Culture and institutions: economic development in the regions of Europe*

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Abstract

Does culture have a causal effect on economic development? The data on European regions suggest that it does. Culture is measured by indicators of individual values and beliefs, such as trust and respect for others, and confidence in individual self-determination. To isolate the exogenous variation in culture, I rely on two historical variables used as instruments: the literacy rate at the end of the XIXth century, and the political institutions in place over the past several centuries. The political and social history of Europe provides a rich source of variation in these two variables at a regional level. The exogenous component of culture due to history is strongly correlated with current regional economic development, after controlling for contemporaneous education, urbanization rates around 1850 and national effects.

Keywords: culture, economic development, trust, literacy, institutions.

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1. Introduction

Since the seminal work of economic historians like North (1981), it has become almost commonplace to view history as the main determinant of current economic development. More recent statistical analyses give further support to a historical perspective. Exploiting cross country comparisons and following up on Hall and Jones (1999), Acemoglu, Johnson and Robinson (2001) have shown that colonial origin (measured by mortality rates amongst early European settlers in the New World) is strongly correlated with current economic performance. Several subsequent papers have confirmed the robustness of these findings, showing that the same colonial origin data also explain a host of policy or political failures in the post-war period, and that the historical variables swamp the effect of almost any other variable affecting current economic performance.[1] In a similar vein, La Porta, Lopez-De-Silanes, Shleifer and Vishny (1999) have argued that indicators of legal origin explain policy performance in the post-war period.

What is the source of this legacy of history? A widespread interpretation is that history shapes current economic performance because it leads to the emergence and consolidation of political interests that have a stake in specific "institutions", and in particular institutions protecting property rights. But the indicators of property right protection exploited in the literature measure broad outcomes, that are due to a variety of formal and informal features of institutions, including education broadly defined (Gleaser et al. 2004). Moreover, the same institutions function very differently in different environments, suggesting that informal institutions play an important role. The judicial system works very differently in Southern and Northern Italy, for instance, with judges taking much longer to complete investigations and to rule on civil cases in the South than in the North. Yet, the legal system and the career path for judges have been the same for 150 years, and the human resources available are also not very different. Similar evidence applies to regional differences in the functioning of hospitals, schools, or public administrations, or to moral hazard inside large private corporations with branches in different regions (Ichino and Maggi 1999). These systematic differences in behaviour can be traced back to different regional histories. But why do they persist for generations, despite identical political and legal institutions? And what economic, political or social forces determine the functioning of institutions and organizations?

This paper addresses these general questions by studying the role of culture as a channel of historical influence within (rather than across) countries. But I try to go

[1] See for instance Acemoglu, Johnson, Robinson and Thaicharoen (2003), Dollar and Kraay (2003), Easterly and Levine (2003).

beyond the general claim that "culture matters", or that informal institutions are important. I estimate the effect of specific cultural traits, which can affect economic development both directly, or indirectly through better functioning institutions.

The key difficulty in estimating a causal effect of culture is that it is endogenous to economic development. As stressed by the so called modernization theory, economic development has predictable effects on culture and social life (Inglehart and Baker 2000). Hence, to identify a causal effect from culture to economic development, we have to find some exogenous source of variation in culture. The central idea in this paper is to apply a methodology similar to that of Acemoglu, Johnson and Robinson (2001), but to exploit variation amongst the European regions *within* rather than across countries. The formal and legal institutions have been the same inside the European countries in our sample for 150 years or more. Yet within several countries there is a variety of political histories. Controlling for country fixed effects removes the effect of the common national institutions. I then seek to explain whatever is left as the effect of history on culture, and then from culture to output, after controlling for other variables such as regional human capital and indicators of past economic development. Thus, although I cannot rely on distinct instruments for culture and formal institutions, the focus on within country variation allows me to study the role of culture as a separate mechanism of historical influence.

I measure culture by aggregating at the regional level individual responses collected in the opinion polls of the World Value Surveys in the 1990s - Inglehart et al. (2000). I focus on specific indicators of individual values and beliefs, such as measures of trust, of respect for others, of confidence in the link between individual effort and economic success. Tabellini (2008a) shows that, when measured at the country level and for a large sample of countries, the slow moving component of a subset of these indicators of culture is strongly correlated with the current functioning of government institutions. Here instead I focus on within country variation in Europe. After controlling for country fixed effects, contemporaneous regional education and urbanization rates in 1850, the cultural indicators are explained by historical variables: regional literacy rates at the end of the XIXth century, and indicators of political institutions in the period from 1600 to 1850. Historically more backward regions (with higher illiteracy rates and worst political institutions) tend to have specific cultural traits today: less generalized trust, less respect for others, less confidence in the individual. Moreover, the component of culture explained by history is strongly correlated with current regional economic development:

less trust and respect for others and less confidence in the individual are associated with lower per capita output and slower growth rates (again after controlling for country fixed effects, contemporaneous regional education and past urbanization rates). Finally, the data do not reject the hypothesis that the effect of the two historical variables (literacy and past political institutions) on regional output only operates through culture.

To put it a bit schematically, the line of research discussed above uses cross country variation to argue that: Historical institutions => Contemporary institutions => Economic development. This paper instead uses within country variation at the regional level to explore the link: Historical institutions => Culture => Economic development. These two views are not necessarily incompatible. On the contrary, a plausible interpretation of the findings of this paper is that cultural differences are so important because they bring about different functioning of the same formal institutions, and that culture is central to the mechanism through which past institutions influence the functioning of current institutions. Nevertheless, the two views emphasize different agendas for future research. In particular, the findings of this paper point to the importance of understanding the diffusion of specific cultural traits, rather than the consolidation of particular power structures or formal institutions.

The closest forerunners of this paper are Banfield (1958) and Putnam (1993), who argued that the pronounced differences in civic, social and economic behaviour between Northern and Southern Italy can be traced back to their distant histories and traditions, and that these different endowments of "social capital" contribute to explain the economic backwardness of Southern Italy. Beugelsdijk, and von Schaik (2001) also study the correlation between social capital and per capita output across European regions, but they do not attempt to link social capital to history nor to account for the endogeneity of social capital. An analysis of the historical origins of social capita across Italian cities, in the spirit of Putnam (1993), is instead at the core of Guiso et al. (2008a). Tabellini (2008a) discusses other related literature.

The outline of the paper is as follows. Section 2 describes the data and shows that there is strong correlation between indicators of culture and of per capita output.. Section 2 discusses the identifying assumptions and defines the regional historical variables used as instruments for culture. Section 3 performs the basic statistical analysis, estimating the link from history to culture and then from culture to economic development. Section 4 discusses the robustness of the estimates and the validity of the identifying assumptions.

Section 5 concludes. Some of the variables are defined more precisely in an historical appendix available on the web.

2. Data on output, education, urbanization and culture

The sample consists of 69 regions in 8 European countries: France, Germany (except East Germany and Berlin), the UK, Italy, the Netherlands, Belgium, Spain and Portugal. The starting point for defining a region is the Eurostat data base on regional per capita output. Eurostat defines regions on the basis of administrative criteria. Different levels of disaggregation are possible. We start from what Eurostat defines as NUTS1 level (with population ranging from 3 to 7 millions) or NUTS 2 level (with population ranging from 800.000 to 3 millions), with NUTS 1 being the preferred definition in most countries. Then we merged some of the smaller regions into larger aggregates, so as to have a sufficiently large cell of individually-based measures of culture within each region. The Data appendix lists the regions in our sample.

2.1 Per capita output

Current economic development is measured by per capita gross value added (GVA) in international prices (adjusted for purchasing power) and expressed in percent of the EU15 average. This variable is available from the mid 1970s to 2001. The source is Cambridge Econometrics, that has done some minor adjustments to data originally collected in the Eurostat database Regio. All variables used in this paper and their sources are defined more precisely in the data appendix.

Since culture is measured in the 1990s, we confine most of the analysis to the more recent period, taking the average of per capita GVA over the period 1995-2000. This variable, called *yp9500*, is the dependent variable in our analysis. But we also look at average yearly growth, defined as the average log difference of per capita GVA over the whole period 1977-2000 – this variable is called *growth.* In the growth regressions we also control for initial per capita GVA in 1977 (in logs) – this variable is called *lyp77.*

Figure 1 displays the regional pattern of per capita output at the end of the 1990s (to draw the map, we have divided the range of *yp9500* into 8 equal intervals, but in the statistical analysis we always use the continuously measured variable). Per capita output is highest in the densely populated urban centers (the areas around Paris, Bruxelles, the urban areas in Nothern Germany, the regions of Northern Italy) while it is lowest in Southern Spain, Portugal and Southern Italy. Overall, there is considerable within country

variation, and Italy stands out as the country with more pronounced inequality in regional output.

Insert Figure 1 about here

2.2 Education

Human capital is a well known determinant of growth and development. Education is also a main determinant of cultural traits. Since our goal is to study the direct link between culture and economic development, we want to avoid using culture just as a proxy for human capital in the region. Thus, we always control for regional differences in the education of the adult population, measured by enrolment in primary and secondary schools in percent of the population of the relevant age group. Both per capita output and culture are measured in the late 1990s. Much of the adult population in this period went to school in the 1960s and 1970s. An early date minimizes the risk of reverse causation and increases regional variation; we thus collected data on school enrolment in 1960. This variable is called *school*. There is no unique European source of regional data for such an early period, and we had to rely on disparate national sources (see the data appendix). Given the early date, this variable varies considerably in our sample: it ranges from 50% to 100%, with several regions having school enrolment around 60%, and many others close to 90%. Since primary school was already compulsory in most if not all European regions in 1960, most of this variation comes from secondary school enrolment. To assess robustness, below we also control for contemporaneous university enrolment in the region, measured as university and doctoral students in percent of total students in 1999 (*tertiary education*).

2.3 Urbanization in 1850

As discussed below, the identification strategy hinges on the assumption that the historical variables used as instruments for culture are uncorrelated with unobserved determinants of current economic performance. The risk of invalid instruments would be reduced if the second stage regression also controlled for regional economic development at about the same point in time as the historical instruments for culture. This would make it more likely that the historical instruments influence current economic performance only through culture rather than, say, through a slow process of economic convergence. Unfortunately, regional data on per capita output do not go back enough in time. As a

proxy for regional economic development in previous centuries, I use past urbanization rates. In the XVIIth and XVIIIth centuries, cities were the center of commerce; the industrial revolution further concentrated economic activities around major urban areas. For this reason, several previous studies rely on city size as a measure of past economic development (eg. De Long and Shleifer 1993, Acemoglu, Johnson and Robinsion 2002). To measure past urbanization rates, I constructed the variable *urb_rate1850,* defined as the fraction of regional population that lived in cities with more than 30 000 individuals around 1850. City size is measured in 1850, and the source is Bairoch, Batou and Chèvre (1988). Regional population is measured in 1860, and drawn from several sources listed in the historical appendix available on the web. The threshold of 30 000 individuals is chosen to maximize the correlation between past urbanization and regional per capita output today. The year 1850 is chosen because it is closest to my earliest data on regional population, namely 1860. But the results are similar if using lower thresholds for city size, or if city size is measured at earlier points in time (like 1700 or 1750 or 1800) but still scaled to regional population in 1860.

2.4 Culture

The measures of culture are obtained from two waves of the World Value Surveys, carried out in 1990-91 and 1995-97 – Inglehart et al. (2000). The average number of individuals polled in each region is about 320, while the median is about 130. In the Spanish regions the polls are much larger (over 2000 individuals in some regions), while in a few other regions we have as little as 50 or 60 individuals. To cope with these disparities, many regressions below weigh regional observations with the inverse of a measure of dispersion of beliefs within each region.

The World Value Surveys are designed to measure a variety of cultural traits. Which are more favorable to growth and economic development? Drawing on a large sociological literature that addresses this issue, I focus on four cultural traits for which I could find measurable counterparts.[2] Two of them measure generalized trust and respect for others. These traits ought to encourage welfare enhancing social interactions, such as anonymous exchange or participation in the provision of public goods, and they are likely to improve the functioning of government institutions. Two other variables measure confidence in the virtues of individualism, and are symptomatic of an entrepreuneurial environment where individuals seek to take advantage of economic opportunities.

[2] Platteau (2000) provides an excellent review of the relevant literature.

The economic importance of trust has been stressed in several studies. In prisoner's dilemma type of situation, interactions between trusting individuals are more likely to lead to efficient outcomes, whereas lack of trust makes it more difficult to overcome the inefficient equilibrium. For this reason, trust facilitates the extension of anonymous market exchange and reduces the need for external enforcement of contractual agreements (see for instance Dixit 2004). Lack of trust, on the other hand, is associated with suspicion and fear of fraud. This raises the cost of transactions outside of the local community and thus reduces the benefit of division of labor and the gains from trade.

To measure trust we consider the following question in the survey: " Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?". The level of trust in each region is measured by the percentage of respondents who answer that "Most people can be trusted" (the other possible answers are "Can't be too careful" and "Don't know"). This variable is called *trust*.

The counterpart of trust is being trustworthy. This relates to the distinction between "generalized" vs "limited" morality stressed by Platteau (2000). In hierarchical societies, codes of good conduct and honest behavior are often confined to small circles of related people (members of the family, or of the clan). Outside of this small network, opportunistic and highly selfish behaviour is regarded as natural and morally acceptable. This contrasts with modern democratic societies, where abstract rules of good conduct apply to many social situations, and not just in a small network of personal friends and relatives. As argued by Weber (1970) and many others, the emancipation of the individual from feudal arrangements has typically been associated with a diffusion of generalized morality. But the distinction between generalized vs limited morality remains relevant today, to understand cultural differences between different parts of modern Europe. In his classic case study of life in Chiaromonte, a rural village in Southern Italy, Banfield (1958) was struck by what he calls "amoral familism", namely the application of the principles of good and evil inside the family only. According to Banfied, moral principles are regarded as irrelevant by residents of Chiaromonte when they deal with non-family members. "Amoral familist" are thus intrinsically not-trustworthy.

The distinction between generalized vs limited morality has several implications. Individuals who practice generalized (as opposed to limited) morality are more reluctant to free ride on others. This matters not only for the economic behaviour of individuals (eg., cheating on taxes or on your boss), but also for their participation in group activities

and for the behaviour of politicians and public officials. As stressed by Putnam (1999) and Banfield (1958), the participation of individuals in the political and administrative life of their local communities is key to organize the provision of local public goods and to monitor political representatives or local administrators. If individuals lack respect for other members of their community and for the "res publica", public good provision is bound to be inadequate, and public administrators are likely to engage in nepotism or outright corruption. This too acts as a drag on economic development, through the functioning of government institutions and other organizations.

As argued by Gleaser et al. (2000), some experimental data suggest that trust attitudes also reveal individual trustworthiness, and not just the belief that others can be trusted. But to obtain a more direct measure of generalized vs limited morality, we also consider the values transmitted from parents to children, and in particular the value attached to respect for other people. Specifically, we consider the following question: "Here is a list of qualities that children can be encouraged to learn at home. Which, if any, do you consider to be especially important? Please choose up to five". The variable *respect* is defined as the percentage of respondents in each region that has mentioned the quality "tolerance and respect for other people" as being important (the other qualities in the list are: "good manners; independence; obedience; hard work; feeling of responsibility; imagination; thrift, saving money and things; determination and perseverance; religious faith; unselfisheness").

Lack of trust and lack of respect for others are typical of hierarchical societies, where the individual is regarded as responding to instinct rather than reason, and where instinct often leads to a myopic or harmful course of action. In such societies, individualism is mistrusted and to be suppressed, since nothing good comes out of it: good behavior is deemed to result from coercion, not from internalization of the values of society. Hence, the role of the state is to force citizens to behave well. Likewise, the role of parental education is to control the negative instincts of children, often through recourse to violence – cf. Banfield (1958). Of course, such coercive cultural environments stifle individual initiative and cooperation within a group, and can hurt growth and development. To capture this cultural feature, distrustful of the benefits of individualism, I consider again the question on the virtues of children mentioned above.

The variable *obedience* is defined as the percentage of respondents that mention "obedience" as an important quality that children should be encouraged to learn.[3]

Finally, a cultural feature often mentioned as a driver of economic development is the conviction that individual effort is likely to pay off. If individuals are highly motivated to succeed and view economic success as related to their deliberate choices, they are more likely to work hard, to invest for the future, to innovate and undertake new economic initiatives. Conversely, if individuals regard success as due to luck or to uncontrollable external events, they are more likely to have a passive, resigned and lazy attitude towards economic activity. Banfield (1958) was struck by the resignation and the helplessness of the peasants in Chiaromonte, and how this contrasted with the determination and the initiative of rural communities in the US. These opposite attitudes towards the perceived consequences of effort and initiative are bound to have a big impact on aggregate economic performance in the long run.

To measure this cultural trait we construct a variable, called *control*, from the following question in the survey: " Some people feel they have completely free choice and control over their lives, while other people feel that what we do has no real effect on what happens to them. Please use this scale (from 1 to 10) where 1 means "none at all" and 10 means "a great deal" to indicate how much freedom of choice and control in life you have over the way your life turns out". The variable *control* is defined as the unconditional average response in each region (multiplied by 10).

We thus have four related but distinct measures of culture: three indicators expected to promote economic development (*trust, control, respect*), and one that might hurt it (*obedience*). A natural question is why these four variables, out of many other possible questions asked in the World Value Surveys. In my selection, I was primarily guided by Banfield (1958). These four variables seek to capture the main traits that according to Banfield are typical of peasants in Southern Italy, in contrast to other similar villages in the US. This selection has some unavoidable arbitrariness in this selection. But hopefully it does not matter much. For instance, if the variable *obedience* is replaced by the fraction of individuals who appreciate independence in children, the results reported below are very similar (with the opposite sign).

[3] Researchers in psychology and sociology that compare cultural traits of different societies have suggested similar ideas. Schwartz (1999) and Licht, Goldschmidt and Schwartz (2008), in particular, stress the relevance of a cultural feature related to our variable *obedience*. They refer to it as the contrast between hierarchy and egalitarianism, where hierarchy corresponds to " a cultural emphasis on oberying role obligations within a legitimately unequal distribution of power, roles and resources" .

To reduce the scope for such idiosyncratic judgments, besides relying on the four individual variables, I have also extracted their first principal component from the whole data set with all individual responses. The regional average of this principal component, called *pc_culture,* is a summary measure of regional culture. Since this principal component is negatively correlated with *obedience*, while it is positively correlated with *trust, control* and *respect,* we take it to be a net measure of the aspects of regional culture that favour economic development. To facilitate the interpretation, we have also extracted the first principal component from the positive beliefs only (*trust, control* and *respect*), called *pc_culture_pos*, as well as the first principal component from the two questions on the desirable qualities of children (*obedience* and *respect*), called *pc_children*. Since this variable is positively correlated with *respect* and negatively correlated with *obedience*, it is once more a net measure of the aspects of norms that favour economic development. To interpret these indicators as percentages, all principal components have been multiplied by 100.[4]

Table 1 displays the correlation between the four original cultural attributes and the summary measures of culture on the whole sample of over 20000 individual. Note that, even though the four cultural attributes are not mutually correlated among individuals (see the last three columns of the table), all four summary measures are quite correlated among themselves (see the cells in the upper left part of the correlation matrix). Moreover, the individual cultural attributes are closely correlated with the corresponding principal component (except when, by construction, they have been omitted in the computation of the principal component). This suggests that, while there is a lot of noise in the individual responses, these summary measures capture a common cultural pattern.[5]

Insert Table 1 about here

The regional averages of these indicators of culture conceal very large variation amongst individuals within each region. *Figure 2a* illustrates the distribution of the

[4] Extracting the first principal component from the whole sample imposes the same structure of correlations in all countries and regions. To relax this constraint, we have also computed the first principal components separately for each country. Although the resulting variables are not perfectly correlated with the principal components extracted from the whole sample, the results of interest remain very similar (see footnote 10 below).

[5] The first principal component of all four cultural traits (the variable *pc_culture*) is almost perfectly correlated with their algebraic sum (*trust* + *control* + *respect* – *obedience*). This suggests that these four measures of culture enter the first principal component with approximately equal weights and that there is only one main dimension of variation common to all variables.

variable *pc_culture* (based on individual responses) in Italy and in two Italian regions, one in the North and one in the South (Lombardy and Campania). The regional distributions are clearly different, but the range of variation within each region remains large. In the overall sample of individual responses, regional dummy variables only explain about 6% of the variance of the variable *pc_culture* (country dummy variables explain about 3.5%).[6] Thus the regional average is likely to be an imperfect measure of regional culture. The concern about measurement error is compounded by the fact that, given the small number of respondents in some of the regions, these opinion polls are unlikely to be based on a representative sample of the regional population.

Figure 2b illustrates the regional pattern in the first principal component of culture, *pc_culture*. Higher values correspond to cultural features expected to be favourable to economic development. Again, data are displayed in equal intervals, but the continuous measures are used in the analysis. The regional pattern of culture in *Figure 2b* is strikingly similar to that of per capita output in *Figure 1*. In particular, Germany, England and Northern Italy tend to have high per capita output and more positive cultural indicators, while Southern Italy, Portugal and Southern Spain fare worse on both counts. But the correlation is not perfect. For instance, France is rich but its cultural traits are a priori less favourable to economic development.

To remove some of the endogenous components of regional culture, I have also computed the regional average after controlling for other observable features of the individual respondent. Specifically, in the comprehensive dataset of individual responses, I have regressed each of the cultural variables described above (including the individual principal components) on a vector of regional dummy variables, as well as on the following additional regressors: marital status, gender, the age group, a self reported social class, and two categorical variables for health condition and years of education. As a measure of regional *conditional* culture, I then use the estimated coefficients on the regional dummy variables. This conditional indicator is used in many of the regressions below, but the results are similar if using the unconditional indicator. Whenever the regressions rely on this conditional indicator, regional observations are weighted with the inverse of the standard errors of these estimated regional coefficients, to allow for different measurement errors across regions (the unweighted results are similar).

Insert Figure 2a and 2b about here

[6] The estimated coefficients of these regional dummy variables are often statistically different from zero (some are positive and some are negative).

2.5 Output and Culture

Some of the correlation between per capita output and culture apparent from *Figures 1* and *2* can simply reflect the influence of other common determinants, such as education, historical levels of economic development or national institutions. To remove the effect of these other variables, we have regressed per capita output (*yp9500*) on a set of dummy variables (one per country), school enrolment in 1960 (*school*), urbanization rates in 1850 (*urb_rate1850*) and the various measures of culture. The estimated coefficients of *school,* past urbanization and culture are displayed in *Table 2* (unconditional culture) and *Table* 3 (conditional culture). Each row reports two standard errors: those estimated by OLS (above), and clustered standard errors (below) that allow for arbitrary patterns of correlation within countries but assume independence across countries. The tables confirm the visual impression from *Figures 1* and *2*: there is a strong and significant correlation between all measures of culture and current development, after controlling for country fixed effects and for school enrolment in 1960. The sign of the estimated coefficients also conforms to prior expectations. These estimates are not only statistically significant, but also economically relevant. Consider for instance the first principal component of all four measures of culture, *pc_culture*. The difference between say Lombardy and a typical region in Southern Italy is about 50. The estimated coefficient in *Table 2* of 0.58 implies that this cultural difference is predicted to be associated with a difference in GDP per capita of about one third of the EU average (namely almost half of the observed income difference between Lombardy and Southern Italy). The estimated coefficients of school enrolment and of past urbanization also have the expected (positive) sign.

Insert Table 2 and Table 3 about here

Finally, *Figure 3* displays the estimated residuals of *yp9500* (on the vertical axis) and of *pc-culture* (on the horizontal axis), estimated from a regression against the remaining control variables in *Table* 2 (namely the variables *school* and *urb_1850* plus the country fixed effects). The positive correlation between output and culture is not due to any outlier observations. The observations labelled IT correspond to the Italian regions, to highlight that the correlation between culture and output is not just due to Italy: even if all Italian regions are excluded from the sample, a positive correlation

remains and the estimated coefficient of culture is statistically significant at the 5% level in the OLS regression (the correlation is weaker without Italy, however, since differences in economic development and in culture are much less pronounced within the other European countries).

Naturally, we cannot safely assume that culture is independent of current levels of economic development. On the contrary, all the cultural indicators are likely to be influenced by the current economic situation. Controlling for current education in each region (the variable *school)* and for past economic development as measured by past urbanization rates (the variable *urb_rate1850)* removes some of this correlation. And considering conditional beliefs (ie. the residual component of regional beliefs after controlling for some features of the respondent such as his education and self – reported social class) can remove other sources of reverse causation from output to culture. Nevertheless, reverse causation remains a fundamental concern. Hence, the estimated coefficients reported in *Tables 2* and *3* could be biased and cannot be interpreted as reflecting a causal effect of culture on output. To cope with this problem, in the remainder of the paper I rely on instrumental variable estimation, using other historical variables as instruments for culture.

Insert Figure 3 about here

3. Estimation strategy and historical data

3.1 Identification

Our goal is to estimate the causal effect of culture on output, in a linear regression:

(1) $$Y = \alpha + \delta C + \beta Y_o + \gamma X + e$$

where Y denotes regional per capita output, C is an indicator of culture, Y_o is an indicator of past economic development (urbanization in 1850), X denotes other regressors, namely education of the currently adult population (measured by school enrolment in 1960) and country dummies (that capture current national institutions), e is an unobserved error term, and δ is the coefficient of interest. The problem is that culture and the unobserved error term in (1) are likely to be correlated.

To get around this problem, I need a theory of how culture is determined. Recent analysis by Bisin and Verdier (2002), Benabou and Tirole (2006) and Tabellini (2008b) suggests that culture can be viewed as shaped by two forces: contemporaneous social interactions and the cultural traditions inherited from earlier generations. Recent

microeconometric evidence on the behaviour of migrants confirms this insight: cultural or behavioural traits of second generation migrants in the US are explained by the average cultural and historical features of the ancestors' country of origin.[7] This suggests that a plausible model of culture can be approximated by:

(2) $C = a + dC_o + bY_o + c\,X + u$

where C_o denotes the cultural traits of earlier generations, while u is an error term capturing all other determinants of culture (including a reverse feedback effect from output to culture). If we could measure the cultural traits of earlier generations, C_o would be a natural instrument for current culture in this setting. The restriction that cultural traits of earlier generations can be excluded from the output equation (1), after controlling for past economic development, contemporaneous institutions and current culture and education, seems reasonable. Unfortunately we don't observe C_o. Nevertheless, equation (2) suggests a way out. Applying the same logic to C_o, the culture of earlier generations is shaped by past social interactions, and hence by historical features of the political and economic environment. Thus, I postulate the following stochastic process for currently observed culture:

(3) $C = \lambda_1 + \lambda_2 X_o + \lambda_3 Y_o + \lambda_4 X + v$

where the λ_i are parameters, v is an unobserved error term (possibly correlated with e, the error term of (1)) and the vector X_o is the historical counterpart of the variables in X, namely education and political institutions in the distant past. Past education is measured by the literacy rate around 1880 (*literacy*), early political institutions are measured by constraints on the executives in the years 1600-1850 (*pc-institutions*). Both variables are defined more precisely in the next section. They are my instruments for culture in the output regression, (1).

These instruments isolate the variation in culture that is exogenous (i.e. due to the historical variables) from the possibly endogenous variation in culture due to the unobserved error term v. The instrumental variable estimate of the parameter of interest in the output regression, δ, only exploits this exogenous variation in culture. Thus, we no longer have to worry that culture is endogenous to output, or that it could proxy for an omitted variable, or that it is measured with error. The critical issue has been shifted

[7] See Guiso, Zingales and Sapienza (2006) and the references cited in Fernandez (2006). Tabellini (2008a) shows that trust attitudes of third generation US immigrants is explained by the political institutions and education prevailing around or before 1900 in the ancestor's country of origin, after controlling for per-capita income in that country around the same time period.

away from whether culture is endogenous or measured accurately, to whether our historical variables are valid instruments.

This estimation strategy thus rests on two premises. First, culture is transmitted slowly over time, from one generation to the next, but it also reflects the current environment. This implies that history shapes culture. In particular, past political institutions and past literacy rates explain current cultural traits such as trust and respect for others, or confidence in the individual. This seems very plausible. Consider an autocratic and corrupt regime that survives thanks to a strong hierarchy of privileges and that subjugates the population with the arbitrary use of force. Such an environment will foster mistrust of unfamiliar people, limited as opposed to general morality, a sense of individual helplessness and resignation. Widespread illiteracy is likely to reinforce these negative attitudes, because it isolates individuals and it reduces their ability to control and understand the external environment. The effect on culture will be opposite in a republican regime where productive entrepreneurs or traders participate openly in the political organization of society, the rule of law is respected, supreme authority is constrained by checks and balances (Putnam 1993, chp. 5). Indeed, several authors have emphasized that the historical evolution of political liberalism, in practice and as a doctrine, goes hand in hand with the diffusion of generalized morality. A well functioning republican institution reinforces positive cultural values, by providing role models and by showing that positive beliefs match reality and are associated with good outcomes (Platteau 2000). Again, widespread education has a similar positive effect, because it increases socialization and the ability of citizens to participate actively to community life.[8] These attitudes then persist over time as they are transmitted from one generation to the next. The validity of this assumption can and will be tested below, at least indirectly.

Second, we need to assume that the variables *literacy* and *institutions* are valid instruments, namely are uncorrelated with the error term *e* in the output regression. Note that in going from (2) to (3) the identifying assumption has become more stringent. In (2), identification is achieved if cultural traits of earlier generations don't have a direct effect on output, a reasonable restriction. In (3), we also need that the political institutions of several centuries ago and the literacy rate six generations ago don't have direct effects on output. This restriction is justified by the fact that the output regression controls for contemporaneous education (regional school enrolment) and political institutions (the

[8] This is why political scientists like Almond and Verba (1963) and Lipset (1959) argue that education is a prerequisite for well functioning democratic institutions.

country fixed effects), as well as past economic development (urbanization in 1850). Nevertheless, it is a rather strong assumption. For instance, past literacy could have a lasting effect on the sectoral composition of current employment, and this could affect regional output despite controlling for past urbanization rates, violating the exclusion restriction. Alternatively, politically more backward regimes might have left smaller endowments of public infrastructures (eg. roads or railways), and almost two centuries of unification and of public investments in the poor regions were not sufficient to remedy this initial deficiency.

In sections 4 and 5 we relax this identifying assumption in various ways. First, we include the sectoral composition of employment in the mid 1970s and other measures of current education as additional regressors. Second, we redefine the dependent variable as growth between the mid 1970s and 2000 (rather than the level of output), and ask if culture explains the rate of convergence in this more recent period; since here we also control for initial per capita output in the mid 1970s, the exclusion of variables that refer to centuries ago is more credible. Third, we control for the capital stock in the late 1970s (restricting attention to a smaller sample of Italian regions where this measure is available). Finally, with two instruments for just one endogenous variable, the model is over-identified and we can test the over-identifying restrictions. This means that, if at least one of the two instruments is valid, we can test for the validity of the other instrument.

We now describe the two historical variables used as instruments for culture.

3.2 Literacy in 1880

To capture regional differences in educational histories, I collected data on the literacy rate around 1880 by region. This variable, called *literacy*, is compiled from a variety of sources, described more in detail in the historical appendix on the web. The precise definition of literacy varies slightly across countries.[9] For almost all countries, I could find data on literacy at the regional level. The exceptions are the Netherlands and Portugal, where I could only find national data (so that all regions in these countries are assigned the same literacy rate).

[9] Literacy is generally defined as the ability to read or write. In some cases the source is the census of the overall population, in other cases literacy rates refer to military recruits, yet in other cases they refer to marriages. The data are thus not always strictly comparable and are certainly measured with error. But, as shown in *Figure 4*, these measurement problems are likely to be swamped by the large variation of the variable *literacy* across regions.

The data on *literacy* are illustrated in *Figure 4* (again with data divided in octiles). This variable is likely to be positively correlated with per capita output around the turn of the century, but certainly it measures much more than just per capita output. For instance, Germany pursued a deliberate policy of widespread education and has the highest literacy rates in our sample, but its per capita income around 1880 was below that of France, and much lower (less than 2/3) than that of the UK, Belgium and the Netherlands. At the opposite end, England and Wales had amongst the highest GDP per capita in Europe around 1850 (Sandberg 1982), but are only in the middle literacy group. Once more, Italy stands out as having large regional differences.

Insert Figure 4 about here

3.3 Early political institutions

As noted in the introduction, a remarkable feature of European history is that regions now belonging to the same country were ruled by very different political institutions in the distant past. To capture these different political histories in a single variable, we had to solve various problems and take several decisions.

A first question is which feature of political institutions to focus on. We followed some of the existing literature, and coded political institutions by the variable *Constraints on the Executive*, as defined in the data set *POLITY IV*. This variable is designed to capture "institutionalised constraints on the decision making powers of chief executives". According to this criterion, better political institutions have one or both features: the holder of executive powers is accountable to bodies of political representatives or to citizens; and/or government authority is constrained by checks and balances and by the rule of law. As in *POLITY IV*, the variable "Constraints on the Executive" varies from 1 (unlimited authority) to 7 (accountable executive, constrained by checks and balances). Higher values thus correspond to better institutions. The historical appendix provides more information about the coding of this variable.

A second question is over which time period to measure political institutions. Following Acemoglu, Johnson and Robinson (2002), we coded regional institutions in a 40 year window around five dates: 1600, 1700, 1750, 1800 and 1850. After this last date, the European countries in our sample were unified approximately along current borders, and we lose any relevant variation in political institutions within countries.

A third question is how to code the variable "Constraints on the Executive" at each of these dates, and based on which sources. Where the relevant political entity is the country with approximately current borders, and there is little or no regional autonomy, we assign to all regions in the country the same value as to the country itself. We obtained this number from the source *POLITY IV* from 1800 onwards, and from Acemoglu, Johnson and Robinson (2002) for the period 1600-1750. This takes care of France, the Netherlands, Belgium, Portugal and most of Spain and of the UK. In all these countries with the exception of Spain and the UK, either the central level of government had considerable authority over the whole territory, or, to the extent that regional or local governments had important prerogatives, there was not much variation in the checks and balances on these local governments compared to those at the center.

There are two exceptions to this rule. One is Northern Ireland in the UK, that we code as having had the same institutions as Ireland (our source for Ireland is Acemoglu, Johnson and Robinson 2002). The second exception are the Spanish regions of Aragon, Catalonia and Valencia. These regions integrated in the Spanish Crown maintaining for a period their own Parliaments, the "Cortes", as guarantors of local freedoms and prerogatives. We thus give them a higher (more democratic) score in 1600 and 1700 compared to the rest of Spain – see the historical appendix for more detailed information.

In the case of Italy and Germany, a unitary state was formed only after 1850. We thus had to track down the complex political history of the Italian regions and of the German Landers (or of smaller territorial entities inside each lander). The historical appendix briefly summarizes the history of these regions, the specific decisions we made, and our mains sources.

This procedure leaves me with a regional variable measured in five dates: 1600, 1700, 1750, 1800 and 1850. There is a general trend towards stronger checks and balances in the more recent period, but not in all regions. In particular, several Italian regions experienced a worsening of their institutions during the Napoleonic period (around 1800) and the Austrian rule (around 1850). This raises one last problem: how to aggregate these five historical variables in a single measure of political history for each region. Taking a snapshot at a single point in time would be incorrect, since the measure would vary depending on the date selected. I thus aggregate the five measures of political institutions into a single variable (*pc_institutions*) defined as the first principal component of the five variables measuring constraints on the executive at the five different points in time. The results are very similar using instead a simple average of the

five historical variables, or a weighted average where more recent dates receive a higher weight.

Figure 5 illustrates the geographic pattern of *pc_institutions*. The Netherlands, the German city states in the North, some regions in Northern Italy continue to display better institutions, while Central and Southern Italy, much of Germany and of Spain fare worse. Note that the geographic pattern of *literacy* and *pc_institutions* bear some resemblance, but there are also significant differences. For instance, Germany has very high literacy rates, but rather bad political institutions. This is confirmed by the fact that the partial correlation coefficient between these two variables expressed in deviation from country means is 0.34, positive but very far from perfect correlation. Thus, these two historical variables do capture different (albeit related) features of the history of the regions in our sample, which increases the power of the tests for over-identification carried out below.

Insert Figure 5 about here

4. Estimating the effect of culture on output

4.1 Reduced form and first stage estimates

We start by estimating the reduced form linking current economic development to both historical variables and to the other exogenous regressors. If past literacy rates and political history are correlated with culture, which in turn influences per capita output, we ought to find a significant effect of both historical variables on per capita output, after controlling for the other regressors.

As shown in the first three columns of *Table 4*, this is indeed what we find. The dependent variable is regional per capita output (*yp9500*) and country dummy variables are always included. Thus, the estimates displayed in *Table 4* only reflect within country variations. As before, robust and clustered standard errors are estimated. Literacy in 1880 (*literacy*) and distant political institutions (*pc-institutions*) have a positive and generally significant estimated coefficient, as expected. The effect of school enrolment in 1960 (*school*) and urbanization in 1850 (*urb_rate1850*) is also positive, as expected, although not always statistically significant.

Both *literacy* and *yp9500* are expressed in percentage points. The estimated coefficient in literacy thus says that a 1% increase in the literacy rate at the end of the 1800s is associated with a 0.8%-0.9% increase in current per capita output relative to the EU average. Given the large differences in literacy rates among European regions at the

end of the 1800s, these are very big effects. The effect of past political institutions is less precisely estimated, but it is also quantitatively relevant. The difference in past political institutions between, say, Southern Italy and Lombardy, as measured by the variable *pc_institutions*, is about 1.7. According to the estimated coefficient of *pc_institutions* in column 3, therefore, if Southern Italy had had the same political institutions as Lombardy, its current income would now be higher by about 17%. This is a smaller effect compared to that of the variable *literacy*, but economically relevant.

The last two columns of *Table 4* report the first stage estimates, namely the effect of *literacy* and *pc-institutions* on culture. Both instruments have a positive and highly significant estimated coefficients, as expected. The table only shows the effect on the aggregate measure of culture (unconditional and conditional respectively, in columns 4 and 5), but the correlation is very strong also with the individual variables: bad political institutions and low literacy rates are associated with negative cultural traits, such as low trust, low respect for others, low feelings of controlling one's life, and high appreciation for obedience in children (see the working paper version).

Note that urbanization in 1850 is correlated with current regional output (columns 1-3), but it does not explain culture (the estimated coefficient of urbanization in 1850 is practically zero in columns 4 and 5). This supports the identifying assumption: contemporaneous cultural traits do not just reflect economic development in previous centuries, but are explained by specific historical circumstances and in particular by the education of previous generations and by the political environment in which they lived.

Insert Table 4 about here

4.2 Instrumental variable estimates

Next, we estimate the effect of culture on per capita output, using literacy and political history as instruments for culture. *Table 5* reports the second stage regressions, for different summary measures of culture and of political institutions, with robust and clustered standard errors. In both stages we always control for country dummy variables, school enrolment and past urbanization. The last two rows report the F statistics for the excluded instruments, and the p-value of Hansen's J statistics for the over-identification test. Columns 1 and 2 refer to the aggregate indicator of culture, unconditional and conditional respectively. The remaining columns refer to other principal components and individual variables for culture, always conditional (unconditional measures of culture

give similar results). When using conditional indicators for culture, observations are weighted by the inverse of the standard error of the relevant cultural indicator. The effect of culture on economic development is always large and statistically significant and with the expected sign, for all indicators of culture. The F statistics for the excluded instruments are comfortably large, particularly for the broader definition of culture. The over-identification restriction is not rejected when culture is measured by a broad indicator; it is rejected for two individual cultural variables, however, suggesting that an excessively narrow definition of culture does not fully capture the channels through which distant history impacts on current economic development.[10]

Comparing the estimated coefficients in *Table 5* with the OLS estimates reported in *Tables 2* and *3*, we see that projecting culture on the two historical variables actually increases its estimated coefficient. In other words, the cross-regional variation in culture that can be attributed to history is more strongly correlated with development compared to the overall measures of culture. Attenuation bias due to measurement error in our indicators of culture could explain this fact, though we cannot rule out the less benign explanation that both instruments are invalid.

Insert Table 5 about here

4.3 Growth and culture

Up to this point, we have studied the effect of culture on the level of per capita output observed today, taking culture to be a long run determinant of labor productivity and per capita output. But if culture influences per capita output in the long run, one should also see its effect on growth in the short run.

Once more, this prior is born out by the data. *Table 6* reports the instrumental variables estimates where the dependent variable is average yearly growth of per capita output between 1977 and 2001 expressed in percentage points (comparable data on per capita output before the mid 1970s are not available for a large sample of regions). To allow for convergence, initial per capita output in logs (*lyp77*) is added to the regressors and treated as exogenous. The specification is otherwise the same as in the previous tables.

[10] The first and second stage estimates are similar if the first principal component (*pc-culture*) is computed separately in each country, to allow the correlation structure between the individual indicators of culture to differ across countries.

Columns (1) and (3) of *Table 6* report the first stage, where the variable *pc_culture* (resp. unconditional and conditional) is regressed on the two historical instruments, on per capita output in 1977, urbanization in 1850 and *school* (omitted to save space), plus the country dummy variables. The estimated coefficients of political institutions and literacy are very similar to those reported in Table 4, with the estimated coefficient on political institutions highly significant, while that on *literacy* border-line significant (the F statistics for the joint significance of the instruments in the first stage regressions exceeds 10). The estimated coefficients of per capita output in 1977, instead, is not statistically significant. Although here per capita output is treated as exogenous, this first stage regression is important, because it shows that the historical variables do not suffer from a weak instrument problem even when controlling for per-capita output in a not-too distant past. In particular, these first stage results rule out reverse causation, with history influencing per capita income which in turn determines culture. Culture is really explained by regional history in the distant past, not by current economic development. For the other cultural indicators, the first stage estimates (not reported) are very similar to those in columns 1 and 3, and the two historical variables are generally significantly different from zero, irrespective of how culture is measured.

The remainder of *Table 6* displays the second stage estimates, for alternative measures of culture. The second stage estimated coefficients in columns (2) and (4-8) are consistent with some convergence (higher initial per capita output reduces subsequent growth).[11] More importantly, all measures of culture influence growth, and the effect is generally statistically significant and economically relevant. According to the estimated coefficient, if Southern Italy had the same culture as Lombardy, its average yearly growth rate would have been higher by almost ½ %.[12] Finally, the p-values testing the over-identification restriction are comfortably above the significance levels in all cases but one (column 10).

Insert Table 6 about here

[11] Given that growth is expressed in percentage points, the rate of convergence is about 1% per year, lower than found in other studies; but recall that our sample starts in 1977, and indeed others have found that regional convergence slowed down after the mid 1970s.

[12] In *Table 6*, initial per capita output is treated as exogenous while in fact it could be regarded as endogenous and correlated with the error term of the growth regression. In principle, with two instruments for culture, we could allow for two endogenous variables, culture and initial per capita output. But attempting to do this results in insignificant estimates for both culture and initial output. Evidently, there is not enough variation in our instruments to separately estimate the growth effect of initial output and culture when both are treated as endogenous.

4.4 Summary

Summarising, all the instrumental variable estimates discussed so far portray a remarkably consistent and robust picture: first, past political institutions and low literacy rates left a mark on regional culture; second, this cultural legacy of history is an important determinant of current economic performance; third, the data cannot reject that past political institutions and literacy rates of previous generations influence economic performance only through culture, particularly when culture is measured by broad aggregates.

5. Sensitivity analysis

This section discusses the robustness of the results and the validity of the identifying assumptions.

5.1 Identification

The identifying assumptions on the validity of our instruments rule out any direct effect of the historical variables on output, after controlling for culture and the other regressors. The orthogonality tests cannot reject this assumption, conditional on at least one of the two instruments being valid. As a further check, I add the two historical variables to the second stage regressions one at a time, treating the included variable as exogenous. Under these specifications, the model is just identified. If the instruments are valid, the estimated coefficients on these additional regressors ought to be close to zero, and the estimated coefficient of *pc_culture* ought to remain statistically significant and stable under these alternative specifications. As shown in columns 1 and 2 of *Table 7*, the estimated coefficient of these additional regressors are indeed not significantly different from zero, thus confirming the results of the over-identification tests. Nevertheless, the estimated coefficient on the variable *pc_culture* does change across the two specifications, suggesting that the failure to reject the over-identifying restrictions is not completely water-proof.

This raises the issue of the power of the test over-identification test. One specific question is whether the failure to reject reported in the previous sections might be due to specific features of our sample. To address this concern, I bootstrapped the Hansen J statistics, randomly replacing one observation from the sample with a random draw from a similar sample, and replicating the instrumental variable estimates 1000 times. The critical value corresponding to a significance level of 5% was exceeded about 30% of the

time (see the working paper version for more detail). This suggests that the failure to reject the over-identifying restrictions may not be very robust to special features of the sample.

A second question concerns the power of the test to reject the null hypothesis that both instruments are valid, when in fact one of them is not. The working paper version reports the results of a Montecarlo simulation. It turns out that the test is quite powerful if one of the two instruments is not valid and the bias in the IV estimates is large. Only if the bias is relatively small (about 20% of the true coefficient) do we see frequent failures to reject when instead one of the two instruments is not valid. Nevertheless, the power of the test drops dramatically if both instruments (and not just one) are invalid. This is a reminder that, to be confident about the implications of the over-identification test, at least one of the two historical variables must be a valid instrument for culture.

A special case of a violation of our assumptions that would not be detected by the orthogonality test would occur if the true model was one in which history influences output, which in turn affects culture, with no direct effect of the historical variables on culture (exactly the reverse of the chain of causation postulated in our identification). Although we cannot rule out this possibility altogether, there are two reasons to doubt it. First, as already remarked with reference to *Table 6*, the variable *pc-culture* is more correlated with distant regional history than with per capita output in the mid 1970s. Second, anecdotal evidence and rigorous statistical analysis illustrates that cultural traits are indeed very persistent over time, both at the individual and aggregate level (see Guiso et al. (2008), Tabellini (2008a) and the working paper version of this paper for further evidence of this point).

Finally, another violation of our assumptions would occur if both historical variables used as instruments have a direct effect on output and on culture, but there is no direct causal effect of culture on output. Cross country evidence shows that historical variables are a powerful predictor of many variables correlated with contemporaneous development. How do we know that the historical component of regional culture is not just picking up the effect of history on other omitted variables, rather than a true causal effect of culture? In particular, is the correlation between culture and economic development just due to the component of culture explained by history? To address this question, I have added another regressor to the basic IV specification corresponding to column (1) of *Table 5*: namely, the residual of the first stage regression of *pc-culture* on the two historical instruments plus all remaining second stage regressors (i.e., the residual

of column 4 in *Table 4*). Thus, this specification decomposes the effect of *pc-culture* on output between two orthogonal variables: the predicted component of culture explained by history, and the remaining component. The estimated coefficients on both components turn out to be statistically significant at the 5% level, although the estimated coefficient of the predicted component is much larger than that of the residual component. *Figure 6* illustrates the correlation between this residual component of *pc-culture* and economic development, after removing the effect of all other regressors, including that of the predicted component of *pc-culture*. The correlation is not due to a few outlier observations, but is a robust feature of the whole sample. Of course, this correlation could just reflect reverse causation (from current development to contemporaneous culture) or other sources of endogeneity. Yet, *Figure 6* shows that, despite likely measurement error, the correlation between culture and economic development is not just due to history.

Insert Figure 6 about here

5.2 Controlling for university education and the sectoral composition of employment in the mid 1970s

Using past literacy rates as an instrument for culture gives rise to a concern. Could it be that regions with low literacy rates at the turn of the previous century remain less educated today, and could this account for the estimated effect of culture on output? To rule out this possibility, the reported regressions control for primary and secondary school enrolment in 1960 (the variable *school*). Moreover, the conditional measures of culture remove the effect of individual education (measured as years of education by the individual respondent). Nevertheless, neither method is completely fool-proof. Regions could differ in terms of higher education, and this is not picked up by the variable *school.* And individual responses on years education could be measured with error, or the effect of education on individual cultural traits could vary across regions (something that our approach has ruled out). To assess the robustness of our estimates, column 3 of *Table 7* adds university education to the basic IV regression. This new variable (*tertiary education*) is defined as the percentage of students enrolled in university or doctoral programs in 1999, in percent of all students in the region; as can be seen from *Table 7*, its estimated coefficient is positive and statistically significant (when standard errors are

assumed to be independent across obervations). But the effect of *pc-culture* on output drops only slightly and remains highly significant.[13]

A second related concern is that historical differences in regional education might have led historically more backwards regions to specialize in agriculture or other sectors with low human capital intensity, and this (rather than culture) explains the effect on current output. To address this issue, column (4) of *Table 7* adds the employment share in agriculture in 1977 (*agr_share*) as an additional control variable, treating it as exogenous[14]. Its estimated coefficient is significantly different from zero in the output regression, though not in the equation for culture (not reported). All our previous inferences remain valid, however: the historical variables remain significant in the culture regression, and the size of the estimated coefficients barely changes. And *pc-culture* remains a significant determinant of per capita output, although with a smaller estimated coefficient.[15]

5.3 Controlling for the capital stock in the late 1970s

Identification fails if the instruments have a direct effect on current development through other slow moving but omitted variables. An obvious suspect is the capital stock. The poorest regions of Europe have benefited from large national public investment and national subsidies to private investment, but this may have been insufficient to make up form pre-existing lack of infrastructures. We are controlling for urbanization in 1850 to capture historical differences in income and capital, but this mat be an imperfect measure. Unfortunately indicators of initial capital are not available on a regional basis for our sample. Nevertheless, Maffezzoli (2006) has estimated the regional capital stock in Italy in 1979. Although these are just a few regions, they are highly representative of the differences in per-capita output, culture and history in our full sample. Thus, we ask

[13] The variable *tertiary education* is likely to be endogenous in this regression. But as explained for instance in the unpublished appendix to Acemoglu and Johnson (2001), for plausible priors about the unobserved correlation between the residuals of the regression and the included endogenous variable *tertiary education*, the coefficient of the variable of interest, *pc-culture*, is likely to be biased downwards, and thus against the hypothesis that *pc-culture* has an effect on output.

[14] 1977 is the first year in which we could find comparable regional data on this variable.

[15] If the sectoral composition of employment is correlated with the residual of the output equation, the estimates in column 4 of *Table 7* could be biased. Treating both culture and the sectoral composition of employment as endogenous, with the two historical variables as instruments, leads to inconclusive results. The partial correlation between our measure of culture and the employment share in agriculture is fairly high (- 0.4), and there is not enough variation in the two instruments to isolate the effects of both variables. As a result, the estimated coefficients of *pc_culture* and *agr_share* in the output regressions are not significantly different from zero when they are both treated as endogenous. This might also be due to a weak instrument problem: although the variable *literacy* is significantly correlated with the employment share in agriculture, the variable *pc_institutions* is not.

whether the results are robust to controlling for this measure of initial capital (pro capite) as an additional regressor (*Capital in 1979*). The results are displayed in column (6) of *Table 7*. Besides the very few degrees of freedom, we have to assume that this variable is exogenous. With these caveats, the estimates suggest that the results are robust to allowing for differences in initial capital: *pc-culture* retains a positive and significant estimated coefficient on output in the second stage (column 6). Initial capital has a positive estimated coefficient, as expected, which however is barely statistically significant in the output regression.

5.4. The functioning of institutions

There are many channels through which culture might affect economic development: different cultural traditions may entail different propensities to innovate or take risks (Galor and Ashraf 2007), or to work hard (Doepke and Zilibotti 2007); mutual trust facilitates the functioning of anonymous markets and hence enhances specialization and productivity growth; generalized morality improves the functioning of government institutions (Tabellini 2008a); and so on. Sorting out these different possible channels goes well beyond the scope of this paper. Nevertheless, it is tempting to ask whether the effect of culture on economic development survives the inclusion of variables measuring the quality of government institutions. One of these variables is the efficiency of the judiciary, measured by the average number of years needed to complete a first-degree civil lawsuit in courts located in the region in the period 2000-2005 (*trial duration*). Unfortunately, this variable is not readily available on a comparable basis for European regions. Hence, as with the capital stock, the analysis is confined to Italian regions and the previous caveats on degrees of freedom apply here too. It is important to stress that the Italian judiciary system has identical legislation and incentive structure for magistrates throughout Italy, and that the resources are not disproportionately favoring the richer regions. On the contrary, regional difference in *trial duration* within Italy are primarily due to different functioning of the same organizations in different parts of the country, and thus they are largely determined by local culture. For this reason, both *pc-culture* and *trial duration* are treated as endogenous, with *literacy* and *pc-institutions* as the instruments in a just-identified model. The results of the IV estimates are displayed in column (6) of *Table 7* (both instruments are highly significant in both first stage regressions). The judicial variable swamps the effect of *pc-culture*, which now even has a negative (and insignificant) estimated coefficient. This suggests that the effect of culture

on output mainly or exclusively operates through the functioning of government institutions, at least within Italy. Of course, this inference ought to be treated with much caution, because of the few degrees of freedom and because we don't have separate exogenous sources of variation for institutions and culture (i.e both instruments predict both endogenous variables). Nevertheless, it is consistent with the findings in Knack (2002) and Tabellini (2008a), where culture was found to be strongly correlated with the functioning of government institutions across US states and in cross country comparisons respectively.

Insert Table 7 about here

6. Concluding remarks

In cross country comparisons, distant history appears to be an important determinant of current economic performance. This finding is often interpreted as evidence that early historical institutions have shaped current institutions protecting property rights. An active and promising line of research in political economics and development is now studying specific features of institutions, and how they propagate over time – see the discussion in Helpman (2004).

One of the contributions of this paper is to show that distant political history emerges as an important determinant of current economic performance also in regional comparisons, and when controlling for national political institutions. Since this result is obtained by estimating a reduced form, it is not dependent on any particular identifying assumption. This finding in itself casts some doubts on the primacy of *formal* institutions as determinant of economic development. The regions in our sample have been ruled by the same formal institutions for at lest a few centuries, and yet we still find an economic legacy of early political institutions. Something else, besides institutional inertia, must account for this legacy of history.

The same historical variables are also correlated with measures of regional culture, such as trust and respect for others, and confidence in individual self-determination. To interpret this second finding, we need additional assumptions. I have thus assumed that past political institutions and past literacy rates are valid instruments for culture in the output regression, holding constant any unobserved national variable, contemporaneous regional education and past urbanization rates. This led to the second and main contribution of this paper: the component of culture explained by the historical

variables is an important determinant of regional economic performance. Under the identifying assumptions, this historically determined component of culture is exogenous. Moreover, we could not reject that culture entirely explains the economic legacy of history in our sample.

As discussed at length in the previous section, several caveats apply to the identifying assumptions and to the power of the orthogonality tests. Nevertheless, the evidence supporting the relevance of property rights institutions in cross country comparisons rests on similar assumptions and similar tests. Property rights institutions too, like culture, are endogenous and imperfectly measured. And the exclusion restrictions imposed on cross country comparisons when interpreting the effects of colonial origin are not much better or worse than those imposed in this paper.

Two sets of cultural traits appear to be favourable to economic development. The first trait resembles what earlier studies have called "social capital", and is captured by the variables *trust* (having trust in other people) and *respect* (appreciating the virtue of being respectful of others in children). The second trait can be interpreted as confidence in the individual, and is captured by the variable *control* (feeling in control of one's life) and, in a negative sense, by the variable *obedience* (appreciating obedience in one's own children). These cultural traits can influence economic development directly, or indirectly through the functioning of current institutions. Preliminary evidence on Italy suggests that the second (institutional) channel might be dominant. But the precise interpretation of these cultural indicators is difficult, and way in which they influence economic development remains to be studied in greater detail. As treated in this paper, "culture" is still largely a black box. Much more work is needed at a microeconomic level to understand which features of individual beliefs and social norms are economically relevant, how they are formed and transmitted over time, how they interact with the economic and the institutional environment. The empirical results of this paper suggest that such a research effort could have high payoffs.

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Data Appendix

agr_share: employment share in agriculture in 1977. Source: CRENOS, http://www.crenos.it/oldsito/databanks/european.html

control: unconditional average response in each region (multiplied by 10) to the question: "Some people feel they have completely free choice and control over their lives, while other people feel that what we do has no real effect on what happens to them. Please use this scale (from 1 to 10) where 1 means "none at all" and 10 means "a great deal" to indicate how much freedom of choice and control in life you have over the way your life turns out". Source: World Value Surveys, Inglehart et al. (2000).

growth: average yearly growth, defined as the log difference of per capita Gross Value Added over the period 1977-2000.

institutions_1600/_1700/_1750/_1800/_1850: constraints on the executive around that date. Higher values correspond to better institutions. For exact definitions and sources for each country see the historical appendix on the web.

literacy: in general, percentage of persons who could read and write around 1880. For exact definitions and sources for each country see the historical appendix on the web.

lyp77: log of per capita Gross Value Added in 1977. Source: Cambridge Econometrics.

obedience: percentage of respondents that mention "obedience" as being important (the other qualities in the list being: "good manners; independence; tolerance and respect for others; hard work; feeling of responsibility; imagination; thrift, saving money and things; determination and perseverance; religious faith; unselfishness") to the question: "Here is a list of qualities that children can be encouraged to learn at home. Which, if any, do you consider to be especially important? Please choose up to five". Source: World Value Surveys, Inglehart et al. (2000).

pc_children: regional average (multiplied by 100) of first principal components extracted from the cultural variables which express desirables qualities for children (*obedience, respect*).

pc_culture: regional average (multiplied by 100) of first principal components extracted from the four cultural variables (*control, obedience, respect, trust*).

pc_culture_pos: regional average (multiplied by 100) of first principal components extracted from the positive cultural variables (*control, respect, trust*).

pc_institutions: first principal component of the five variables measuring constraints on the executive at the five different points in time.

respect: percentage of respondents in each region that has mentioned the quality "tolerance and respect for other people" as being important (the other qualities in the list being: "good manners; independence; obedience; hard work; feeling of responsibility; imagination; thrift, saving money and things; determination and perseverance; religious faith; unselfishness") to the question: "Here is a list of qualities that children can be

encouraged to learn at home. Which, if any, do you consider to be especially important? Please choose up to five". Source: World Value Surveys, Inglehart et al. (2000).

school: gross enrolment rate of primary and secondary school in 1960. Data disaggregated in regions but for Ireland and the Netherlands for which data have national aggregation. Great Britain is divided into North Ireland, Scotland, England and Wales. Source: National Statistical Institutes.

trial duration: average duration (in days) of civil lawsuits, in 2000-2005. Source: ISTAT

trust: percentage of respondents who answer that "Most people can be trusted" (the other possible answers being "Can't be too careful" and "Don't know") to the question "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?". Source: World Value Surveys, Inglehart et al. (2000).

tertiary education: students enrolled in university or doctoral degrees, in percent of total students in the region, in 1999.

urb_rate1850: percentage of regional population that lived in cities of size above 30 000 in 1850 (regional population data refer to 1860, while city size data refer to 1850). Source: see the historical appendix on the web.

yp9500: average over the period of 1995-2000 of Gross Value Added (GVA) in international prices (adjusted for purchasing power) expressed as in percent of the EU15 average. GVA corresponds to GDP at "basic prices", ie. It excludes taxes on products (mainly VAT and excise duties). Source: Cambridge Econometrics

Conditional indicators of culture correspond to the regional fixed effects of a regression of culture on the following variables: marital status, gender, the age group, a self reported social class, and two categorical variables for health condition and years of education.

The regions in the sample are:

Country	*Region*	*Country*	*Region*
Belgium	VLAAMS GEWEST	Spain	GALICIA
Belgium	REGION WALLONNE	Spain	ASTURIAS-CANTABRIA
Belgium	REG.BRUXELLES-CAP./BRUSSELS HFDST.GEW.	Spain	PAIS VASCO
France	ILE DE FRANCE	Spain	NAVARRA - RIOJA
France	NORTH FR	Spain	ARAGON
France	EAST FR	Spain	MADRID
France	WEST FR	Spain	CASTILLA-LEON
France	SOUTH WEST FR	Spain	CASTILLA-LA MANCHA
France	SOUTH EAST FR	Spain	EXTREMADURA
France	MEDITERREAN FR	Spain	CATALUNA
France	PARIS BASIN EAST/WEST	Spain	COMUNIDAD VALENCIANA
Italy	PIEMONTE - VALLLE D'AOSTA	Spain	BALEARES
Italy	LIGURIA	Spain	ANDALUCIA
Italy	LOMBARDIA	Spain	MURCIA
Italy	TRENTINO ALTO ADIGE - VENETO - FRIULI VENEZIA GIULIA	Spain	CANARIAS
Italy	EMILIA-ROMAGNA	UK	NORTH UK
Italy	TOSCANA	UK	EAST MIDLANDS

Country	*Region*	*Country*	*Region*
Italy	UMBRIA - MARCHE	UK	EAST ANGLIA
Italy	LAZIO	UK	SOUTH EAST UK
Italy	CAMPANIA	UK	SOUTH WEST UK
Italy	ABRUZZI - MOLISE - BASILICATA	UK	WEST MIDLANDS
Italy	PUGLIA	UK	NORTH WEST UK
Italy	CALABRIA	UK	WALES
Italy	SICILIA - SARDEGNA	UK	SCOTLAND
Netherlands	NOORD NEDERLAND - GRONINGEN	UK	NORTHERN IRELAND
Netherlands	OOST NEDERLAND	UK	YORKSHIRE & HUMBERSIDE
Netherlands	WEST NEDERLAND	W Germany	BADEN-WUERTTEMBERG
Netherlands	ZUID NEDERLAND	W Germany	BAYERN
Portugal	NORTE	W Germany	BREMEN HAMBURG
Portugal	CENTRO (P)	W Germany	HESSEN
Portugal	LISBOA E VALE DO TEJO	W Germany	NIEDERSACHSEN
Portugal	ALGARVE	W Germany	NORDRHEIN-WESTFALEN
Portugal	ALENTEJO	W Germany	RHEINLAND-PFALZ
			SAARLAND
Portugal	MADEIRA	W Germany	SCHLESWIG-HOLSTEIN
Portugal	AZORE ISLANDS		

Table 1 – Correlation among cultural variables

	pc_culture	*pc_culture_pos*	*pc_children*	*trust*	*control*	*respect*
pc_culture_pos	0.82					
pc_children	0.81	0.46				
trust	0.60	0.65	0.11			
control	0.32	0.60	0.03	0.06		
respect	0.55	0.56	0.74	0.05	0.03	
obedience	-0.65	-0.12	-0.74	-0.11	-0.01	-0.10

N. observations: 20902

Table 2 – Culture and output: OLS estimates, unconditional indicators of culture

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. variable				*yp9500*			
school	0.49	0.78	0.37	0.77	0.51	0.38	0.52
	(0.15)***	(0.17)***	(0.20)*	(0.23)***	(0.17)***	(0.20)*	(0.24)**
	(0.11)***	(0.16)***	(0.12)**	(0.19)***	(0.13)***	(0.14)**	(0.10)***
urb_rate1850	0.62	0.71	0.61	0.71	0.8	0.62	0.74
	(0.17)***	(0.17)***	(0.16)***	(0.20)***	(0.21)***	(0.21)***	(0.15)***
	(0.21)**	(0.21)**	(0.18)**	(0.25)**	(0.27)**	(0.23)**	(0.20)***
pc_culture	0.58						
	(0.12)***						
	(0.17)**						
pc_culture_pos		0.71					
		(0.15)***					
		(0.11)***					
pc_children			0.57				
			(0.19)***				
			(0.27)*				
control				1.36			
				(0.83)			
				(0.39)**			
trust					0.93		
					(0.38)**		
					(0.53)		
obedience						-0.93	
						(0.46)**	
						(0.64)	
respect							1.64
							(0.51)***
							(0.63)**
Obs	69	69	69	69	69	69	69
Adj R-squared	0.56	0.57	0.53	0.46	0.48	0.47	0.54

Robust standard errors in parentheses (below: clustered, allowing for arbitrary correlations within countries)
* significant at 10%; ** significant at 5%; *** significant at 1%
Country dummy variables are always included

Table 3 – Culture and income: OLS estimates, conditional indicators of culture (weighted by inverse of standard error)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. variable				*yp9500*			
school	0.57	0.91	0.46	0.76	0.57	0.46	0.69
	(0.18)***	(0.20)***	(0.23)**	(0.29)**	(0.21)***	(0.23)*	(0.27)**
	(0.10)***	(0.16)***	(0.10)***	(0.21)***	(0.15)***	(0.15)**	(0.12)***
urb_rate1850	0.67	0.79	0.63	0.75	0.81	0.65	0.78
	(0.18)***	(0.18)***	(0.16)***	(0.20)***	(0.21)***	(0.22)***	(0.16)***
	(0.23)**	(0.23)**	(0.19)**	(0.26)**	(0.27)**	(0.26)**	(0.20)***
pc_culture	0.60						
	(0.13)***						
	(0.19)**						
pc_culture_pos		0.74					
		(0.16)***					
		(0.13)***					
pc_children			0.58				
			(0.18)***				
			(0.28)*				
control				0.88			
				(0.82)			
				(0.12)***			
trust					0.75		
					(0.46)		
					(0.68)		
obedience						-0.68	
						(0.48)	
						(0.68)	
respect							1.79
							(0.47)***
							(0.59)**
Obs	69	69	69	69	69	69	69
Adj R-squared	0.53	0.54	0.51	0.43	0.44	0.44	0.54

Robust Standard errors in parentheses (below: clustered, allowing for arbitrary correlations within countries)
* significant at 10%; ** significant at 5%; *** significant at 1%
Estimation method: OLS, weighted by inverse of standard errors of conditional culture indicators. Country dummy variables are always included

Table 4 - The influence of literacy and political history on output and culture: reduced form and first stage estimates

Dep. variable	(1)	(2) *yp9500*	(3)	(4) *pc-culture unconditional*	(5) *pc-culture conditional*
school	0.46	0.54	0.42	0.32	0.15
	(0.37)	(0.20)***	(0.36)	(0.30)	(0.25)
	(0.22)*	(0.11)***	(0.20)*	(0.30)	(0.26)
urb_rate1850	0.55	0.62	0.49	0.03	-0.05
	(0.26)**	(0.18)***	(0.22)**	(0.16)	(0.13)
	(0.33)	(0.23)**	(0.29)	(0.14)	(0.12)
literacy	0.94		0.81	0.48	0.46
	(0.23)***		(0.23)***	(0.15)***	(0.16)***
	(0.28)**		(0.23)**	(0.18)**	(0.19)**
pc_institutions		10.71	7.21	10.16	9.89
		(4.06)**	(4.31)*	(3.06)***	(2.93)***
		(1.32)***	(4.42)	(2.24)***	(2.38)***
Obs	67	69	67	67	67
Adj R-squared	0.56	0.51	0.58	0.76	0.76

Robust standard errors in parentheses (below: clustered, allowing for arbitrary correlations within countries)
* significant at 10%; ** significant at 5%; *** significant at 1%
Estimation method: OLS. Country dummy variables are always included.
Column (5) weighted OLS, with weights inversely proportional to standard errors of conditional culture

Table 5 – Culture and output: instrumental variables estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. variable					*yp9500*			
pc_culture	1.07	1.11						
	(0.26)***	(0.28)***						
	(0.34)**	(0.39)**						
pc_culture_pos			1.16					
			(0.32)***					
			(0.37)**					
pc_children				1.40				
				(0.39)***				
				(0.48)**				
control					13.17			
					(7.61)*			
					(6.53)*			
trust						4.67		
						(1.41)***		
						(1.73)**		
obedience							-5.88	
							(2.19)***	
							(1.90)**	
respect								2.86
								(0.76)***
								(0.60)***
Conditional indicator for culture	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	67	67	67	67	67	67	67	67
F statistics	12.71	10.83	17.47	6.75	2.40	4.84	3.20	9.29
Chi2(1) p-value	0.20	0.21	0.10	0.08*	0.19	0.89	0.95	0.01***

Robust standard errors in parentheses (below: clustered, allowing for arbitrary correlations within countries)
* significant at 10%; ** significant at 5%; *** significant at 1%
Country dummy variables, *school* and *urb_rate1850* are always included in the first and second stage regressions
Estimation method: IV, weighted by inverse of standard errors of conditional culture in columns 2-8.
F statistics is F-test of the excluded instruments. Chi2(1) is the p- value of Hansen J statistic testing the over-identifying restriction.

Table 6 – Culture and growth: instrumental variables estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dep. variable	*pc_culture*	*growth*	*pc-culture*	*growth*	*growth*	*growth*	*growth*	*growth*	*growth*	*growth*
lyp_77	12.32	-1.16	10.49	-1.12	-1.09	-1.16	-0.87	-1.02	-0.96	-0.79
	(11.53)	(0.35)***	(10.43)	(0.37)***	(0.35)***	(0.42)***	(0.47)*	(0.44)**	(0.51)*	(0.33)**
	(13.71)	(0.61)*	(12.87)	(0.41)***	(0.67)	(0.60)*	(0.75)	(0.76)	(0.59)	(0.46)
pc_institutions	9.59		9.32							
	(2.75)***		(2.52)***							
	(2.23)***		(2.39)***							
literacy	0.39		0.32							
	(0.17)**		(0.17)*							
	(0.22)		(0.20)							
pc_culture		0.02		0.02						
		(0.01)***		(0.01)***						
		(0.007)*		(0.01)**						
pc_culture_pos					0.02					
					(0.01)***					
					(0.01)					
pc_children						0.02				
						(0.01)***				
						(0.01)*				
Control							0.18			
							(0.12)			
							(0.15)			
Trust								0.06		
								(0.03)**		
								(0.04)		
Obedience									-0.08	
									(0.04)**	
									(0.03)*	
Respect										0.03
										(0.02)*
										(0.02)*
Conditional culture	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	67	67	67	67	67	67	67	67	67	67
F statistics		10.80		10.03	16.23	8.29	1.87	3.27	2.86	11.82
Chi2(1) p-val.		0.43		0.34	0.26	0.18	0.45	0.67	0.65	0.03

Robust standard errors in parentheses (below: clustered, allowing for arbitrary correlations within countries). * significant at 10%; ** significant at 5%; *** significant at 1%
Country dummy variables, *school* and *urb_rate1850* are always included in the first and second stage regressions
Estimation method: IV, weighted by inverse of standard errors of conditional culture in columns 3-10.
F statistics is F-test of the excluded instruments. Chi2(1) is the p- value of Hansen J statistic testing the over-identifying restriction.

Table 7 – Culture and output: sensitivity analysis

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. variable			*yp9500*			
pc_culture	1.74	0.75	0.96	0.78	0.62	-0.30
	(0.71)**	(0.33)**	(0.23)***	(0.20)***	(0.21)***	(0.39)
	(0.98)	(0.58)	(0.32)**	(0.30)**		
pc_institutions	-9.78					
	(9.59)					
	(15.04)					
literacy		0.45				
		(0.32)				
		(0.52)				
tertiary education			2.27	3.02		
			(0.92)**	(0.97)***		
			(1.41)	(1.51)*		
agr-share				-0.51		
				(0.24)**		
				(0.27)*		
capital in 1979					16.31	
					(9.54)*	
trial duration						-15.18
						(5.80)***
Obs	67	67	67	64	13	13
F statistics	8.72	11.43	10.27	8.49	54.41	21.64, 60.02
Chi2(1) p-value			0.46	0.84	0.02**	

Robust standard errors in parentheses (below: clustered, allowing for arbitrary correlations within countries)
* significant at 10%; ** significant at 5%; *** significant at 1%
Country dummy variables, *school* and *urb_rate1850* are always included in the first and second stage regressions
Estimation method: IV, weighted by inverse of standard errors of culture; F statistics is F-test of the excluded instruments from the first stage regressions.
Chi2(1) is the p-value of the Hansen J-statistic testing the over-identifying restriction.
Pc-culture refers to conditional indicator of culture;
Columns (1) and (2): just identified model with only one instrument. In columns (4-6) the additional regressors are taken as exogenous, and the instruments are *pc-institutions* and *literacy*. In column (6), both *pc-culture* and *trial duration* are endogenous, and the instruments are pc-institutions and literacy; the first F-statistics refers to *pc-culture*, the second one to *trial duration.*

Figure 1. Per capita income in 1995-2000

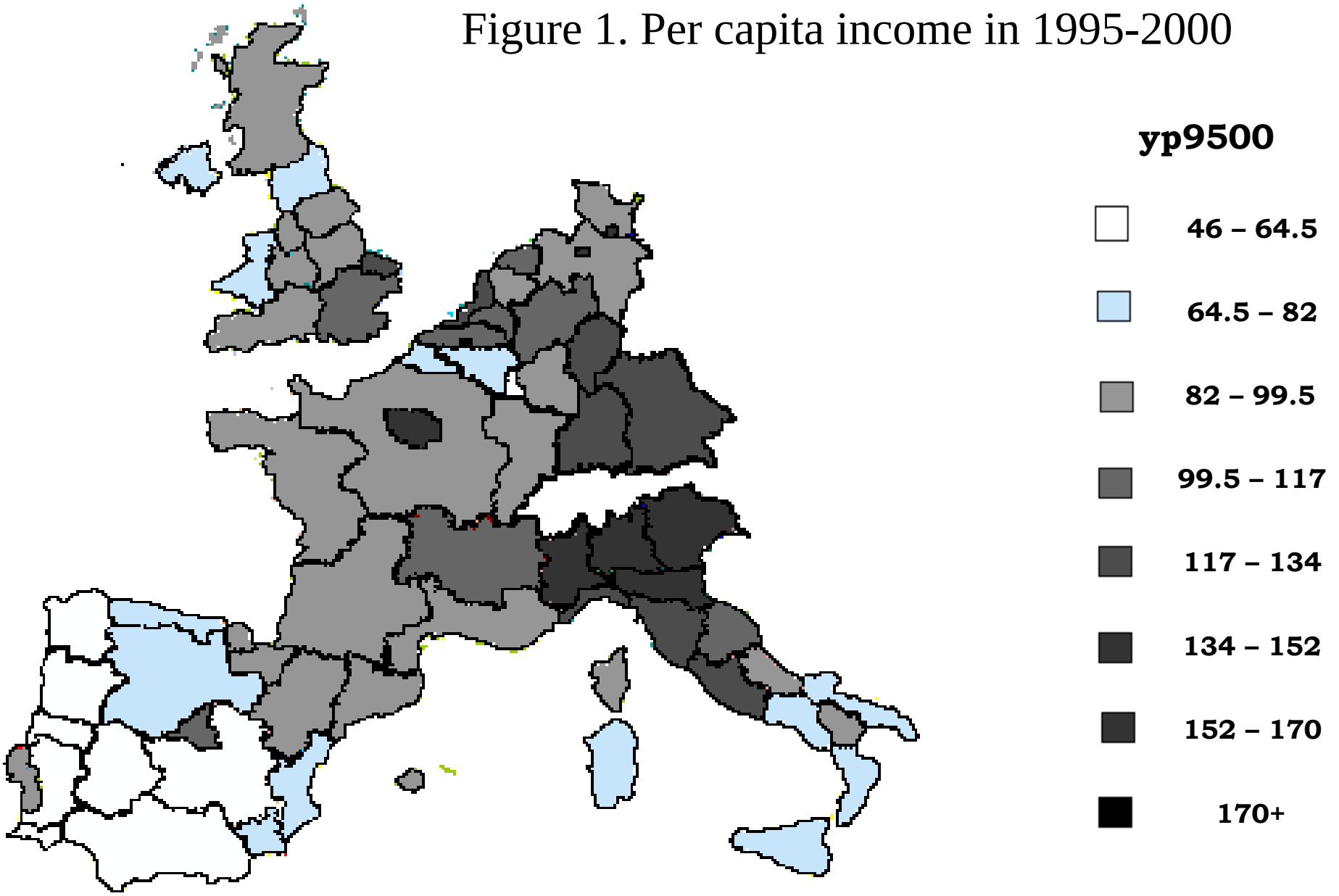
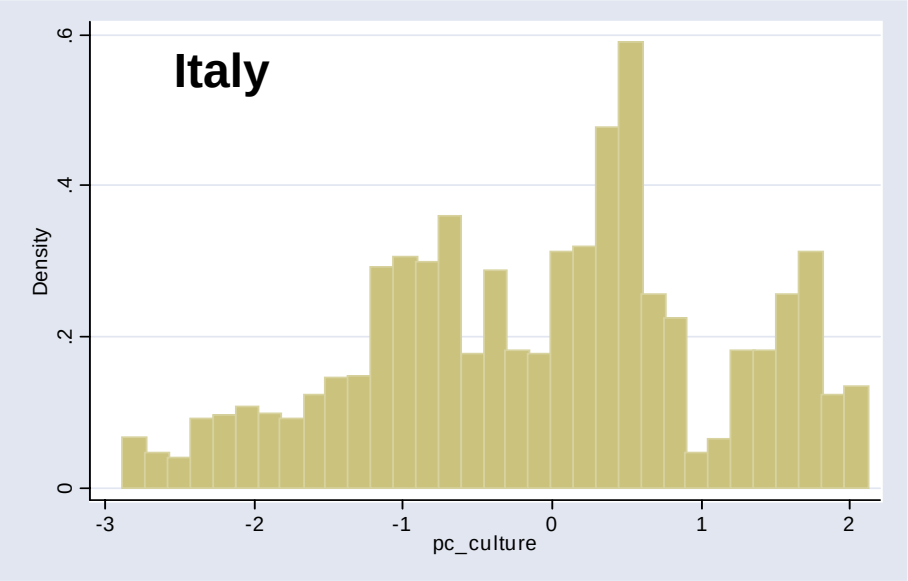
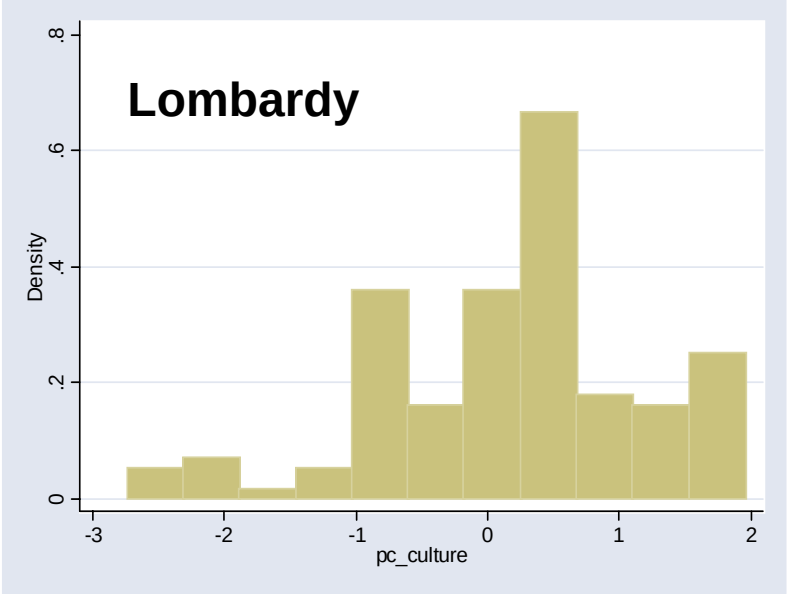


Figure 2a Distribution of PC-Culture in Italy, Lombardy and Campania





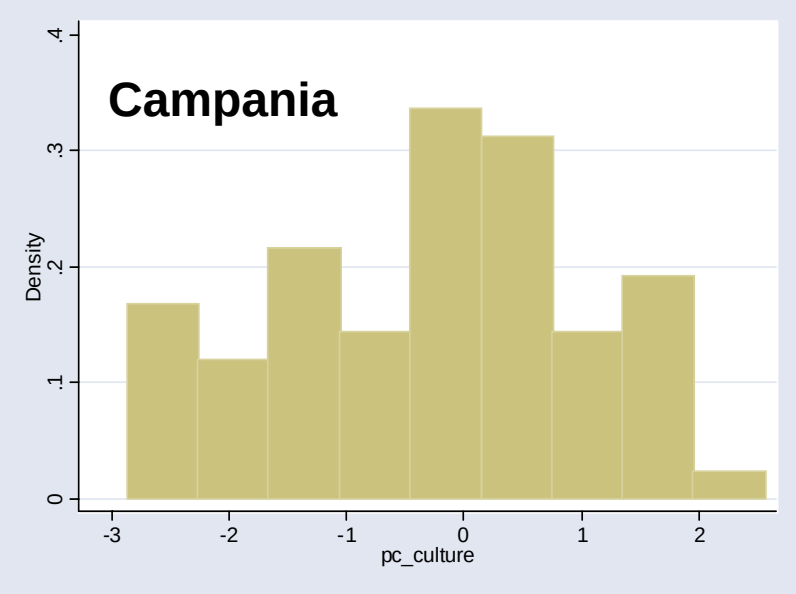


Figure 2b. Cultural map of Europe in the 1990s

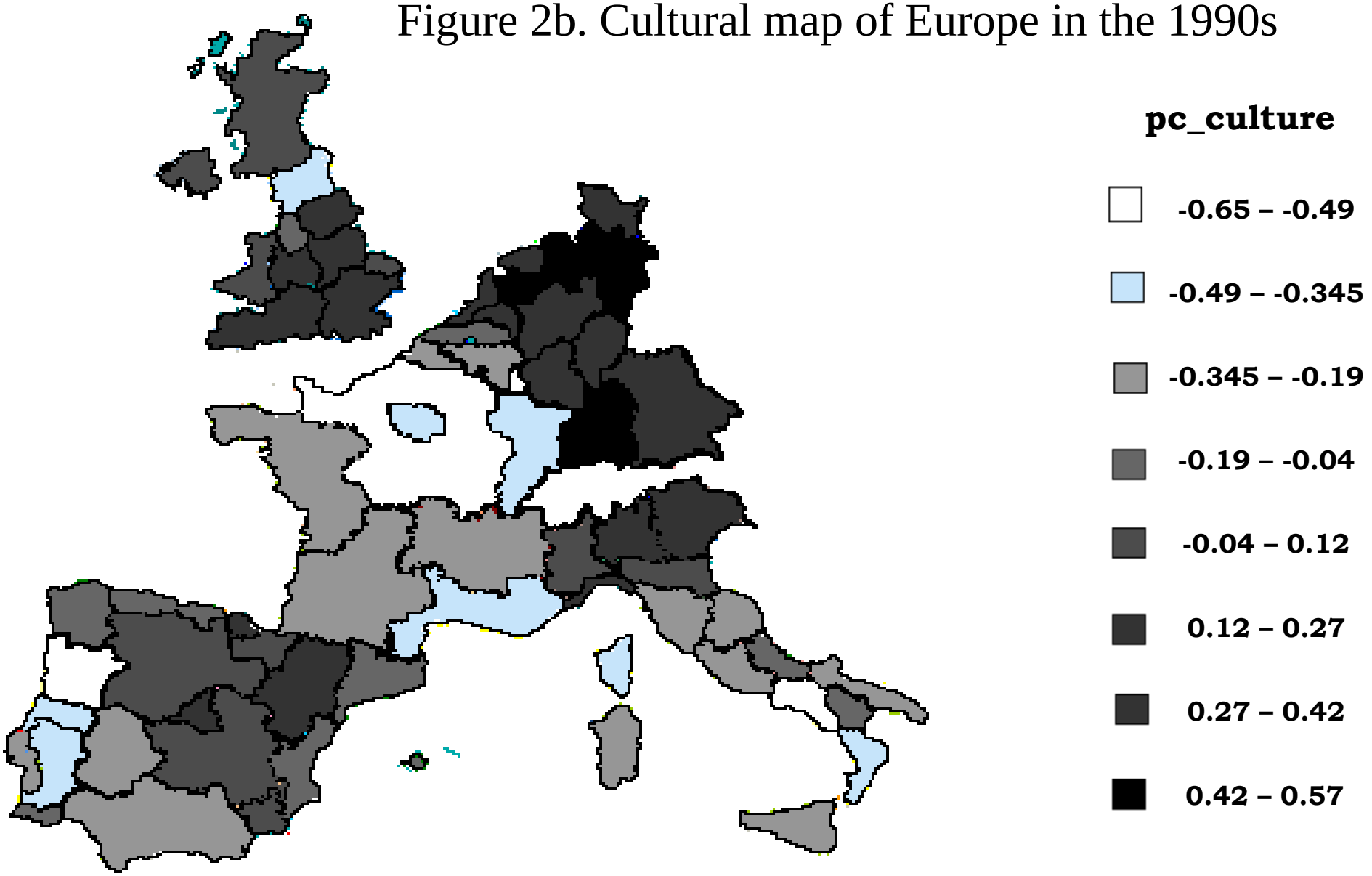


Figure 3.

OLS residuals, after controlling for country FE, *school* and *urb_1850*

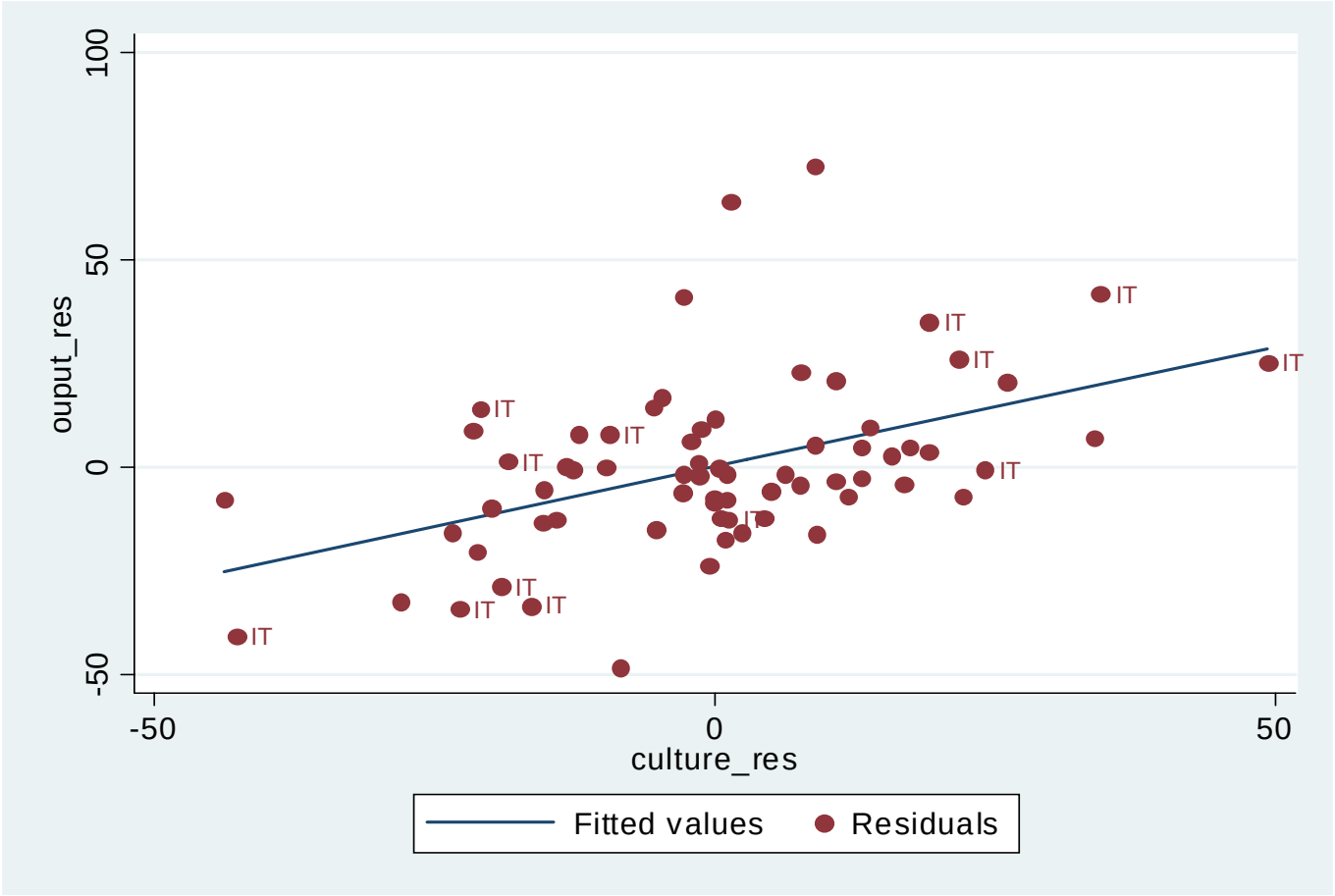


Figure 4. Literacy rates around 1880

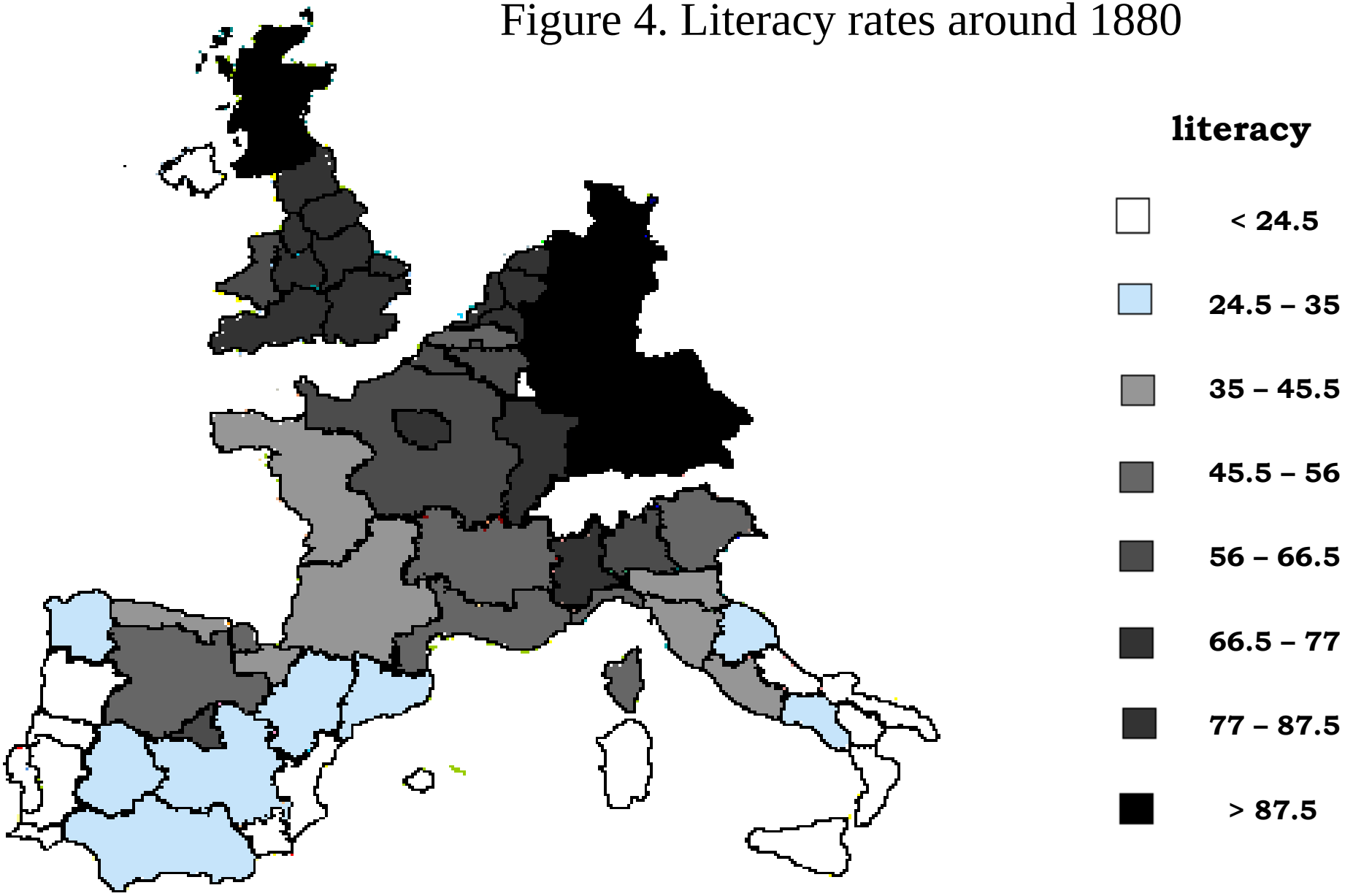


Figure 5. First principal component of political institutions (1600 – 1850)

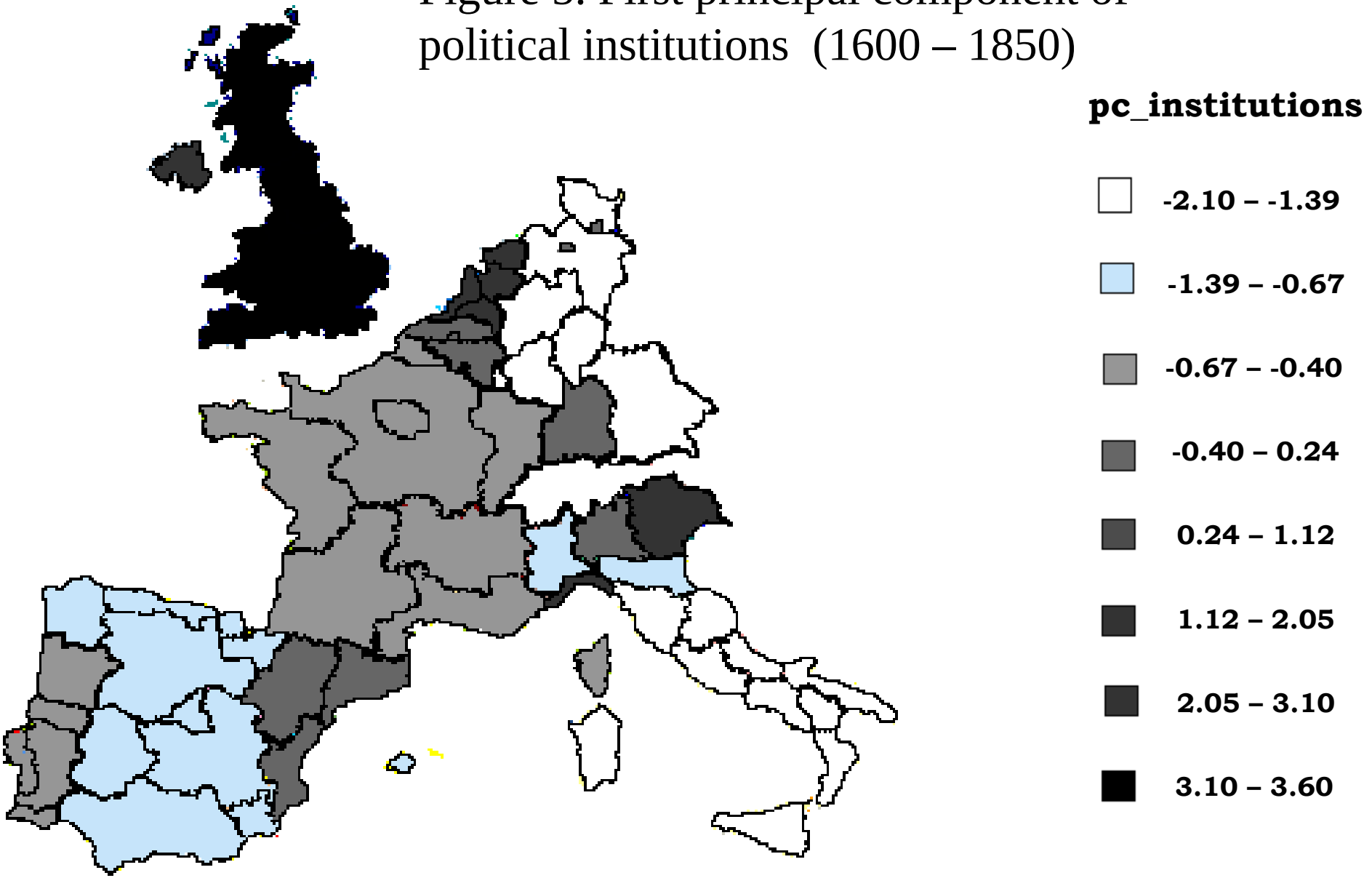


Figure 6
Output and residual component of culture