/\alpha)]$, and $\eta = \gamma/\alpha$.

Equation (a8) thus justifies the empirical model provided in the text for worker productivity. As in Rauch (1993), Acemoglu and Angrist (2000) and Moretti (2004), if local social capital generates positive spillovers on productivity, it will hold that $\eta>0$. By contrast, when $\eta=0$, the model collapses back into the standard Mincerian equation, where wage differences only depend on individual education (here we obviously abstract from worker's "experience").

Appendix II
Italian provinces classified by fourteenth-century local political regimes

Communal republics

Arezzo, Bologna, Ferrara, Firenze, Forlì, Grosseto, Imperia, La Spezia, Livorno, Lucca, Massa Carrara , Modena, Padova, Pisa, Pistoia, Prato, Ravenna, Reggio Emilia, Rimini, Savona, Siena, Treviso, Venezia

*Ex-communal republics (*Signorie*)*

Alessandria, Asti, Belluno, Bergamo, Biella, Brescia, Como, Cremona, Gorizia, Lecco, Lodi, Mantova, Milano, Novara, Parma, Pavia, Piacenza, Pordenone, Rovigo, Sondrio, Trieste, Udine, Varese, Verbania-Cusio-Ossola, Vercelli, Verona, Vicenza

Papal State

Ancona, Ascoli Piceno, Frosinone, Latina, Macerata, Perugia, Pesaro e Urbino, Rieti, Roma, Terni, Viterbo

Kingdom of Sicily

Agrigento, Bari, Benevento, Brindisi, Campobasso, Catania, Catanzaro, Chieti, Cosenza, Crotone, Enna, Foggia, Isernia, L'Aquila, Lecce, Matera, Messina, Napoli, Palermo, Pescara, Potenza, Ragusa, Reggio Calabria, Salerno, Siracusa, Taranto, Teramo, Trapani, Vibo Valentia

Peripheral areas

Aosta, Bolzano, Cagliari, Cuneo, Nuoro, Oristano, Sassari, Torino, Trento.

Notes: Based on Barraclough and Stone (1989), Hyde (1973), Larner (1980), and the map "L'Italia intorno al 1300" from *www.sapere.it/tca/minisite/storia/atlantestorico*.

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