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

by

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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. Moreover, the data do not reject the over-identifying assumption that the two historical variables used as instruments only influence regional development through culture. The indicators of culture used in this paper are also strongly correlated with economic development and with available measures of institutions in a cross-country setting.

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), an influential paper by Acemoglu, Johnson and Robinson (2001) has shown that colonial origin (measured by mortality rates amongst early European settlers in the New World) is strongly correlated with current economic performance. 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 through "institutions". Acemoglu, Johnson and Robinson (2001) argue that colonial origin is correlated with indicators of the quality of current institutions, in particular of institutions protecting property rights from the abuse of governments. Based on instrumental variable estimation, they show that the "exogenous" variation in current institutions due to history explains current economic development. Moreover, they cannot reject the hypothesis that all the effect of history, as measured by colonial origin, is fully captured by current institutions. 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]

But why do the same institutions function so differently in different environments? 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 the public administration, or to moral hazard inside large private corporations with branches in different regions (Ichino and Maggi 1999). These systematic differences in behaviour and economic development can be traced back to different regional histories. But why do they persist for generations, despite identical political and legal institutions? This paper addresses this question by studying the role of culture as a channel of historical influence.

[1] See for instance Acemoglu, Johnson, Robinson and Thaicharoen (2003), Dollar and Kraay (2003), Easterly and Levine (2003), Rodrik, Subramanian and Trebbi (2002), Satyanath and Subramanian (2004).

But I try to go beyond the general claim that "culture matters". I estimate the effect of specific cultural traits, traditionally regarded as favourable to economic growth and to the effective functioning of democratic institutions.

Culture, like institutions, is a vague concept. In the formal jargon of economists, culture corresponds to the social norms and individual beliefs that sustain Nash equilibria as focal points in repeated social interactions (eg. Schotter 1981, Myerson 1991, Greif 1994). In this interpretation, culture is one aspect of broadly defined institutions, and contributes to shape individual incentives. A more radical view is that culture directly influences individual behaviour through values and preferences (eg. Akerlof and Kranton 2000, Rabin 1993). Others have pointed out that social norms and individual values could interact in systematic fashions (Bernheim 1994, Benabou and Tirole 2006). This paper does not seek to discriminate between these alternative interpretations. Its goal is to show that specific indicators of culture, that can be interpreted either as social norms or as individual values, are correlated both with historical patterns and with current economic development, and to suggest a causal interpretation of these correlations.

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 (eg. 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 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 or indicators of past economic development. 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.

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. When measured at the country (rather than regional) level and for a large sample of countries, these indicators of culture are strongly correlated with available measures of institutions, and even with the colonial origin variables exploited in the cross-country studies mentioned above. But to reduce the scope of omitted variables, 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 correlated with two 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 trust in others, 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, again after controlling for country fixed effects, contemporaneous regional education and past urbanization rates: less trust and respect for others and less confidence in the individual are associated with lower per capita output. 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.

Of course, to interpret these correlations as causal, from history to culture to economic development, one has to rely on strong identifying assumptions that make history a valid instrument for culture in the output regressions. The validity of these assumptions is open to doubts and is extensively discussed below. But the kind of evidence presented in this paper is not different from that brought to bear in cross country studies in favour of institutions. Overall, the evidence does not point to a primacy of institutions (at least of formal institutions) over culture. Both cross country studies and regional comparisons point to a strong and robust influence of history on current economic performance. And these different samples support the view that culture as well as institutions are plausible channels of historical influence.

The roles of culture and institutions in the propagation of historical influence are not mutually exclusive. On the contrary, culture can be viewed as a component of broadly defined institutions, that explains why the same formal institutions often function so

differently in different environments. Nevertheless, the research priorities and the questions emphasized by the two interpretations are different. According to the "institutions" view, the challenge for researchers is to identify specific features of institutions that shape economic incentives, and to explain the sources of institutional inertia (eg., how does the distribution of factor endowments influence the evolution of institutions).[2] The results of this paper point in another direction. To explain economic development we also ought to understand which specific cultural traits influence economic performance, and how these traits emerge and persist over time.

The outline of the paper is as follows. The next section briefly reviews some related literature. Section 3 describes data on regional output, education, past urbanization and culture, and shows that there is strong correlation between indicators of culture and of per capita output. This section also shows that these same indicators of culture are strongly correlated with economic development and with widely used measures of institutions in a large sample of countries. Section 4 introduces the regional historical variables that will be used as instruments for culture. Section 5 outlines the estimation strategy and discusses the identifying assumptions. Section 6 performs the basic statistical analysis, estimating the link from history to culture and then from culture to economic development. Section 7 discusses the robustness of the estimates, trying to address the crucial issues of the validity of the instruments and of the power of the over-identifying tests through Montecarlo simulations. Section 8 concludes.

2. Related literature

The idea that culture is a fundamental determinant of economic development is not new. It was stressed by economic historians like North (1981) and more recently Landes (1998) – other relevant contributions in economic history are discussed by Jones (2006). In an interesting paper, Greif (1994) emphasizes the interaction between culture and institutions; he points out how the different cultures of Maghribi and Genoese traders in the late medieval period led them to develop different institutions, and how this mattered for their subsequent development paths. Glaeser et al. (2004) suggest that the effect of history on current economic development reflects the accumulation of human capital, which in turn influences institutional outcomes, rather than the other way around. Referring to a long tradition in political science (eg. Lipset (1959)), they argue that education facilitates economic development also because it plays a key role in the

[2] See for instance Acemoglu and Johnson (2005), Acemoglu and Robinson (2006), Rajan and Zingales (2006) and the research reviewed by Helpman (2004).

evolution of institutions. Democracy functions well when citizens accept it as a legitimate instrument of conflict resolution, but this requires specific cultural traits and an educated population.[3]

Closer to the object of this study, two influential books (Banfield 1958 and Putnam 1993) have 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" in turn contribute to explain the economic backwardness of Southern Italy. This paper does not study in great detail the cultural differences between Northern and Southern Italy, but focuses on several European countries; this makes it possible to rely on more observations and hence to exploit more powerful quantitative and statistical techniques. Beugelsdijk, and von Schaik (2001) and Knack and Keefer (1997) perform a similar analysis for European regions and a sample of countries respectively, studying the correlation between indicators of social capital and per capita output. But these papers do not attempt to link social capital to history or to account for the endogeneity of social capital.[4]

An interesting recent paper by Licht, Goldschmidt and Schwartz (2004) studies the link between culture (as measured by researchers in cross-cultural psychology) and institutions (such as the rule of law and the control of corruption), in a sample of countries; to remove joint endogeneity, culture is instrumented by a linguistic variable that reflects the importance of the individual relative to the context of speech; despite the different methodologies and data sources, their empirical results are in line with those of this paper. Barro and McCleary (2003) provide evidence that religious beliefs are correlated with economic growth in a sample of countries, and through instrumental variable estimation they interpret this correlation as causal. Guiso, Sapienza and Zingales (2004a) study the effect of social capital on individual financial habits. A recent paper by Spolaore and Wacziarg (2005) finds that income differences between countries are positively correlated with genetic and geographic distance, and interpret this evidence as suggestive of cultural barriers to the diffusion of innovations across countries. Platteau

[3] Exploiting cross-country correlations, Glaeser et al. (2004) argue that education favors the emergence of democratic institutions. Acemoglu, Johnson, Robinson and Yared (2004) question this conclusion, showing that no such correlation exists within countries at intervals of five or ten years; but their results do not rule out a causal effect of education on democracy over a longer time horizon.

[4] See also von Schaik (2002) and Healy ((2003) for references to alternative measures of social capital in Europe or in larger international samples, and de Blasio and Nuzzo (2006) for a related study on Italy.

(2000) provides an excellent discussion of other contributions that have studied the role of culture in other development contexts.[5]

3. 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 first two columns of *Table 2* list the regions in our sample.

3.1 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 below.

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.*

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[5] Outside of this line of research in development economics, other recent microeconomic studies provide evidence that cultural traits are a crucial determinant of important individual economic decisions, such as female labor supply or educational and fertility decisions (Fernandez, Fogli and Olivetti 2002, Fernandez, Fogli and Olivetti 2004, Fernandez and Fogli 2005 a,b**)**, international exchange (Guiso, Sapienza and Zingales 2004b), decisions where trust plays an important role (Glaeser, Laibson, Scheinkman and Soutter 2000, Ichino, Bornhorst, Schlag and Winter 2004). Guiso, Sapienza and Zingales (2005) survey this recent literature.

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.

3.2 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; 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). Note that primary school was already compulsory in most if not all European regions in 1960; hence, most of the regional variation in this variable comes from secondary school enrolment.

3.3 Urbanization in 1850

As discussed below, my 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 appendix. 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.

3.4 Culture

The measures of culture are obtained from the World Value Surveys – Inglehart et al. (2000). These are opinion polls designed to enable a cross national comparison of values and norms on a wide range of topics. I exploit two waves, one carried out in 1990-91, the other in 1995-97. The number of individuals polled varies considerably across regions. On average, there are about 320 individuals polled in each region. But the number polled in the Spanish regions is much higher than in the rest of the sample (over 2000 individuals in some regions), while in a few regions we have as little as 50 or 60 individuals. The median number of individuals polled in each region is about 130. To cope with these disparities, in some of the regression analysis below I also weigh our regional measures of beliefs with the size of the cell corresponding to each region or with other measures of the 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.[6] Two of them measure mutual 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. Two other

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

variables measure confidence in the virtues of individualism, and are symptomatic of an entrepreuneurial environment where individuals seek to take advantage of economic opportunities.

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 familism" is the other side of trust. With trust we measure

the belief that others can be trusted. An “amoral familist” is intrinsically not trustworthy. The two cultural traits are thus related and have similar economic implications.

The distinction between generalized vs limited morality has other relevant implications, however. 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.

To measure the relative importance of generalized vs limited morality, we 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.[7]

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*). In the analysis below I consider each of these variables in isolation. But to come up with a single measure of culture, I have also extracted the first principal component of these four variables, from the whole data set with all individual responses, based on the correlation matrix. The regional average of this principal component, called *pc_culture,* is a summary measure of these cultural beliefs. 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

[7] Researchers in psychology and sociology that compare cultural traits of different societies have suggested similar ideas. Schwartz (1999) and Licht, Goldschmidt and Schwartz (2004), 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" - Licht, Goldschmidt and Schwartz (2004).

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. Finally, since the principal component only captures the variation that is common to all beliefs, while these norms could have more than one relevant dimension of variation, I have also computed an alternative summary measure called *sum_culture,* defined as the sum of the three positive beliefs (*trust, control, respect)* minus the negative belief (*obedience*).

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 do capture a common cultural pattern. Finally, note that the first principal component of all four cultural traits (the variable *pc_culture*) is almost perfectly correlated with their algebraic sum, *sum_culture = trust + control + respect – obedience*. This suggests that these four measures of culture enter the first principal component with approximately equal weights.

The regional averages of these indicators of culture conceal very large variation amongst individuals within each region. *Figure 2a* illustrates the distribution of the 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%).[8] 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. To cope with this problem, besides taking the unconditional averages described above, we have also computed the regional average after controlling for other observable features of the individual respondent. Specifically, in the comprehensive dataset of individual responses, we have regressed each of the cultural variables described above on a vector of regional dummy variables, as well as on the following additional individual controls: a dummy variable for being married, a dummy variable for being male, the age group, and a self reported social class.[9] Our regional measures of *conditional* beliefs are taken to be the estimated coefficients on the regional dummy variables. In some regressions below, we also weight regional observations with the standard errors of these estimated coefficients, or with the size of the cells of respondents polled in each region, to allow for different measurement errors across regions.

The unconditional beliefs in each region and their summary measures are listed in *Table 2. 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. In particular, France is rich but its cultural traits are a priori less favourable to economic development.

3.5 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

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

[9] An indicator of the size of the town of residence turned out to be statistically insignificant and was not used as a regressor in the final specification.

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 3* (unweigthed observations) and *Table 4* (observations are weighted by the numbers of individuals polled in each region). 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 estimated coefficients 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 in the value of this variable between say Lombardy and a typical region in Southern Italy is about 50. The estimated coefficient in *Table 3* 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). Very similar results are obtained if beliefs are measured by their conditional counterparts (ie the residuals of beliefs after controlling for some individual features of the respondent – see the discussion above). The estimated coefficient of school enrolment also has the expected (positive) sign, although it is not always statistically significant, while that of past the urbanization rate is always positive and highly significant, to signal strong persistence in economic development.

Finally, the left hand side panel of *Figure 3* displays the estimated residuals of *yp9500* (on the vertical axis) and of *pc_culture* (on the horizontal axis), estimated from a regressions against the remaining control variables in *Table* 3 (namely the variables *school* and *urb_1850* plus the country fixed effects). A strong and robust positive correlation is evident. The slope of the line going through the scatter plots corresponds to the estimated coefficient displayed in column 5 of *Table 3*. *Figure 3* thus confirms that the positive correlation between output and culture is not due to any outlier observations. The right hand side panel of *Figure 3* shows 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. But the correlation is weaker without

Italy, 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 our variables measuring culture 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 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 3* and *4* 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. But before turning to that, I further discuss the properties of these indicators of culture.

3.6 Output, culture and institutional outcomes in a sample of countries

How do these cultural indicators relate to the measures of institutions widely used in existing cross-country analysis? And do they explain cross country differences in per-capita income? Before turning to the historical analysis, I address this question. A recent wave of the World Value surveys, conducted in 1999-2000 and covering a larger sample of countries, has just been made available. From this third wave, I constructed the same indicators of culture at the country (rather than regional) level, for almost 50 countries.

Table 5 reports alternative cross-country regressions, with some of the same variables used in the literature, namely the log of per capita output in 1988 (*logyl*) and a measure of protection of property rights between 1986 and 1995 (*gadp*). These variables are those used by Hall and Jones (1999). All correlations are remarkably strong, confirming that indeed these variables do measure cultural traits that vary systematic with economic development and with available measures of institutional outcomes.

Column 1 and 2 report a simple OLS regression of the log of output per worker (*logyl*) and of institutional outcomes protecting property rights (*gadp*) against the first principal component of culture (*pc_culture*). The estimated coefficient of *pc_culture* is positive and highly significant, as expected, and it is even higher than in the OLS

regression in the sample of European regions (cf. Table 4). Based on these estimates, variation in culture between Sweden and Uganda (the countries with the highest and lowest values for *pc_culture* respectively) can explain over two thirds of the difference in output per worker, and almost all of the difference in institutional outcomes, between these two countries.

Columns 3-5 attempt to remove bias due to reverse causation or omitted variables, by using religion as an instrument for culture. Column 3 displays the first stage, where *pc_culture* is regressed on the percentage of the population professing protestant religion in 1980 (*protestant*).[10] Protestant religion helps to explain the positive attributes of culture. As shown in columns 4 and 5, the second stage estimates confirm a positive and highly significant effect of culture on both output and institutional outcomes.

Finally, columns 6-8 repeat the instrumental variable estimation, but using colonial origin (measured by the celebrated log of settler's mortality, *Log-mortality*) as an instrument for culture. Here data are available for only 20 countries. Yet, the results remain remarkably robust. Higher mortality (i.e. worse colonial origin) leads to worse cultural traits in the first stage regression (column 6). And culture has an even stronger and significant effect on both output and institutional outcomes.

Even without suggesting a causal interpretation, these regressions are nevertheless remarkable. They show that these cultural indicators are meaningful, and highly correlated with variables that have attracted so much interest in the recent analysis of cross country differences in economic development. They also suggest that institutions and culture are likely to interact to determine economic development. But separating the effect of culture from that of institutions is more credibly done in the sample of European regions, where one can control for common political and economic institutions at the national level, and where unobserved heterogeneity is less problematic. This is what I do in the remainder of the paper.

4. Estimation strategy and historical data

4.1 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

[10] The source for this variable is LaPorta et al. (1998).

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. This is a topic generally neglected by economists. But recent theoretical analysis by Bisin and Verdier (2002) and Benabou and Tirole (2006) suggests that, generally speaking, culture can be viewed as shaped by two forces: contemporaneous social interactions and the cultural features of earlier generations (transmitted over time through education or other means). In other words, 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 (*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 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.[11] These attitudes then persist over time as they are transmitted from one generation to the next.

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 very 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

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

controls for contemporaneous education (regional school enrolment) and political institutions (the 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 5 and 6 we relax this identifying assumption in two ways. First, we include the sectoral composition of employment in the mid 1970s as one of the 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.

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. Essentially, this amounts to asking whether the instrumental variable estimates vary significantly depending on whether we use only one instrument, and which one, or both instruments. In section 6 we discuss more extensively the power of this test.

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

4.2 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 data appendix. The precise definition of literacy varies slightly across countries.[12] 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

[12] 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 2*, these measurement problems are likely to be swamped by the large variation of the variable *literacy* across regions.

find national data (so that all regions in these countries are assigned the same literacy rate).

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.

4.3 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* – cf. Eckstein, H. and T. Gurr 1975. Patterns of Authority: A Structural Basis for Political Inquiry, Wiley Interscience. 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.

The variables corresponding to all five dates, 1600, 1700, 1750, 1800 and 1850, are listed in *Table 6* (*institution_1600* etc...) A general trend towards stronger checks and balances in the more recent period is evident. But the trend does not cover 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. We thus aggregate the five measures of political institutions into a single variable defined as the first principal component of the five variables measuring constraints on the executive at the five different points in time, and we call this new variable *pc_institutions* – also listed

in *Table 6*. But to check the robustness, we also report results for a simple average of the five historical variables (*institutions_average*), as well as for a weighted average (*institutions_weighted*) where more recent dates receive a higher weight, to account for the possibility that the influence of past institutions fades with.[13]

Figure 5 illustrates our political map of the European regions around 1700. Not much variation in institutions is apparent at this time. But the UK, the Netherlands and the republics of Venice and Genova stand out as having better institutions, with Southern Spain, some regions in central Italy and in Germany, Belgium and Portugal having intermediate values. *Figure 6* illustrates the geographic pattern of the first principal component of political institutions (*pc_institutions*). Now more variation is evident, also within countries. 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 (cf. *Figures 4* and *6*). 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 – cf. *Table 7*. 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. *Table 7* also reports the full matrix of partial correlation coefficients between most of the variables described up to this point, always expressed in deviations from country means. The historical variables are strongly correlated with our measures of culture, as well as with regional per capita output, always with the expected signs.

5. Estimating the effect of culture on output

5.1 Reduced form 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

[13] Specifically, the precise definition of the weighted average is: *institutions_weighted* = (0.5**institutions_1600* + 0.7**institutions_1700*+0.8**institutions_1750*+0.9**institutions_1800*+ +*institutions_1850*)/(0.5+0.7+0.8+0.9+1)

ought to find a significant effect of both historical variables on per capita output, after controlling for the other regressors.

As shown in *Table 8*, 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 8* only reflect within country variations. As before, regular and clustered standard errors are estimated. School enrolment in 1960 (*school*) has the expected positive coefficient, although it is statistically significant only with respect to the clustered standard errors. Urbanization in 1850 (*urb_rate1850*) has a positive estimated coefficient, always significant with OLS estimation. The literacy rate in 1880 (*literacy*) always has a positive and statistically significant estimated coefficient, for all specifications. The alternative measures of political institutions also have the expected sign, always significant with OLS estimation, but less precisely estimated when observations are allowed to be clustered within countries.

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.

5.2 Instrumental variable estimates

Next, we estimate the effect of culture on per capita output, using literacy and political history as instruments for culture. *Table 9* reports the first and second stage regressions, for different summary measures of culture and of political institutions, with regular and clustered standard errors. In both stages we always control for country dummy variables, school enrolment and past urbanization. The last row reports the p-value of Sargan's chi-square statistics for the over-identification test.[14] The two historical instruments are

[14] The Sargan statistics assumes homoscedastic residuals. But estimating with the robust option that allows for heteroscedastic residuals and testing the over-identifying restrictions with Hansen's J statistic gives very similar results.

strongly correlated with cultural indicators, for all measures of political institutions, with the expected sign. 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), and the F statistics on the excluded instruments is around 13. The effect of culture on economic development is always large and statistically significant, again with the expected sign. Finally, the over-identification restrictions are never rejected.

Note that urbanization in 1850 is strongly correlated with current regional output, but it does not explain culture (the estimated coefficient of urbanization in 1850 is practically zero in all first stage regressions). 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.

Comparing the estimated coefficients in *Table 9* with the OLS estimates reported in *Table 3*, we see that projecting culture on the two historical variables actually increases their 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 why instrumental variables yields higher estimated coefficients compared to the OLS regressions.[15]

Table 10 repeats the same exercise for the individual measures of culture, always using the same indicator of political institutions, *pc_institutions* (but the results are similar for other measures of political institutions). All cultural variables have a large and significant estimated coefficient in the second stage regressions, always with the expected sign. In the first stage regressions one of the historical instruments is always significant, though not always the same one depending on the measure of culture. Note also that the orthogonality test does not reject the over-identifying restrictions, except when culture is measured by the variable *respect*. Comparing the estimates in *Tables 9* and *10*, a possible interpretation is that the individual measures of beliefs used in *Table 10* capture an incomplete dimension of culture, and thus are imperfectly correlated with the historical

[15] The finding that IV estimates are larger in absolute value than OLS estimates is quite common in the literature on cross country comparisons. Besides measurement error, a less benign reason could be "heterogeneous treatment effect" (in our case, heterogeneity in the true coefficient of culture in the second stage regression). As pointed out by Heckman (1997), if the heterogeneity in the treatment effect is correlated with the instrument, then IV estimates are inconsistent even with valid instruments (i.e., even if the instruments are orthogonal to the second stage residual in the absence of heterogeneity).

variables. When a more comprehensive indicator of culture is used (through simple averages or by extracting the first principal component), the correlations are stronger and more robust and the over-identification assumptions seem more consistent with the data.

So far we have measured culture by unconditional beliefs, and we did not weigh observations for the size of the regional cell from which individual beliefs are averaged. *Table 11* reports the instrumental variables estimates for *conditional* measures of culture, weighting observations by the standard errors of the regional averages –see section 2 for a precise definition of conditional beliefs. The results are very similar to those of *Table 9* and always convey the same message: culture is explained by the historical instruments; culture in turn explains current economic development; and we cannot reject the over-identifying restriction that the historical variables influence development only through culture.

5.3 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 12* reports the estimates of a set of instrumental variables regressions 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) is included among the regressors and treated as an exogenous variable. The specification is otherwise the same as in the previous tables, with unconditional beliefs as measures of culture.

Column (1) of *Table 12* reports the first stage, where the variable *pc_culture* 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 the previous tables, 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 regression takes a value of 9). The estimated coefficients of per capita output in 1977 and urbanization in 1850, instead, are

not statistically significant. Although here we are treating per capita output 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.

The remainder of *Table 12* displays the second stage estimates, for alternative measures of culture (the first stage estimates are very similar to those in column 1, and the two historical variables are always significantly different from zero, irrespective of how we measure the dependent variable, culture). The estimated coefficients in columns (2)-(8) are consistent with some convergence (higher initial per capita output reduces subsequent growth).[16] More importantly, all measures of culture influence growth, and the effect is always 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 %.[17]

5.4 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.

These inferences rest on a critical assumption, however: that at least one of the historical variables is a valid instrument for culture, after controlling for country fixed effects, past urbanization rates and contemporary education. The next section further discusses the validity of this assumption and the power of these orthogonality tests.

[16] 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.

[17] In *Table 11*, 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.

6. How credible is the identification?

As already anticipated in section 4, 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 specialised in agriculture, and this in turn explains their current low per capita output? To address this issue, I add the employment share in agriculture in 1977 (*agr_share*) as an additional control variable to both the first and second stage equations.[18] The employment share in agriculture is negatively correlated with our measure of culture, *pc_culture*, with a partial correlation coefficient of about -0.4. I treat this new variable as exogenous and thus uncorrelated with both the first and second stage residuals. Columns 1 and 2 of *Table 13* display the estimates. The estimated coefficient of the employment share in agriculture is significantly different from zero in the output regression, but not in the equation for culture. All our previous inferences remain valid: the historical variables remain significant in the culture regression, and the size of the estimated coefficients barely changes. And culture remains a significant determinant of per capita output, although with a smaller estimated coefficient.[19]

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 for 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 in the variable *pc_culture* ought to remain stable under these alternative specifications. As shown in columns 3 and 4 of *Table 13*, the estimated coefficient of these additional regressors are indeed not significantly different from zero, thus confirming the results of the Sargan statistics reported in the previous section as a test of the over-identifying restrictions. Nevertheless, the estimated coefficient on the

[18] 1977 is the first year in which we could find comparable regional data on this variable.

[19] If the sectoral composition of employment is correlated with the residual of the output equation, the estimates in columns 3 and 4 of *Table 12* 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.

variable *pc_culture* does change across the two specifications, suggesting that the failure to reject the over-identifying restrictions is not completely water-proof.

Another important issue concerns the power of the orthogonality test for the over-identifying restrictions. 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 bootstrap the Sargan 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 results are shown in *Figure 7*. In about 70% of the replications, the bootstrapped statistics does not reach the threshold of 3.84 that corresponds to a significance level of 5%. But in the remaining 30% of the time, the Sargan statistics exceed the critical value of 3.84. This exercise suggests that the failure to reject the over-identifying restrictions may not be very robust to special features of the sample; or, to put in other words, it suggests that the estimated p-value of the Sargan statistics reported in *Table 9* is not significant at conventional levels, but it is nevertheless a bit low to be totally confident on the validity of the instruments.

A second more important question concerns the power of the Sargan statistics to reject the null hypothesis that both instruments are valid, when in fact one of them is not. To assess the power of this test, I ran a Montecarlo simulation. The details are provided in *Table 14*. The data generating process (dgp) matches the observed moments of the data, and uses as true coefficients those obtained from *Table 9*, columns 1 and 2, except for the true coefficient of culture on output in the second stage regression. This coefficient is set to 0.21 in the upper panel of *Table 14*, and to 0.86 in the lower panel of *Table 14*. These values correspond to 20% and 80% of the corresponding coefficient estimated in *Table 9*, respectively. The dgp allows for measurement error in culture, and assumes that the system given by equations (1) and (2) above is recursive – i.e. it assumes no correlation between the error terms in the output and in the culture regressions (according to the estimated residuals, the system is almost recursive).

I then consider four cases: (i) both historical variables are valid instruments for culture (i.e. they are both uncorrelated with the residuals of the output regression). This corresponds to the first row in the upper and lower panels of *Table 14*. (ii), (iii) One of the two historical variables is a valid instrument for culture, the other is not (the correlation coefficient between the error term in the output equation and one of the two instruments is set to 0.4). These correspond to the second and third rows in the upper and lower panels of *Table 14*. (iv) No historical variable is a valid instrument (both are

correlated with the residual of the output equation, with a correlation coefficient of 0.4). This corresponds to the last row in the two panels of *Table 14*.

In cases (ii)-(iii), instrumental variables lead to biased estimates. Indeed, this is what we find. The bias, expressed as a percentage of the true coefficient, ranges from about 80% when the true coefficient is small (the upper panel of *Table 14*), to about 20% when the true coefficient is bigger (the lower panel of *Table 14*). In these two cases, the Sargan statistics should detect that one of the two instruments is not valid. It does so almost 70% of the time in the upper panel, where the bias is larger. But when the bias is smaller (because the true coefficient is larger), the Sargan statistics exceeds the critical value of 3.84 only about 60% of the time – cf. the lower panel. Moreover, the Sargan test finds it easier to reject (correctly) when *literacy* is a valid instrument, while invalidity of *pc_institutions* as an instrument is harder to detect.

Overall, these simulations are not too disturbing. When the bias in the instrumental variable estimates is large, the Sargan statistics is not unreliable and rejects often when it should. 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, as illustrated in the last row of both panels in *Table 14*, the Sargan statistics almost never rejects when both instruments are not valid, despite a very large bias. This is no surprise, but it is an important reminder that, to be confident about the implications of the Sargan 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 Sargan statistics 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). This concern is made more serious by the fact that income and culture are measured at the same point in time. Unfortunately, measures of culture are not readily available for earlier time periods at a European level.

Nevertheless, much of the relevant variation in history, culture and development comes from the Italian regions. And for Italy, I could find a variable that reflects cultural attitudes of earlier time periods. In 1946, Italy held a popular referendum in favour or against the monarchy. At the time, the monarchy was widely blamed for not preventing the dictatorial regime in the pre-war period. Hence, a vote in favour of the monarchy was

likely to reflect backward cultural values, associated with mistrust of democratic institutions or nostalgia for the autocratic regime. As a measure of cultural backwardness in the immediate post-war period, I thus use the percentage of regional votes in favour of the monarchy at the 1946 referendum (this variable is called *pro-monarchy*). [20]

As shown in *Table 15,* despite the very small number of observations (only 13), the patterns of vote in this referendum is strongly correlated both with the two historical instruments (the literacy rate and historical political institutions), and with contemporaneous measures of culture. In columns 1-3, I regress *pro-monarchy* on the two historical variables, *literacy* and *pc_institutions*, both separately and jointly in the same regressions. When entered separately, both historical variables have a negative and significant estimated coefficient, although when entered jointly there is not enough variation in the data to provide significant estimates. Thus, as expected, historically more illiterate regions and regions with a worst political history, were more likely to vote in favour of the monarchy. In columns 4-5, votes in favour of the monarchy in 1946 are used to explain the contemporaneous measure of culture, *pc-culture*. Again, there is a significant and negative relationship, both when estimated with OLS and when the two historical variables are used as instrument for *pro-monarchy*. Regions that voted in favour of the monarchy in 1946 have worse cultural attitudes today. Thus, not surprisingly, there is persistence in cultural traits. This evidence cannot dispel all doubts, given the small number of observations and the likely measurement error in the variable *pro-monarchy* as indicator of culture. But it supports the view that history has an effect on culture, possibly independent from that development.

7. 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. An active and promising line of research in macroeconomics 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 early political institutions emerge 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

[20] I am grateful to Andrea Ichino for suggesting the use of this variable and for making the data available.

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 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.

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 one’s own 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 are strongly correlated not only with the economic development of European regions, but also with economic development and institutional outcomes in a broad sample of countries. This suggests that the correlations described in this paper are not driven by measurement error or by peculiar features of the data. But the precise interpretation of these cultural indicators is difficult and remains to be studied in greater detail.

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 institutions rests on similar assumptions and similar tests. 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.

An implication of this analysis, therefore, is that there is no primacy of formal institutions over culture. On the contrary, both are likely to interact and to shape the actual functioning of real world institutions, and to influence the incentives and the beavior of economic and political agents. Of course, this paper only scratched the surface of how culture might influence economic performance. 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.

The idea that culture is an important and lasting determinant of economic performance also has relevant policy implications for the regions of Europe. It is still premature to draw firm conclusions from the correlations studied in this paper. But if confirmed by future research, these findings suggest that the low labor productivity of economically backward regions will not go away soon. They also suggests that income transfers and public investment are not a solution, because they don't address the source of the problem. Instead, economically and culturally poor regions are likely to benefit from investments in education, from cheap sources of finance (to facilitate the emergence of local entrepreuneurs), and from decentralization of administrative and political powers (to stimulate the accumulation of social capital). Finally, these findings reinforce the simple but often neglected idea that regions with lower productivity ought to pay lower real wages. A single national wage concentrates unemployment in the poor regions (as it happened in Southern Italy and East Germany), self perpetuating the adverse cultural features that might be at the root of the low labor productivity in these regions.

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A.1 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).

gadp: index of government's anti-diversion policies, measured around 1985. It is an equal-weighted average of these five categories: i) law and order, ii) bureaucratic quality, iii) corruption, iv) risk of expropriation and v) government repudiation of contracts (each of these items has higher values for governments with more effective policies towards supporting production) and ranges from zero to one. Source: Hall and Jones (1999).

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 below.

institutions_average: simple arithmetic average of the five variables measuring constraints on the executive at the five different points in time.

institutions_weighted: weighted average of the five variables measuring constraints on the executive at the five different points in time, computed as follows: *institutions_weighted* = (0.5**institutions_1600* + 0.7**institutions_1700* + 0.8**institutions_1750* + 0.9**institutions_1800* + *institutions_1850*)/(0.5+0.7+0.8+0.9+1)

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 below.

log-mortality : log of mortality of European settlers in colonies around the world. Source: Acemoglu, Johnson and Robinson (2001)

logyl: natural log of output per worker, measured in 1988. Source: Hall and Jones (1999)

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.

pro-monarchy: percentage of votes in favour of the monarchy in the Italian referendum held in 1946. Source: Ufficio Elettorale del Ministero degli Interni, data collected by Andrea Ichino, European University Institute, Florence.

protestant: percentage of the population in each country professing the Protestant religion in 1980. Source: La Porta et al. (1998).

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.

sum_culture: sum of the three positive beliefs (*control, respect, trust*) minus the negative belief (*obedience*).

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).

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).

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

A.2 Historical appendix: data on literacy

Belgium: percentage of population over 6 years old able to read and write 1880. Source: Flora(1983).
Britain and Wales: percentage of brides and grooms signing the Marriage Register in 1870. Data were disaggregated by counties and were aggregated using the county population statistics in 1870 contained in Mitchell(1988). Source: Stephens(1973).
France: percentage of population over 6 years old able to read and write (in 1872). Source: ICPSR 0048 (2001).
Germany: percentage of population able to read in 1871. Source: Cipolla(1969).[21]
The Netherlands: data extrapolated from literacy of military recruits (percentage of recruits able to read) around 1870. The extrapolation was obtained from a regression of the available literacy data on the variable literacy of recruits in Austria, Belgium, France, Germany, Italy (data aggregated at country level).
Ireland: percentage of population over 10 years old able to read in 1880. Source: Flora(1983).
Italy: percentage of population over 6 years old able to read in 1881. Source Flora(1983).
Portugal: percentage of population over 7 years old able to read and write in 1890. Data not regionally disaggregated. Source: Cipolla(1969).
Scotland: percentage of brides and grooms signing the Marriage Register in 1880. Source: Flora(1983).
Spain: percentage of population over 10 years old able to read and write in 1877. Source Núñez(1990).[22]

A.3 Historical Appendix: data on urbanization rates in 1850

Except for three regions (Madeira, Azore Islands and Canary islands), the size city data are from Bairoch, Batou and Chèvre (1988).

City size data for Madeira (apart from Ponta Delgada), Azore Islands and Canary islands are from the University of Utrecht population statistics database (http://www.library.uu.nl/wesp/populstat/populhome.html)

Regional population data are from the University of Utrecht population statistics database (http://www.library.uu.nl/wesp/populstat/populhome.html), which in turn relies the following specific sources:

Belgium	Year: 1862 estimate, Source: Almanach de Gotha
France	Year: 1861 census, Source: French Statistical Institute INSEE
Germany	Year: 1867 estimate, Source: Almanach de Gotha

[21] For the cities of Bremen and Hamburg we took the simple arithmetic average of their respective regions (Hannover and Schleswig-Holstein). The correspondence between the regions in the dataset and the regions in the source data is the following: Hessen: Hessen-Nassau; Niedersachsen: Hannover; NordRhein-Westfalen: Vestfalia; Rhineland-Pfalz: Rhineland; Schleswig-Holstein: Schleswig-Holstein. For the regions Baden-Wuerttemberg and Bayern we took a simple arithmetic average of Cipolla's data, excluding the most eastern regions of the Prussian Kingdom which are not part of today's Germany. Data for East Germany is given by the simple arithmetic average of the Prussian regions which approximately constitute today's eastern German part (Brandburg, Pomeran, Sachsen).
[22] The correspondence between the regions in the dataset and the regions in the source data is the following (excepts regions which had the same name): Asturias-Cantabria: Astur; Pais Vasco: Basque Country; Navarra-Rioja: Navarra; Castilla-Leon: Old Castilla+Leon; Castilla-La Mancha: New Castile; Extremadura: New Castile; Comunidad Valencia: Levante; Andalucia: Western+Eastern Andalusia; Murcia: Levante. Whenever two regions needed to be aggregated, since we had no data on population, we used a simple arithmetic average.

Italy	Year: 1861 census, Source: Almanach de Gotha
Netherlands	Year: 1859/60 census, Source: Almanach de Gotha
Portugal	Year: 1862 estimate, Source: Almanach de Gotha
Spain	Year: 1860 census, Source: Almanach de Gotha
U.K.	Year: 1861 census, Source: Almanach de Gotha

A.4 Historical appendix: data on political institutions

A.3.1 Constraints on the executive

Our measure of political institutions refers to the variable "constraint on the executive" in the POLITY IV dataset. This variable ranges from 1 to 7, with higher values corresponding to more checks and balances on executive powers and a more accountable executive.

A value of 1 corresponds to a situation in which there are no regular limitations on the executive's actions (as distinct from irregular limitations such as the threat or actuality of coups and assassinations). To quote from POLITY IV : "Absolutist monarchies, regardless of their openness to public dissent or respect for civil liberties, are typically coded here. In other words, this code is not used to differentiate between benevolent absolute monarchs and malevolent ones. So long as constraints on their power are non-existent, it is coded here."

A value of 3 describes executives that face real but limited constraints. For instance, there is a legislative body which has more than just consultative functions, but can also delay implementation of executive decrees, or can initiate some categories of legislation.

A value of 5 corresponds to an executive having more effective authority than any accountability group but subject to substantial constraints by them. Examples are a legislature that often modifies or defeats executive proposals for action; a council or legislature that sometimes refuses funds to the executive; an accountability group that makes important appointments to administrative posts.

Finally, a value of 7 corresponds to a situation in which accountability groups have effective authority equal to or greater than the executive in most activity. Most consolidated democracies fall in this category.

The values of 2, 4 and 6 correspond to transitions between the above situations.

A.3.2 General sources and criteria

Our first task was to account for the territorial changes that took place in Europe between 1600 and 1850. In doing that we referred mainly to the historical maps provided in G. Duby (2001) and J. and A. Sellier (2002).

When regions did not have substantial political autonomy, we assigned to all regions in the same country the value of constraints in the executive coded by POLITY IV (if available) or by Acemoglu et al. (2002). This procedure took care of France, the Netherlands, Belgium, Portugal and most of Spain and of the UK. Northern Ireland was given the same values Acemoglu et al. (2002) give to Ireland.

In all other cases, we coded the variable "constraints on the executive" ourselves, with the same criteria used in POLITY IV and considering the historical situation in a 40 year window around each date. For example to assign the values of constraints on executive in 1700, we considered the situation from 1680 to 1720. This is the same procedure used by Acemoglu et al. (2002).

Below we summarize some of the main stylized facts on which we based our coding decisions, when we could not rely on Acemoglu et al. (2002) nor on POLITY IV.

A.3.3 Italy in 1600, 1700 and 1750

Our main sources for this period are Galasso (1972), (1976) and Enciclopedia Italiana Treccani.

State of Milan.

From 1535 to 1713, the State of Milan was part of Charles V's Empire, and at his abdication (1555) it passed under the control of the Spanish Monarchy. During this period Milan lost political autonomy in foreign affairs, although it maintained its own legal and administrative structures, at least to some extent. In 1541, the Emperor Charles V promulgated the "*New Constitutions*". This act should not be read just as an attempt to centralize the political structure of the Lombard dominion and reduce its autonomy. Lombard jurists drafted the Chart on the basis of local legal traditions and when Charles adopted it, he acted like a successor of the Sforza and a caretaker of the local traditions. Charles V and his Spanish successors intervened to control the functioning of the Milan administration and to guarantee the obedience of their subjects; but they did that mainly when they had to deal with specific and concrete financial or military issues. Charles V and his Spanish successors left the administrative structures of Milan substantially as it was in 1535.

The State was organized in provinces that had large autonomy in matter of economic policies, taxation, public order and roads. Because of their long tradition of autonomy, the central government did not exert strong control on the provinces. At the level of central government, power was shared between the offices controlled by the Spanish Monarchy and those derived from the ducal age. The office more directly controlled by Spain was the Governor. This king's *"alter ego"* was at the top of the administrative structure in Milan and had the authority of promulgating or changing laws. The Governor was usually in charge for few years and was mainly absorbed in military issues. He had to deal with the local collective bodies, first of all the Senate. These collective bodies had a deep knowledge of the Lombard reality and managed to defend their own prerogatives. The Senate had strong powers in implementing the law and the king's pardons, and was able to exert strong influence on the whole legislation. The senate often refused to implement the Governor' s deliberations, appealing against them to the king's final decision. In this way, the Senate was often able to stop the Governor acts. This situation gave room to large autonomy and even to insubordinations to his authority. Since the beginning of the Spanish domination, there was strong disagreement between Milan local institutions and the Governor every time he tried to limit their powers. Philip the Second in 1580 tried to limit some large discretionary powers of the Senate, especially in the field of pardon implementation or law interpretation. But even after this attempt, the Senate remained a strong check on the Governor's authority. The other Spanish kings respected existing local institutions and tried to maintain an equilibrium between the Governor and the Senate. They also looked for cooperation with local elites, without which it would have been too difficult to govern the State of Milan.

Under the Utrecht Treaty of 1713, Milan passed to the Austria Monarchy. But until 1760, any Crown's attempt to modify the institutional and administrative structure of the State failed. Thus, the internal equilibrium of power remained the same as it had been for centuries.

In the 1760s Vienna, under Maria Teresa, showed a strong will to strength its royal authority and to discipline local powers. Since 1765, supreme magistracies (including the Senate) were deprived of important prerogatives, and the local elites lost substantial influence over the State. An irreversible process of change took place. In 1765 a Supreme Council of the Economy was founded, that looked like the symbol of Hapsburg absolutism. The Supreme Council exerted huge power in controlling economic

and financial affairs and was completely subordinated to the government authority, in spite of the secular autonomist tradition of the ancient magistracies.

The building up of the new State went on until 1790, also under Maria Teresa's successor Giuseppe II. He was strongly committed to make the rules of the whole Austria's dominions similar and to absorb local powers in a hierarchical bureaucracy, so as to eliminate even the last traces of self-organization within the society. In Milan this process peaked with the suppression of the Senate (1786), for many centuries symbol of the Lombard autonomy.

Reflecting this evolution, this is how we coded the variable "constraints on the executives" in Lombardy up to 1750. We assigned a value 3 in 1600 and 1700 because of the existence of some real constraints over executive power, and 2 in 1750 to account for the transition towards an absolutistic regime, completely established later in the XVIII century.

Piedmont.

Since the beginning of the XVII century, the Savoia' s Monarchy was nearly autocratic. Court aristocracy, for instance, formed the Secret Council, but this Council was practically without any political relevance. The Monarchy became even more absolutistic under king Vittorio Amedeo II, from the Utrecht peace (1713) to the year of his abdication (1730). Vittorio Amedeo' s absolute Monarchy was very similar to the classical French model of Louis XIV, with strong central bureaucratic structures. The provincial intendants linked central government and local communities, fighting local particularities and imposing a high degree of administrative homogeneity. During this consolidation period, the village assemblies stopped working and local communities lost their residual autonomy, adopting the administrative frameworks suggested and imposed by the central authorities. The three Senates of Piemonte, Chambéry and Nizza did not represent a threat for the monarchic absolutism, but were a source of Crown's high bureaucrats. The State, characterized by autocratic paternalism at the top and by passivity and obedience at the bottom, became a typical example of an absolute monarchy. Such an institutional set up, improved and made more efficient by Vittorio Amedeo' s successors, lasted for the whole XVIII century.

We gave Piemonte a value of 2 in 1600 and 1700 and of 1 in 1750; by this last date the absolutistic regime was perfectly set up.

Tuscany

Under Cosimo I de Medici (1537 -1574) the building up and consolidation of an absolute State gradually took place in Tuscany. The new Prince tried to build up a monarchic State similar to those prevailing in Europe, while at the same time preserving some aspects of the older republican institutions and norms. The main breakdown with the past was the attribution of the legislative power to the Prince. The Constitution of 1532 was still in force and stipulated that the the Council ("*Il Consiglio dei 200*") and the Senate ("*Il Senato dei 48*") would take part in the legislative process and in law implementation. These two collective bodies lasted for the whole Medici regime. They also elected some important magistracies. Even though the Prince formally respected the prerogatives of the Senate and of the Council', he ended up by concentrating the legislative power in his hands. To some extent, Ferdinado I (1587 – 1609) mitigated the centralizing process initiated by his father Cosimo I. In a framework of partial liberalization, he gave more relevant power to the "*Consulta*". The main task of this body, formally established in 1550, was to admit appeals against ordinary magistracy sentences and to give advice on law formulation and elaboration. Ferdinado I promoted also a wider citizen participation in local magistracies. This institutional framework

remained substantially unchanged up to the end of the Medici regime (1737). In 1737 Tuscany passed to the Lorena's dynasty, and especially when Pietro Leopoldo came to the throne (1765) it fell under the dependence of the Austrian Crown.

We assigned a value of 2 to Tuscany in 1600 and 1700, in consideration of the gradual building up of an absolutistic regime. In 1750 we gave the same value Acemoglu et al. (2002) assign to Austria, namely 1.

Papal State

Since the end of the XVIth century, the Papal State was like an absolute monarchy. Similarly to what happened in other European countries, there was a process of increasing administrative centralization and of more relevant governmental control over peripheries. Yet, the Papal State was not able to reach a really homogenous institutional structure. The Northern Legation of Bologna, Ravenna, Forlì and Ferrara had more autonomy: many laws (for instance fiscal or custom rules) were implemented with exceptions and derogations concerning this area. In particular Bologna, the second town of the State, played an important role as leader of the whole Legation area. On the basis of "Capitula" of 1447, the city was ruled by a diarchy made of a Legate of the Pope and of a large and representative Senate. Bologna was able to maintain a special regime of local magistracies, in charge of justice administration and fiscal legislation. The city of Ferrara too was ruled by a Papal Legate and by a Council of 100 citizens, but here the Papal Legate was able to exercise more power.

In 1600, 1700 and 1750 we assign to the northern region of the Papal State (Emilia – Romagna) a value of 2, and to the remaining ones (Lazio, Umbria and Marche) a value of 1.

Venice

The Doge was the leader of the Republic of Venice and one of its most relevant political institutions. Even thought he was chosen by means of sophisticated elections, he was appointed for life. His power was constrained by several checks and balances. The Doge presided over the most important Councils of the Republic, but only together with his Advisors and the three Chiefs of "*La Quarantìa*". These individuals formed a body called "*La Serenissima Signoria*". The Doge could convene a meeting of the most important Republican Councils only with the agreement of "*La Serenissima Signoria*".

The sovereign power over the Republic was up to "*Il Maggior Consiglio*", the assembly of Venice's elite. All laws became effective only after ratification by this Council. The Council also elected several magistrates and members of other collective bodies, such as the Senate, "*Il Consiglio dei X*" and "*I Procuratori di San Marco*". This last body had the judiciary task of safeguarding the Republic's political and institutional system. Over time, the Senate acquired growing relevance and played a key role in the Venice's political life.

To account for a regime in which the executive had effective power but was subject to substantial constraints and was accountable to other collective bodies, we assigned to Venice a value of 5 in 1600, 1700 and 1750.

Republic of Genoa

In 1576 the Republic of Genoa provided itself with a new Constitution, which was in force until 1797. The executive power was shared between the Doge (appointed for two years) and a collective body made up of two Councils, " *I Collegi*". To avoid authoritarian risks, the new Constitution imposed stronger limits on their power than in the past. The competence on penal matters was subtracted to the executive organs and granted to an independent one, "*La Rota Criminale*". The Constitution increased the

powers of the two Councils (Lower and Upper). The Lower Council, made up of 100 members, acquired increasing relevance under the new constitution: it approved legislation and it took decisions on the most important political issues of the Republic. The Lower Council designated the so called "*Thirty Electors*", that in turn had to choose the members of the two Councils, at the moment of their renovation. The ancient magistracy ("*I Supremi Sindacatori*") also had outstanding relevance in this constitutional framework. They controlled each Governor after he left office, and acted as a Constitutional Court controlling the decisions of the two Councils – although in the end the Lower Council had the final word.

We can consider Genoa as having an institutional framework in which the authority of the executive is relevant but at the same time subject to real checks and balances and some accountability. Accordingly, we coded Genoa with a value of 5 in 1600, 1700 and 1750.

The Kingdom of Naples

Since 1600 the Kingdom of Naples was an absolutistic and autocratic monarchy. We give it a value of 1 for all the period under consideration.

A.3.4 Italy in 1800 and 1850

To code constraints on the executive in 1800 in Italy we focused mainly on the historical events of Napoleonic period. As general rule, we coded the Italian regions with 1, because after complex vicissitudes they fell directly or indirectly under Napoleone' s control. Nevertheless, we gave a value 2 to Lombardy, Emilia–Romagna and Liguria, to account for the brief republican experiences they lived in this lapse of time. For instance, in 1796 Cispadana and Transpadana Republics were created respectively in Lombardy and Emilia-Romagna. In 1797 they merged into the Cisalpina Republic, which survived until 1802[23]. The Republic of Liguria, established in 1797, lasted until 1805 when it was annexed to the French Empire.

Italy became a unified and independent State in 1861. To code constraints on executive in 1850, we focused on the so called Restoration period. Using the information provided by Polity IV, we coded Tuscany, the Papal State and the Two Sicilies with 1; Piemonte and Liguria, which were part of the Kingdom of Sardinia, were coded as 3[24]. Autocratic regimes, established by the Council of Vienna of 1815, ruled the remaining Italian States, so we gave them value of 1 in 1850.

A.3.5 Germany

During these centuries, Germany consisted of several territorial entities, in many cases difficult to relate to present-day Landers. As general rule, German Landers were coded with a value of 1 in 1600, 1700, 1750, 1800 and 1850, following Acemoglu et al.(2002). But there are some exceptions, namely some territorial entities not characterized by autocratic institutions and that we can clearly relate to today Landers. For some of these entitities, we have information provided by Polity IV dataset. Our sources on Germany are Asch (1988), Vierhaus (1988) and Graves (2001).

Baden-Wurttemberg

[23] In this year the Cisalpina Republic became the so called Italian Republic, that survived until 1805.

[24] The Isle of Sardegna was part of the this Kingdom too. But in our dataset we consider Sicilia and Sardegna as one territorial entity (too few observations on culture are available to code Sardinia as a separate entity).

During the period under consideration, Baden and Wurttemberg were two distinct territorial entities. The values assigned to the current Lander of Baden-Wurttemberg are the simple average of those we gave to each of part.

Following Acemoglu et al.(2002), we coded Baden as 1 in the years 1600, 1700, 1750 and 1800. Following Polity IV we code it as 3 in 1850 (Polity IV gives Baden a 3 between 1819 and 1871).

Wurttemberg had more advancec political institutions. After the Thirty Years War (1648) Germany experienced a general decline of territorial Estates and a strengthening of autocratic regimes. But the Assembly of Wurttemberg (*Landtag*) was able to preserve its political position in the seventeenth and eighteenth centuries. This Assembly was made up of delegates of the towns and of protestant prelates; it mainly had the right to approve taxation and to control the fiscal management. Permanent parliamentary committees worked whenever the full assembly was not summoned. These bodies not only had fiscal and administrative competences, but also played an important rule in the decision-making about governmental and economic matters. The Wurttemberg' s *Landtag* was thus able to exert real constraints over the executive power[25]. We thus assigned a value 3 to Wurttemberg in 1600, 1700, 1750 and 1800. Polity IV assigns to Wurttemberg a value of 5 between 1819 and 1871. Thus, we coded Wurttemberg as 5 in 1850.

Bayern

After the early XVIIth century, the Assembly of Bayern became ineffective and under ducal control. Following Acemoglu et al. (2002), we thus assigned a value of 1 to Bayern for 1600, 1700 and 1750. The values of 1 and 3 for 1800 and 1850 respectively derive from information provided by the Polity IV dataset.

Bremen-Hamburg

The two Landers of Bremen and Hamburg are considered as one entity in our data set. The values assigned to Bremen-Hamburg are the simple average of those given to each part.

Bremen and Hamburg were two of the few free cities (*Freiestadt*) that survived until the XIX century and entered the German Confederation in 1815. Free cities had to pay taxes directly to the Empire. They were usually ruled by magistrates, althought their sovereignty could vary from one city to an other. Political power was generally in the hands of the patriciate or more often of guildes. For instance, Bremen established an aristocratic constitution in 1433, that gave power to the local patriciate. In Hamburg, a council of delegates of guildes of merchants and artisans shared the political power with the ancient aristocratic Senate since the XVI century. We coded Bremen and Hamburg as 3 in 1600, 1700, 1750 and 1800.

In 1815, Bremen established a republican constitution that provided separation of power and an aristocratic system of designation to public offices by cooptation. Legislative power was up to an elected Council of Citizens (*Burgerschaft*), made up of 150 members. A 16 member Senate exercised the executive power. The Council elected its members under instruction of the Senate itself. We thus assigned a value of 5 to Bremen in 1850. As we don't have evidence of relevant institutional change in Hamburg over the same period, we retain the value of 3.

[25] Polity IV codes Wurttemberg from 1800 to 1818 as 3.As we have no evidence of striking institutional changes at the beginning of the XIX century in comparison with the two previous centuries, this confirms our coding. In 1819 a new constitution was established in Wurttemberg, and after this year Polity IV gives it a value of 5.

Hessen

The Assembly of Hessen was quite powerful in the distant past and further increased its relevance at the end of XVI century. Like other German principalities, Hessen experienced several religious conflicts, which weakened the regime of Maurice of Hesse–Cassel (1592 – 1627). He thus became increasingly dependent on the support of the Estates for defence and military matters, and for taxation. In 1627 eventually he was forced by the Assembly to abdicate in favour of his son William V (1627 – 1637). To account for these checks and balances, we assigned to Hessen a value of 3 in 1600.

Over time the Estates lost their authority because of conflicts and divisions between towns and nobility. After 1655, this enabled William IV to unilaterally impose taxes in emergencies and, when convenient, to ask the Assembly for retrospective consent. Following Acemoglu et al. (2002), we assigned to Hessen value a value of 1 in 1700, 1750, 1800 and 1850.

A.3.6 Spain

Our sources for Spain are Graves (2001), Ortiz (1988), Menedéz Pidal and Jover Zamora (1987). As general rule we assigned to the Spanish regions the same values that Acemoglu et al.(2002) give to Spain. Nevertheless, in the XVII century there were some relevant differences between Castile and other Spanish regions, namely the eastern kingdoms of Aragon (Aragon, Catalonia and Valencia). These three regions integrated in the Spanish Crown maintaining their own laws, organization and institutions. In particular these regions preserved their own Parliaments, the "*Cortes*", as guarantors of local freedoms and prerogatives. In the kingdoms of Aragon, people usually thought about the monarchic power as a contractual one, so any Castile' s king had to comply with "*constitutions*" or "*fueros"* of these regions. These constraints over the royal sovereignty, especially in the fiscal and military fields, stood against the absolutistic tendencies prevailing at that time in Spain, sometimes giving rise to episodes of tension and conflict[26]. The Cortes not only had some veto powers over taxation, but had other important legislative prerogatives. Since the basis of the royal power was contractual, the kings could enact laws only with the consent of the Cortes of Aragon. In the XVII century the relevance of these Cortes was declining in comparison to the previous centuries, and the Spanish kings did not summon them very often. Nevertheless, when they met, the Cortes kept dealing with fiscal, political and legislative matters. Moreover, each of the Cortes of the kingdoms of Aragon had permanent committees (called "*Diputaciòn*" or "*Generalitat*") endowed with fiscal competences. Over time, these permanent committees acquired also political and economic relevance and often acted as caretakers of local liberties. To account for this institutional framework of the kingdoms of Aragon, we assigned value 3 in 1600 to the Spanish regions of Aragon, Catalonia and Valencia.

At the beginning of the XVIII century, the ancient institutions of the three kingdoms of Aragon were abolished. To account for this period of transition towards autocratic regimes, we assigned to the regions of Aragon, Catalonia and Valencia the value 2 in 1700.

In all subsequent dates, all Spanish regions are given the same values that Acemoglu et al. (2002) give to Spain.

[26] We can mention the crisis between Aragon and Spanish Crown in 1592, the refuse of Cortes of Catalonia to consent to taxation in 1626, the rebellion that occurred again in Catalonia in 1640-1659, and finally the less known and relevant successes of Valencia in 1645-1648.

Table 1 – Correlation among cultural variables

	pc_culture	*pc_culture_pos*	*pc_children*	*sum_culture*	*trust*	*control*	*respect*
pc_culture_pos	0.82						
pc_children	0.81	0.46					
sum_culture	0.99	0.82	0.80				
trust	0.60	0.65	0.11	0.62			
control	0.32	0.60	0.03	0.31	0.06		
respect	0.55	0.56	0.74	0.55	0.05	0.03	
obedience	-0.65	-0.12	-0.74	-0.64	-0.11	-0.01	-0.10

N. observations: 20902

Table 2 – Culture in the 1990s

Country	*Region*	*trust*	*control*	*obedience*	*respect*	*pc_culture*	*pc_culture_pos*	*pc_children*	*sum_culture*
Belgium	VLAAMS GEWEST	37.72	60.17	42.69	71.79	-12.43	-9.80	-14.52	127.00
Belgium	REGION WALLONNE	28.87	63.26	29.93	54.56	-21.76	-32.58	-24.68	116.76
Belgium	REG.BRUXELLES-CAP./BRUSSELS HFDST.GEW.	26.90	64.08	25.55	71.43	1.46	-14.80	9.82	136.85
France	ILE DE FRANCE	26.22	58.98	55.14	76.76	-37.17	-20.34	-24.37	106.82
France	NORTH FR	17.05	58.55	46.15	79.12	-34.09	-32.88	-7.35	108.56
France	EAST FR	19.19	59.93	50.47	75.70	-38.00	-21.26	-19.33	104.36
France	WEST FR	26.72	58.45	50.00	79.58	-26.49	-20.45	-12.19	114.75
France	SOUTH WEST FR	30.19	56.08	54.13	77.98	-33.17	-19.98	-20.86	110.13
France	SOUTH EAST FR	24.79	56.65	53.66	85.37	-29.04	-19.84	-7.86	113.14
France	MEDITERREAN FR	22.00	59.91	59.05	79.05	-40.93	-24.64	-26.24	101.91
France	PARIS BASIN EAST/WEST	14.18	57.61	52.14	72.14	-56.69	-49.99	-27.70	91.79
Italy	PIEMONTE - VALLLE D'AOSTA	37.76	60.84	28.29	72.37	11.45	-5.68	7.40	142.68
Italy	LIGURIA	37.69	64.35	25.00	74.29	17.75	5.74	15.39	151.33
Italy	LOMBARDIA	44.30	63.12	19.84	70.85	24.94	5.29	17.18	158.43
Italy	TRENTINO ALTO ADIGE - VENETO - FRIULI VENEZIA GIULIA	48.96	65.72	25.70	82.33	40.49	31.25	27.78	171.31
Italy	EMILIA-ROMAGNA	30.84	62.22	25.45	73.64	9.98	-9.57	13.65	141.25
Italy	TOSCANA	35.53	49.69	36.71	70.89	-30.00	-45.67	-7.33	119.39
Italy	UMBRIA - MARCHE	35.94	56.00	36.43	68.22	-20.46	-30.22	-11.38	123.72
Italy	LAZIO	27.70	64.07	35.90	66.03	-23.12	-26.47	-14.25	121.91
Italy	CAMPANIA	28.01	62.90	45.69	48.56	-50.73	-45.25	-57.62	93.79
Italy	ABRUZZI - MOLISE - BASILICATA	29.31	50.29	24.19	75.81	-10.64	-39.09	19.10	131.22
Italy	PUGLIA	29.17	65.40	35.14	56.76	-30.81	-31.44	-28.59	116.19
Italy	CALABRIA	37.35	54.34	45.35	59.30	-34.74	-37.62	-39.22	105.64
Italy	SICILIA - SARDEGNA	26.87	59.68	32.27	61.82	-25.67	-39.82	-15.99	116.09
Netherlands	NOORD NEDERLAND - GRONINGEN	47.30	60.00	34.21	81.58	18.52	14.33	14.14	154.67
Netherlands	OOST NEDERLAND	64.14	53.69	35.90	92.31	47.20	36.04	29.57	174.24
Netherlands	WEST NEDERLAND	53.16	58.64	30.54	86.63	37.49	26.00	27.90	167.89
Netherlands	ZUID NEDERLAND	50.00	57.18	33.45	86.48	28.16	18.83	23.41	160.21
Portugal	NORTE	21.15	59.55	56.07	65.03	-56.56	-41.43	-45.28	89.65
Portugal	CENTRO (P)	19.71	63.32	50.00	65.71	-46.06	-33.24	-35.30	98.74
Portugal	LISBOA E VALE DO TEJO	22.77	63.20	38.14	68.59	-25.35	-26.89	-13.24	116.42
Portugal	ALGARVE	26.09	63.16	39.13	79.35	-9.08	-8.82	3.26	129.47
Portugal	ALENTEJO	17.78	61.24	51.58	66.32	-45.33	-37.83	-36.60	93.75
Portugal	MADEIRA	23.85	60.86	65.77	63.06	-65.13	-36.17	-62.68	82.01
Portugal	AZORE ISLANDS	19.54	58.79	43.82	65.17	-42.16	-43.76	-27.21	99.67
Spain	GALICIA	31.03	62.92	40.36	78.50	-5.39	-3.23	0.09	132.09
Spain	ASTURIAS-CANTABRIA	31.86	61.26	49.11	76.79	-17.87	-9.25	-15.54	120.81
Spain	PAIS VASCO	40.34	63.40	30.84	80.80	21.61	13.82	17.75	153.70
Spain	NAVARRA - RIOJA	41.13	68.48	36.99	71.92	6.54	12.47	-6.01	144.55

Country	*Region*	*trust*	*control*	*obedience*	*respect*	*pc_culture*	*pc_culture_pos*	*pc_children*	*sum_culture*
Spain	ARAGON	55.93	60.04	42.98	76.03	14.84	19.46	-7.87	149.03
Spain	MADRID	41.72	64.77	28.09	75.05	21.45	12.69	12.16	153.44
Spain	CASTILLA-LEON	42.20	60.99	34.96	73.35	3.99	-2.00	-0.68	141.57
Spain	CASTILLA-LA MANCHA	32.60	63.18	33.68	74.61	4.77	-1.52	3.30	136.71
Spain	EXTREMADURA	26.39	65.83	46.41	75.82	-21.20	-4.19	-13.22	121.63
Spain	CATALUNA	34.40	60.86	44.91	79.48	-6.74	-1.12	-4.93	129.84
Spain	COMUNIDAD VALENCIANA	24.50	64.48	44.33	79.35	-13.35	-7.22	-4.31	124.00
Spain	BALEARES	23.66	53.13	35.71	81.63	-16.31	-33.56	12.04	122.70
Spain	ANDALUCIA	24.48	66.64	52.91	75.45	-26.58	-6.25	-23.31	113.66
Spain	MURCIA	34.17	61.51	35.38	77.69	-1.96	-5.65	5.95	137.99
Spain	CANARIAS	23.57	67.21	44.51	85.37	-6.67	3.80	5.46	131.63
UK	NORTH UK	26.45	63.74	56.45	80.65	-35.89	-11.79	-19.80	114.38
UK	EAST MIDLANDS	33.58	70.90	46.43	84.29	20.79	36.20	0.86	142.33
UK	EAST ANGLIA	47.41	69.63	53.45	71.55	6.11	31.67	-30.59	135.15
UK	SOUTH EAST UK	39.63	67.51	42.65	84.94	35.25	39.47	7.45	149.43
UK	SOUTH WEST UK	34.25	65.85	41.94	87.10	23.77	29.04	12.09	145.27
UK	WEST MIDLANDS	41.42	60.99	38.87	85.83	33.48	21.14	14.45	149.37
UK	NORTH WEST UK	32.38	65.56	44.80	74.80	-6.46	-3.02	-12.58	127.94
UK	WALES	40.75	66.31	47.26	79.57	6.91	22.63	-8.20	139.38
UK	SCOTLAND	39.24	67.74	52.36	83.62	8.25	28.38	-8.87	138.25
UK	NORTHERN IRELAND	43.62	71.61	55.92	79.93	3.45	36.82	-20.21	139.25
UK	YORKSHIRE AND HUMBERSIDE	34.07	68.11	38.79	83.62	14.85	19.20	10.87	147.01
West Germany	BADEN-WUERTTEMBERG	44.13	67.38	16.59	84.75	51.65	34.38	45.09	179.67
West Germany	BAYERN	34.59	67.62	21.16	76.49	26.39	12.12	24.67	157.54
West Germany	BREMEN HAMBURG	35.53	70.76	10.53	87.37	57.22	36.46	58.28	183.13
West Germany	HESSEN	32.77	65.69	17.86	80.36	33.50	9.66	35.92	160.96
West Germany	NIEDERSACHSEN	43.79	67.83	16.43	83.85	47.57	28.67	43.82	179.05
West Germany	NORDRHEIN-WESTFALEN	39.70	67.86	19.04	80.74	39.81	23.34	34.83	169.26
West Germany	RHEINLAND-PFALZ SAARLAND	42.51	65.95	22.69	82.35	40.71	27.63	32.21	168.13
West Germany	SCHLESWIG-HOLSTEIN	34.19	66.25	16.54	75.94	22.80	3.37	30.47	159.83

Table 3 – Culture and output: OLS estimates, unweighted

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. variable	*yp9500*	*yp9500*	*yp9500*	*yp9500*	*yp9500*	*yp9500*	*yp9500*	*yp9500*
school	0.77	0.51	0.38	0.52	0.49	0.47	0.37	0.78
	(0.40)*	(0.37)	(0.38)	(0.35)	(0.34)	(0.34)	(0.35)	(0.34)**
	(0.19)***	(0.13)***	(0.14)**	(0.10)***	(0.11)***	(0.13)***	(0.12)**	(0.16)***
urb_rate1850	0.71	0.8	0.62	0.74	0.62	0.62	0.61	0.71
	(0.23)***	(0.22)***	(0.23)**	(0.21)***	(0.20)***	(0.20)***	(0.21)***	(0.20)***
	(0.25)**	(0.27)**	(0.23)**	(0.20)***	(0.21)**	(0.21)**	(0.18)**	(0.21)**
control	1.36							
	(0.88)							
	(0.39)**							
trust		0.93						
		(0.42)**						
		(0.53)						
obedience			-0.93					
			(0.45)**					
			(0.64)					
respect				1.64				
				(0.46)***				
				(0.63)**				
pc_culture					0.58			
					(0.14)***			
					(0.17)**			
sum_culture						0.77		
						(0.19)***		
						(0.21)***		
pc_children							0.57	
							(0.17)***	
							(0.27)*	
pc_culture_pos								0.71
								(0.16)***
								(0.11)***
Obs	69	69	69	69	69	69	69	69
Adj R-squared	0.46	0.48	0.47	0.54	0.56	0.56	0.53	0.57

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

Table 4 – Culture and income: OLS estimates, weighted by number of individuals polled in each region

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. variable	*yp9500*	*yp9500*	*yp9500*	*yp9500*	*yp9500*	*yp9500*	*yp9500*	*yp9500*
school	1.51	0.97	0.29	1.18	0.47	0.45	0.33	1.14
	(0.44)***	(0.42)**	(0.48)	(0.35)***	(0.39)	(0.39)	(0.39)	(0.36)***
	(0.38)***	(0.38)**	(0.34)	(0.26)***	(0.13)***	(0.16)**	(0.22)	(0.22)***
urb_rate1850	0.77	0.79	0.59	0.8	0.64	0.66	0.61	0.75
	(0.23)***	(0.22)***	(0.22)***	(0.20)***	(0.20)***	(0.20)***	(0.19)***	(0.20)***
	(0.33)*	(0.35)*	(0.28)*	(0.25)**	(0.29)*	(0.29)*	(0.21)**	(0.32)*
control	1.4							
	(1.28)							
	(0.58)**							
Trust		0.88						
		(0.45)*						
		(0.58)						
Obedience			-1.42					
			(0.44)***					
			(0.42)**					
Respest				2.13				
				(0.48)***				
				(0.36)***				
pc_culture					0.71			
					(0.15)***			
					(0.15)***			
sum_culture						0.87		
						(0.19)***		
						(0.19)***		
pc_children							0.86	
							(0.17)***	
							(0.28)**	
pc_culture_pos								0.83
								(0.20)***
								(0.12)***
Obs	69	69	69	69	69	69	69	69
Adj R-squared	0.46	0.48	0.53	0.58	0.60	0.60	0.61	0.58

Standard errors in parentheses (above: OLS; below: clustered, allowing for arbitrary correlations within countries)
* significant at 10%; ** significant at 5%; *** significant at 1%
Estimation method: OLS weighted by numbers of individuals polled in each region. Country dummy variables are always included

Table 5 – Income, culture and institutions across countries

Dep. variable	(1) *logyl*	(2) *gadp*	(3) *pc_culture*	(4) *logyl*	(5) *gadp*	(6) *pc_culture*	(7) *logyl*	(8) *gadp*
pc_culture	1.44	0.34		1.23	0.41		4.68	0.70
	(0.26)***	(0.05)***		(0.41)***	(0.08)***		(1.41)***	(0.25)**
protestant			0.94					
			(0.17)***					
log-mortality						-0.18		
						(0.07)**		
Estimation	OLS	OLS	OLS	2SLS	2SLS	OLS	2SLS	2SLS
Obs.	46	47	58	46	47	20	20	20
Adj.R2	0.40	0.51			0.49	0.25		

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
column 3 is the first stage specification for columns 4 and 5
column 6 is the first stage specification for columns 7 and 8

Table 6 – Constraints on the Executive (1600-1850) and first principal component

Country	*Region*	*institutions_1600*	*institutions_1700*	*institutions_1750*	*institutions_1800*	*institutions_1850*	*Pc_institutions*
Belgium	VLAAMS GEWEST	2	2	2	4	5	0.265
Belgium	REGION WALLONNE	2	2	2	4	5	0.265
Belgium	REG.BRUXELLES-CAP./BRUSSELS HFDST.GEW.	2	2	2	4	5	0.265
France	ILE DE FRANCE	1	1	1	4	5	-0.613
France	NORTH FR	1	1	1	4	5	-0.613
France	EAST FR	1	1	1	4	5	-0.613
France	WEST FR	1	1	1	4	5	-0.613
France	SOUTH WEST FR	1	1	1	4	5	-0.613
France	SOUTH EAST FR	1	1	1	4	5	-0.613
France	MEDITERREAN FR	1	1	1	4	5	-0.613
France	PARIS BASIN EAST/WEST	1	1	1	4	5	-0.613
Italy	PIEMONTE - VALLLE D'AOSTA	2	2	1	1	3	-1.061
Italy	LIGURIA	5	5	5	2	3	2.049
Italy	LOMBARDIA	3	3	2	2	1	-0.370
Italy	TRENTINO ALTO ADIGE - VENETO - FRIULI VENEZIA GIULIA	5	5	5	1	1	1.420
Italy	EMILIA-ROMAGNA	2	2	2	2	1	-0.994
Italy	TOSCANA	2	2	1	1	1	-1.469
Italy	UMBRIA - MARCHE	1	1	1	1	1	-2.093
Italy	LAZIO	1	1	1	1	1	-2.093
Italy	CAMPANIA	1	1	1	1	1	-2.093
Italy	ABRUZZI - MOLISE - BASILICATA	1	1	1	1	1	-2.093
Italy	PUGLIA	1	1	1	1	1	-2.093
Italy	CALABRIA	1	1	1	1	1	-2.093
Italy	SICILIA - SARDEGNA	1	1	1	1	1	-2.093
Netherlands	NOORD NEDERLAND - GRONINGEN	5	5	5	4	6	3.104
Netherlands	OOST NEDERLAND	5	5	5	4	6	3.104
Netherlands	WEST NEDERLAND	5	5	5	4	6	3.104
Netherlands	ZUID NEDERLAND	5	5	5	4	6	3.104
Portugal	NORTE	2	2	2	2	3	-0.585
Portugal	CENTRO (P)	2	2	2	2	3	-0.585
Portugal	LISBOA E VALE DO TEJO	2	2	2	2	3	-0.585
Portugal	ALGARVE	2	2	2	2	3	-0.585
Portugal	ALENTEJO	2	2	2	2	3	-0.585
Portugal	MADEIRA	2	2	2	2	3	-0.585
Portugal	AZORE ISLANDS	2	2	2	2	3	-0.585
Spain	GALICIA	1	1	1	2	4	-1.260
Spain	ASTURIAS-CANTABRIA	1	1	1	2	4	-1.260
Spain	PAIS VASCO	1	1	1	2	4	-1.260
Spain	NAVARRA - RIOJA	1	1	1	2	4	-1.260

Country	*Region*	*institutions_1600*	*institutions_1700*	*institutions_1750*	*institutions_1800*	*institutions_1850*	*Pc_institutions*
Spain	ARAGON	3	2	1	2	4	-0.314
Spain	MADRID	1	1	1	2	4	-1.260
Spain	CASTILLA-LEON	1	1	1	2	4	-1.260
Spain	CASTILLA-LA MANCHA	1	1	1	2	4	-1.260
Spain	EXTREMADURA	1	1	1	2	4	-1.260
Spain	CATALUNA	3	2	1	2	4	-0.314
Spain	COMUNIDAD VALENCIANA	3	2	1	2	4	-0.314
Spain	BALEARES	1	1	1	2	4	-1.260
Spain	ANDALUCIA	1	1	1	2	4	-1.260
Spain	MURCIA	1	1	1	2	4	-1.260
Spain	CANARIAS	1	1	1	2	4	-1.260
UK	NORTH UK	3	5	6	7	7	3.582
UK	EAST MIDLANDS	3	5	6	7	7	3.582
UK	EAST ANGLIA	3	5	6	7	7	3.582
UK	SOUTH EAST UK	3	5	6	7	7	3.582
UK	SOUTH WEST UK	3	5	6	7	7	3.582
UK	WEST MIDLANDS	3	5	6	7	7	3.582
UK	NORTH WEST UK	3	5	6	7	7	3.582
UK	WALES	3	5	6	7	7	3.582
UK	SCOTLAND	3	5	6	7	7	3.582
UK	NORTHERN IRELAND	2	4	5	6	6	2.278
UK	YORKSHIRE AND HUMBERSIDE	3	5	6	7	7	3.582
West Germany	BADEN-WUERTTEMBERG	2	2	2	2	4	-0.381
West Germany	BAYERN	1	1	1	1	3	-1.685
West Germany	BREMEN HAMBURG	3	3	3	3	4	0.718
West Germany	HESSEN	3	1	1	1	1	-1.449
West Germany	NIEDERSACHSEN	1	1	1	1	1	-2.093
West Germany	NORDRHEIN-WESTFALEN	1	1	1	1	1	-2.093
West Germany	RHEINLAND-PFALZ SAARLAND	1	1	1	1	1	-2.093
West Germany	SCHLESWIG-HOLSTEIN	1	1	1	1	1	-2.093

Table 7 – Correlation coefficients among regions (all variables are expressed in deviations from country means)

	yp9500	*school*	*urb_rate1850*	*literacy*	*pc_institutions*	*pc_culture*	*pc_culture_pos*	*pc_children*
school	0.22							
urb_rate1850	0.41	0.11						
literacy	0.53	0.2	0.25					
pc_institutions	0.41	0.11	0.22	0.34				
pc_culture	0.51	0.20	0.19	0.46	0.53			
pc_culture_pos	0.49	0.04	0.09	0.46	0.59	0.88		
pc_children	0.46	0.16	0.21	0.32	0.45	0.85	0.60	
sum_culture	0.52	0.22	0.19	0.46	0.54	0.97	0.86	0.88

Table 8 - Literacy, political history and output: reduced form estimates

	(1)	(2)	(3)	(4)	(5)
Dep. variable	*yp9500*	*yp9500*	*yp9500*	*yp9500*	*yp9500*
school	0.46	0.54	0.42	0.43	0.43
	(0.50)	(0.36)	(0.49)	(0.49)	(0.49)
	(0.22)*	(0.11)***	(0.20)*	(0.20)*	(0.21)*
urb_rate1850	0.55	0.62	0.49	0.49	0.49
	(0.21)**	(0.22)***	(0.21)**	(0.21)**	(0.21)**
	(0.33)	(0.23)**	(0.29)	(0.29)	(0.29)
literacy	0.94		0.81	0.81	0.81
	(0.24)***		(0.24)***	(0.24)***	(0.24)***
	(0.28)**		(0.23)**	(0.24)**	(0.24)**
pc_institutions		10.71	7.21		
		(3.71)***	(3.71)*		
		(1.32)***	(4.42)		
Institutions_average				9.93	
				(5.14)*	
				(6.02)	
Institutions_weighted					10.33
					(5.50)*
					(6.14)
Obs	67	69	67	67	67
Adj R-squared	0.56	0.51	0.58	0.58	0.57

Standard errors in parentheses (above: OLS; 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

Table 9 – Culture and output: instrumental variables estimates, unweighted

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. variable	*pc_culture*	*yp9500*	*pc_culture*	*yp9500*	*pc_culture*	*yp9500*	*sum_culture*	*yp9500*
urb_rate1850	0.03	0.48	0.02	0.48	0.02	0.48	0.02	0.49
	(0.16)	(0.22)**	(0.16)	(0.22)**	(0.16)	(0.22)**	(0.12)	(0.21)**
	(0.14)	(0.26)	(0.15)	(0.26)	(0.15)	(0.26)	(0.11)	(0.25)*
pc_culture		1.07		1.08		1.09		
		(0.26)***		(0.26)***		(0.27)***		
		(0.34)**		(0.34)**		(0.34)**		
sum_culture								1.38
								(0.33)***
								(0.46)**
literacy	0.48		0.48		0.48		0.35	
	(0.19)**		(0.19)**		(0.19)**		(0.14)**	
	(0.18)**		(0.18)**		(0.18)**		(0.14)**	
pc_institutions	10.16						8.02	
	(2.82)***						(2.14)***	
	(2.24)***						(1.94)***	
institutions_average			13.88					
			(3.92)***					
			(3.28)***					
institutions_weighted					14.41			
					(4.22)***			
					(3.92)***			
Obs	67	67	67	67	67	67	67	67
Adj R-squared	0.76		0.76		0.75		0.78	
F statistics	13.55		13.29		12.76		13.98	
Chi2(1) p-value		0.18		0.19		0.20		0.14

Standard errors in parentheses (above: OLS; below: clustered, allowing for arbitrary correlations within countries)
* significant at 10%; ** significant at 5%; *** significant at 1%
Country dummy variables and *school* are always included in the first and second stage regressions
Estimation method: 2SLS. First stage in odd columns, second stage in even columns.
F statistics is F-test of the excluded instruments. Chi2(1) is the value of the Sargan statistic testing the over-identifying restriction.

Table 10 – Culture and output: instrumental variables estimates, unweighted

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. variable	*trust*	*yp9500*	*obedience*	*yp9500*	*respect*	*yp9500*	*control*	*yp9500*
urb_rate1850	-0.09	0.91	-0.10	-0.10	-0.03	0.70	0.03	0.19
	(0.06)	(0.32)***	(0.06)	(0.48)	(0.06)	(0.21)***	(0.03)	(0.39)
	(0.06)	(0.45)*	(0.05)*	(0.41)	(0.04)	(0.17)***	(0.03)	(0.32)
trust		4.83						
		(1.69)***						
		(1.44)**						
obedience				-5.66				
				(2.19)***				
				(1.61)***				
respect						3.05		
						(0.96)***		
						(0.76)***		
control								10.10
								(3.82)***
								(2.99)***
literacy	0.13		-0.14		0.02		0.06	
	(0.07)*		(0.07)*		(0.07)		(0.04)	
	0.08		(0.04)**		(0.06)		(0.01)***	
pc_institutions	1.99		-1.32		3.69		1.01	
	(1.13)*		(1.13)		(0.99)***		(0.56)*	
	(0.72)**		(0.87)		(0.36)***		(0.25)***	
Obs	67	67	67	67	67	67	67	67
Adj R-squared	0.63		0.76		0.61		0.55	
F statistics	4.47		3.35		7.97		4.00	
Chi2(1) p-value		0.59		0.96		0.003***		0.53

Standard errors in parentheses (above: OLS; below: clustered, allowing for arbitrary correlations within countries)
* significant at 10%; ** significant at 5%; *** significant at 1%
Country dummy variables and *school* are always included in the first and second stage regressions
Estimation method: 2SLS. First stage in odd columns, second stage in even columns.
F statistics is F-test of the excluded instruments. Chi2(1) is the value of the Sargan statistic testing the over-identifying restriction.

Table 11 – Conditional culture and output: instrumental variables estimates, weighted by inverse of SE of conditional culture

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. variable	*cond_pc_culture*	*yp9500*	*cond_pc_children*	*yp9500*	*cond_pc_culture_pos*	*yp9500*	*cond_sum_culture*	*yp9500*
urb_rate1850	-0.06	0.61	0.06	0.5	-0.17	0.76	-0.06	0.62
	(0.14)	(0.21)***	(0.15)	(0.23)**	(0.11)	(0.20)***	(0.12)	(0.21)***
	(0.10)	(0.28)*	(0.13)	(0.27)	(0.07)**	(0.25)**	(0.09)	(0.28)*
literacy	9.67		8.2		9.78		8.06	
	(2.59)***		(2.74)***		(2.04)***		(2.17)***	
	(2.17)***		(1.41)***		(1.77)***		(1.81)***	
pc_institutions	0.57		0.33		0.46		0.48	
	(0.17)***		(0.18)*		(0.13)***		(0.14)***	
	(0.18)**		(0.14)**		(0.12)***		(0.15)**	
cond_pc_culture		1.07						
		(0.26)***						
		(0.30)***						
cond_pc_children				1.41				
				(0.39)***				
				(0.46)**				
cond_pc_culture_pos						1.14		
						(0.28)***		
						(0.31)***		
cond_sum_culture								1.28
								(0.32)***
								(0.36)***
Obs	67	67	67	67	67	67	67	67
Adj R-squared	0.79		0.65		0.81		0.79	
F statistics	16.73		7.97		22.73		16.65	
Chi2(1) p-value		0.4		0.20		0.22		0.41

Standard errors in parentheses (above: OLS; below: clustered, allowing for arbitrary correlations within countries)
* significant at 10%; ** significant at 5%; *** significant at 1%
Country dummy variables and *school* are always included in the first and second stage regressions
Estimation method: 2SLS. First stage in odd columns, second stage in even columns.
F statistics is F-test of the excluded instruments. Chi2(1) is the value of the Sargan statistic testing the over-identifying restriction.

Table 12 – Culture and growth: instrumental variables estimates, unweighted

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. variable	*pc_culture*	*growth*	*growth*	*growth*	*growth*	*Growth*	*growth*	*growth*
lyp_77	12.32	-1.16	-1.09	-1.03	-1.03	-1.26	-1.17	-1.15
	(11.05)	(0.31)***	(0.44)**	(0.32)***	(0.42)**	(0.44)***	(0.37)***	(0.30)***
	(13.71)	(0.61)*	(0.61)*	(0.62)	(0.59)	(0.82)	(0.79)	(0.61)*
urb_rate1850	-0.035	0.005	-0.003	0.008	0.001	0.013	0.004	0.008
	(0.168)	(0.004)	(0.000)***	(0.004)*	(0.007)	(0.007)**	(0.005)	(0.004)*
	(0.192)	(0.003)*	(0.003)*	(0.005)	(0.005)	(0.005)	(0.007)	(0.004)
pc_institution	9.59							
	(2.86)***							
	(2.23)***							
literacy	0.39							
	(0.20)*							
	(0.22)							
pc_culture		0.017						
		(0.006)***						
		(0.007)*						
obedience			0.02					
			(0.007)***					
			(0.009)*					
respect				-0.082				
				(0.044)*				
				(0.030)**				
control					0.042			
					(0.021)**			
					(0.014)**			
trust						0.146		
						(0.076)*		
						(0.092		
pc_children							0.078	
							(0.036)**	
							(0.037)*	
pc_culture_pos								0.023
								(0.010)**
								(0.010)*
Obs	67	67	67	67	67	67	67	67
F statistics	9.04		1.80	5.90	3.00	2.66	4.36	14.73
Chi2(1) p-value		0.52	0.78	0.03**	0.85	0.86	0.27	0.37

Standard errors in parentheses (above: OLS; below: clustered, allowing for arbitrary correlations within countries).
* significant at 10%; ** significant at 5%; *** significant at 1%
Country dummy variables and *school* are always included in the first and second stage regressions.
Estimation method: 2SLS.Only second stage in reported.
F statistics is F-test of the excluded instruments from the first stage regressions.
Chi2(1) is the value of the Sargan statistic testing the over-identifying restriction.

Table 13 – Culture and output: sensitivity analysis

	(1)	(2)	(3)	(4)
Dep. variable	*pc_culture*	*yp9500*	*yp9500*	*yp9500*
urb_rate1850	-0.05	0.33	0.45	0.48
	(0.18)	(0.22)	(0.27)*	(0.19)**
	(0.16)	(0.28)	(0.31)	(0.28)
pc_culture		0.82	1.69	0.71
		(0.27)***	(0.65)***	(0.33)**
		(0.41)*	(0.90)	(0.57)
pc_institutions	9.94		-9.92	
	(2.88)***		(9.17)	
	(2.28)***		(15.09)	
literacy	0.43			0.47
	(0.21)**			(0.31)
	(0.24)			(0.52)
agr_share	-0.22	-0.75		
	(0.32)	(0.40)*		
	(0.18)	(0.55)		
Obs	64	64	67	67
Adj R-squared	0.73			
F statistics	9.69		13.55	13.55
Chi2(1) p-value		0.35		

Standard errors in parentheses (above: OLS; below: clustered, allowing for arbitrary correlations within countries)
* significant at 10%; ** significant at 5%; *** significant at 1%
Country dummy variables and *school* are always included in the first and second stage regressions
F statistics is F-test of the excluded instruments from the first stage regressions.
Chi2(1) is the value of the Sargan statistic testing the over-identifying restriction.

Columns (1) and (2): *agr_share* treated as additional exogenous variable
Columns (3) and (4): just identified model with only one instrument

Table 14. Montecarlo simulation of estimated Sargan statistics for over-id test

DGP: (1) $Y = \alpha_o + \beta_o X + \delta_o C^* + e$; (2) $C^* = \alpha_1 + \beta_1 X + \lambda_1 Z_1 + \lambda_2 Z_2$ (3) $C = C^* + v$

Sargan statistics estimated from: (1)' $Y = \alpha_o + \beta_o X + \delta_o C + e$ (2)' $C = \alpha_1 + \beta_1 X + \lambda_1 Z_1 + \lambda_2 Z_2 + v$

True value of δ_o: 0.21

Cor(e, Z_1)	Cor(e, Z_2)	Estimated bias (% δ_o)	Distribution of Estimated Sargan Statistics							
			Average	10th pc	20th pc	30th pc	40th pc	60th pc	80th pc	90th pc
0	0	0	1.14	0.01	0.06	0.16	0.29	0.83	1.84	3.32
0.4	0	61%	9.80	2.64	4.17	5.77	7.40	10.74	14.68	17.87
0	0.4	97%	6.84	1.09	2.32	3.46	4.59	7.34	10.92	13.32
0.4	0.4	161%	1.48	0.02	0.10	0.24	0.40	1.09	2.36	3.86

True value of δ_o: 0.86

Cor(e, Z_1)	Cor(e, Z_2)	Estimated bias (% δ_o)	Distribution of Estimated Sargan Statistics							
			Average	10th pc	20th pc	30th pc	40th pc	60th pc	80th pc	90th pc
0	0	0	1.22	0.02	0.10	0.21	0.34	0.89	2.11	3.49
0.4	0	15%	4.92	0.34	1.01	1.82	2.68	4.69	8.36	11.21
0	0.4	24%	3.71	0.10	0.42	0.09	1.60	3.46	6.29	9.04
0.4	0.4	40%	1.34	0.02	0.07	0.17	0.33	0.95	2.22	3.66

The DGP uses the true value of the vector of controls *X*. The randomly generated variables (e, v, Z_1, Z_2) match the first and second moments of the corresponding observed or estimated variables, where Z_1 matches the moments of *Literacy* and Z_2 matches the moments of *pc_institutions*. The DGP also imposes Cor(Z_1, Z_2) =0.4, to match the observed correlation between these two variables. The coefficients in the DGP are those obtained from the OLS estimate of (2) and the 2SLS estimate of (1), except for the value of δ_o, which is as indicated above. The simulation is replicated 1000 times. The correlation between Z_i and e is as indicated in the first two columns of both panels.

Table 15. Referendum on the Italian monarchy, history and culture

	(1)	(2)	(3)	(4)	(5)
Dep. variable	*pro-monarchy*	*pro-monarchy*	*pro-monarchy*	*pc_culture*	*pc_culture*
literacy	-0.57		-0.40		
	(0.24)**		(0.32)		
pc_institutions		-6.64	-3.43		
		(3.13)*	(3.97)		
pro-monarchy				-1.01	-2.12
				(0.37)**	(0.80)**
Estimation	OLS	OLS	OLS	OLS	2SLS
Obs.	13	13	13	13	13
Adj R2	0.28	0.23	0.27	0.36	

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
In column 5, the first stage specification is that of column 3
Sample: Italian regions only

Figure 1. Per capita income in 1995-2000

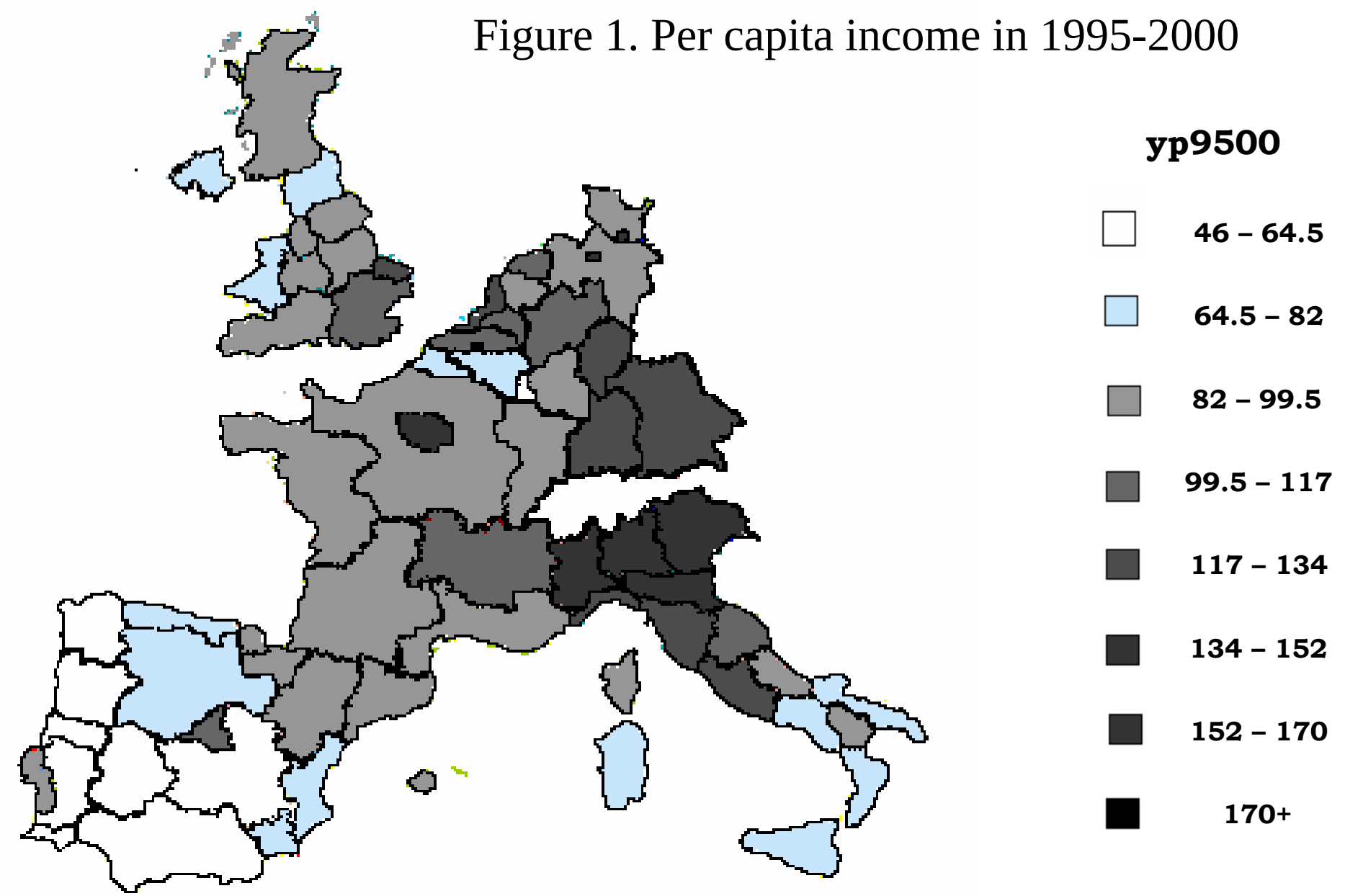
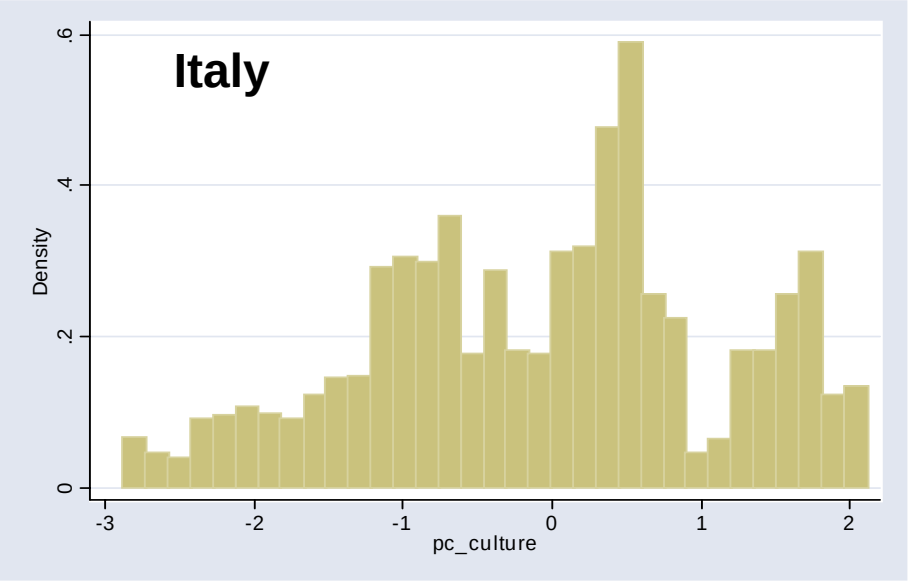
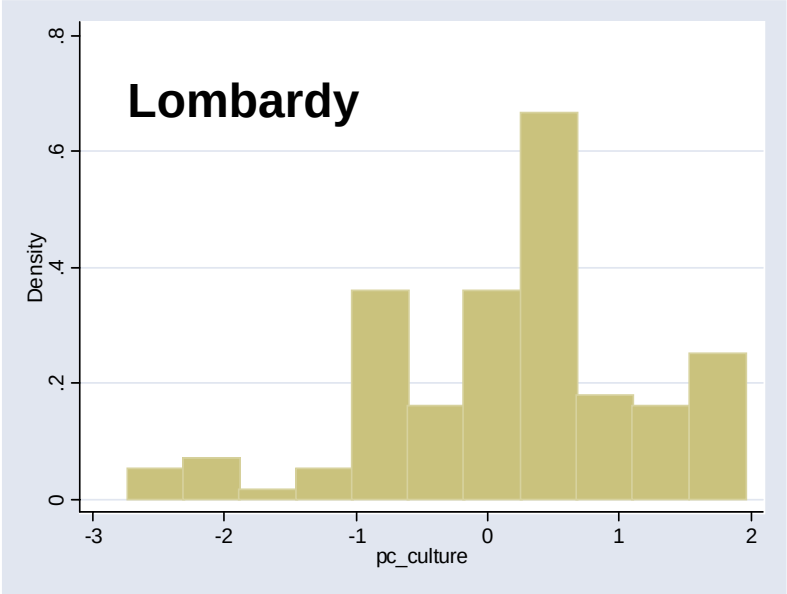


Figure 2a Distribution of PC-Culture in Italy, Lombardy and Campania





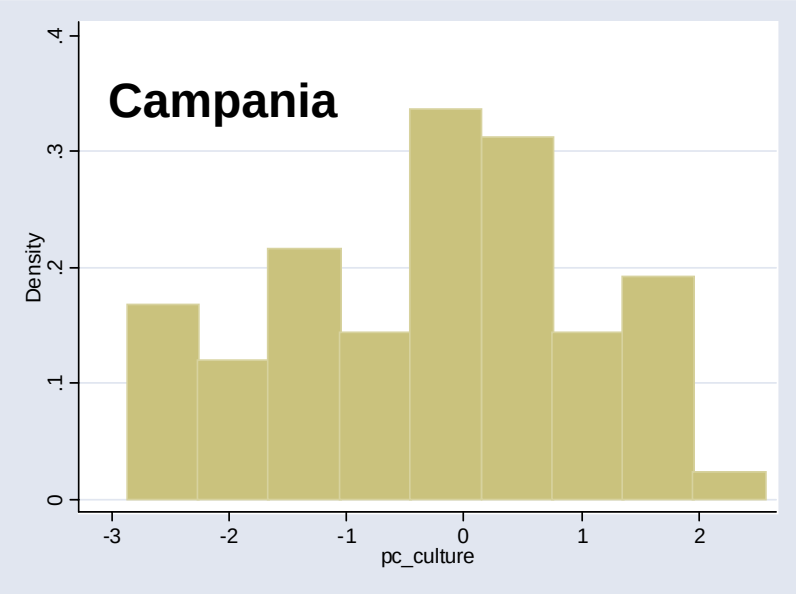


Figure 2b. Cultural map of Europe in the 1990s

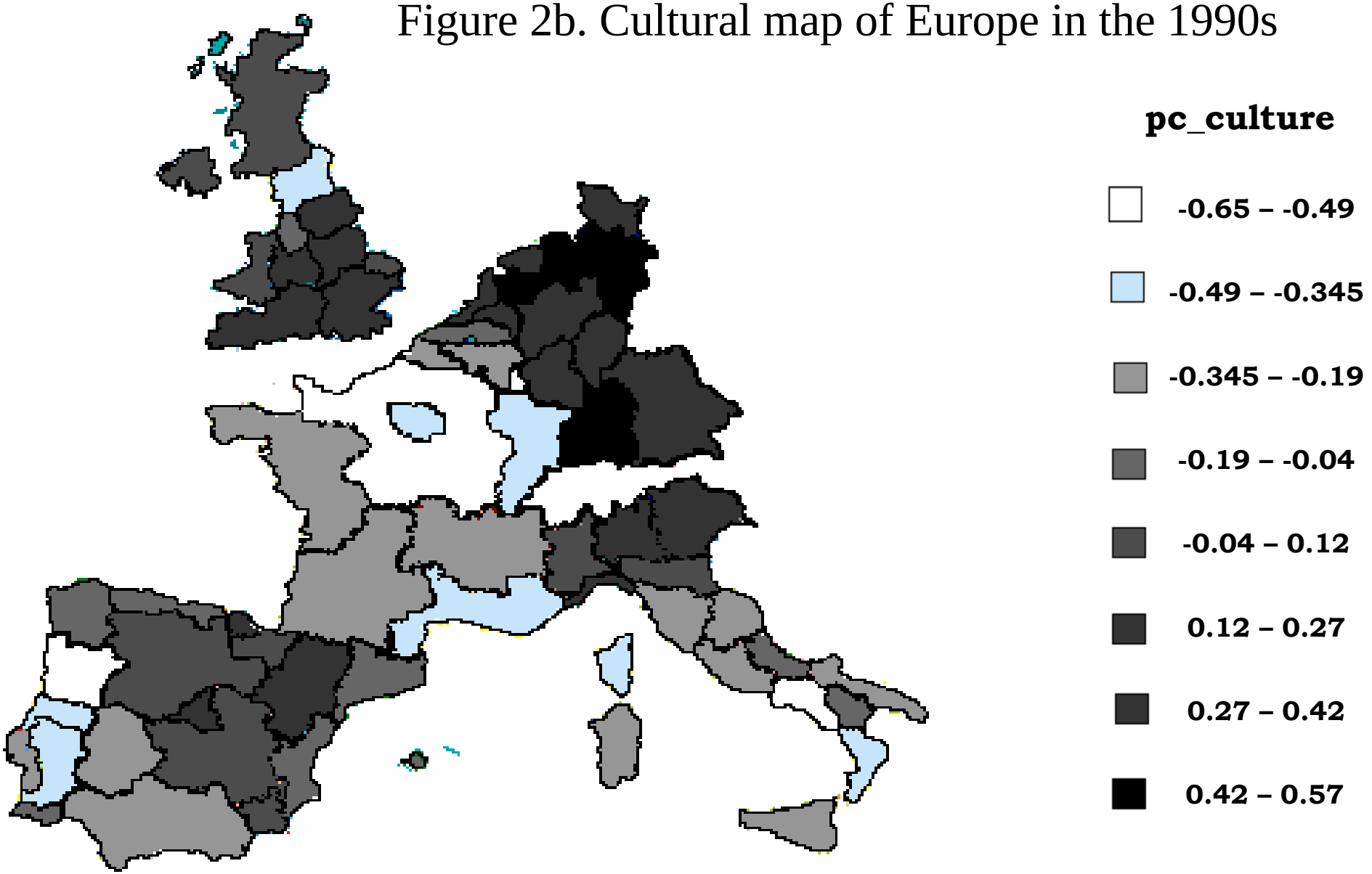
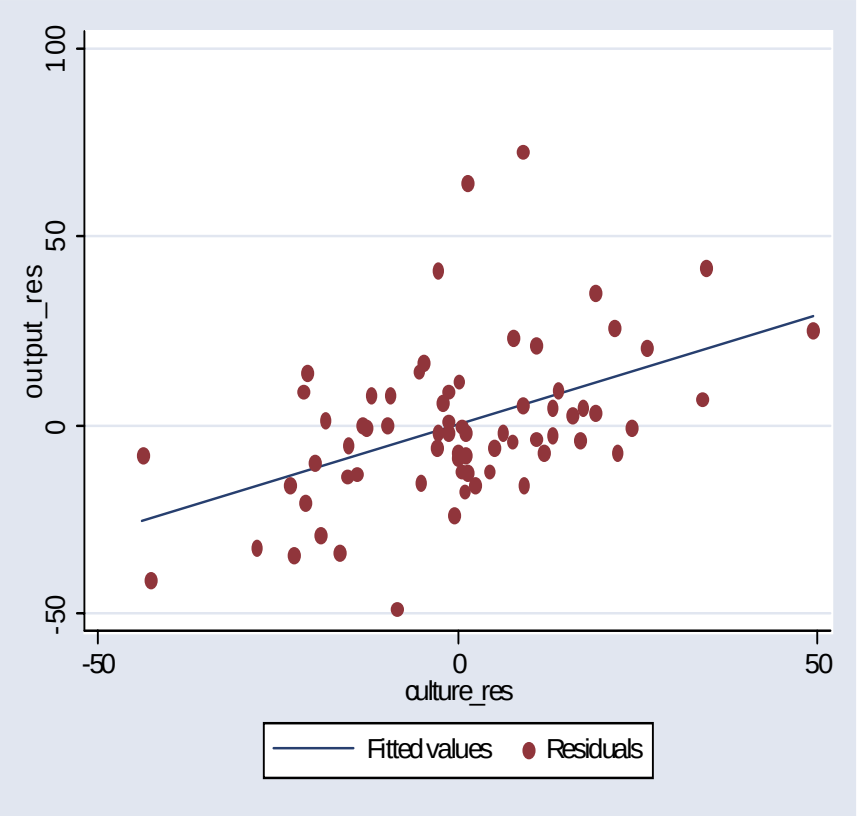
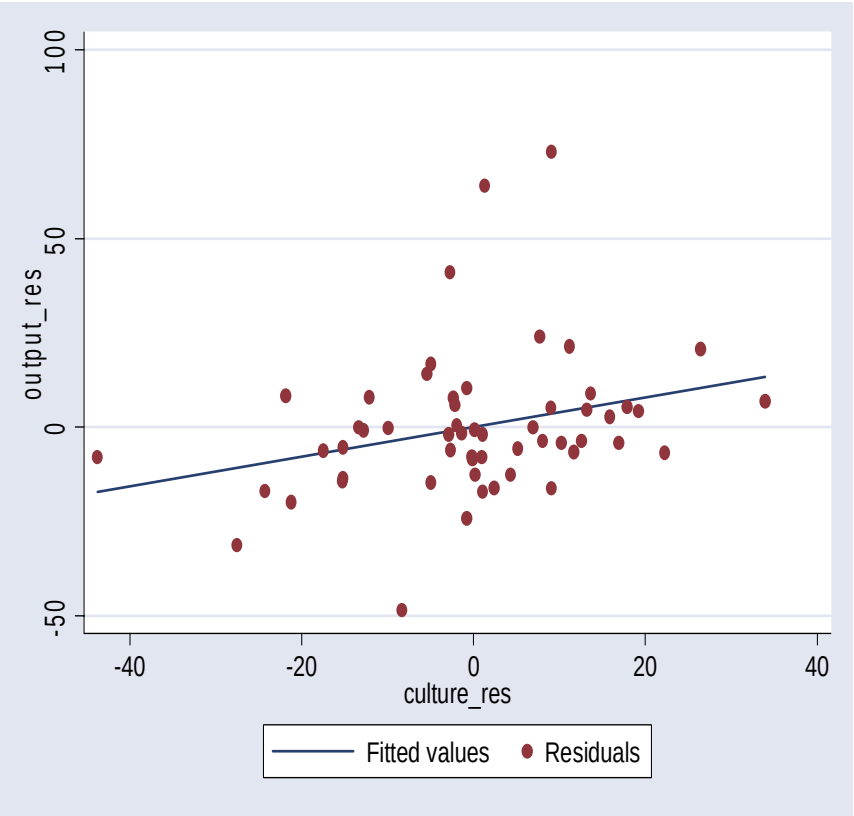


Figure 3.
OLS residuals, after controlling for country FE, *school* and *urb_1850*



with Italy



without Italy

Figure 4. Literacy rates around 1880

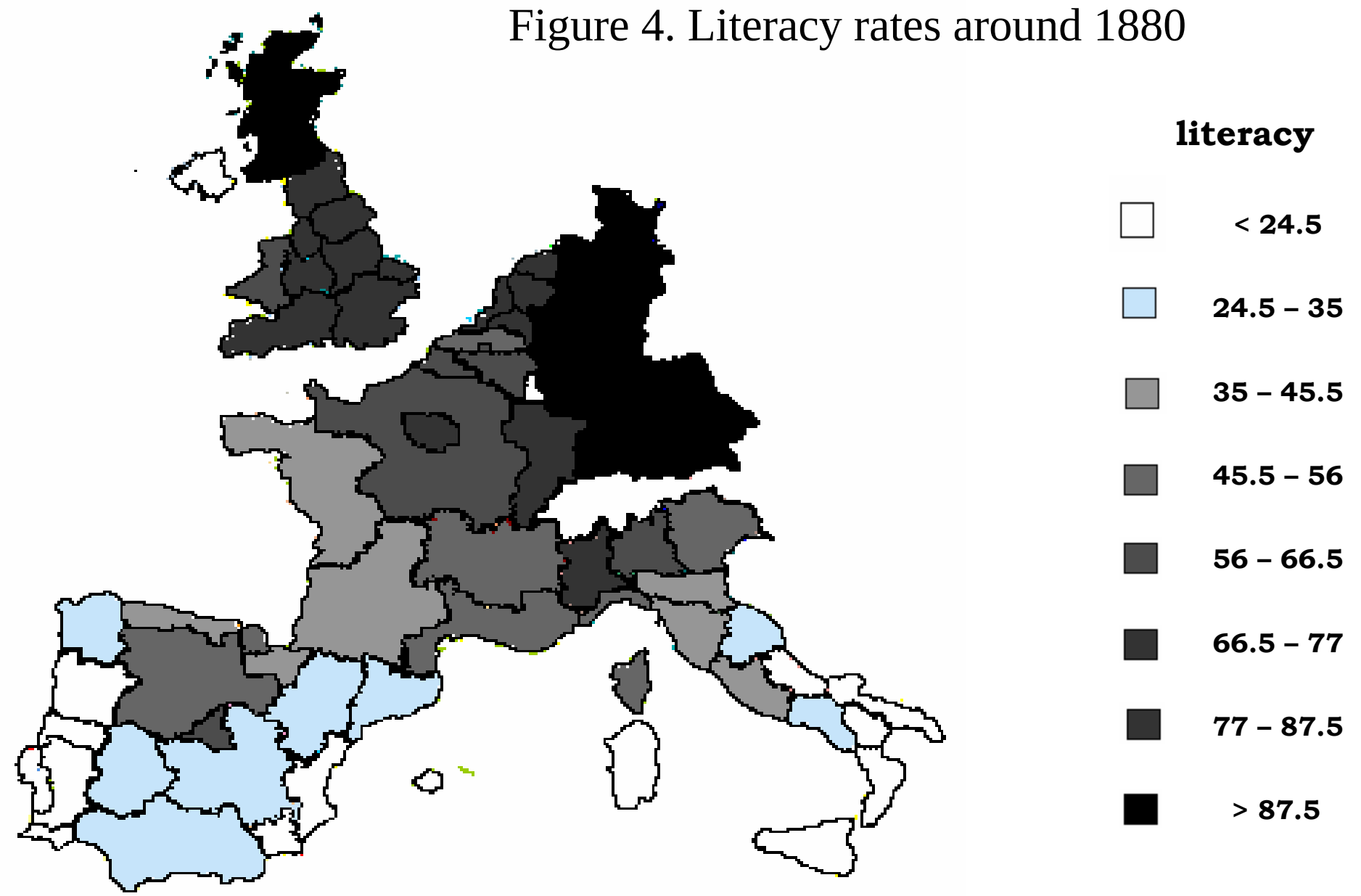


Figure 5. Constraints on the executive in 1700

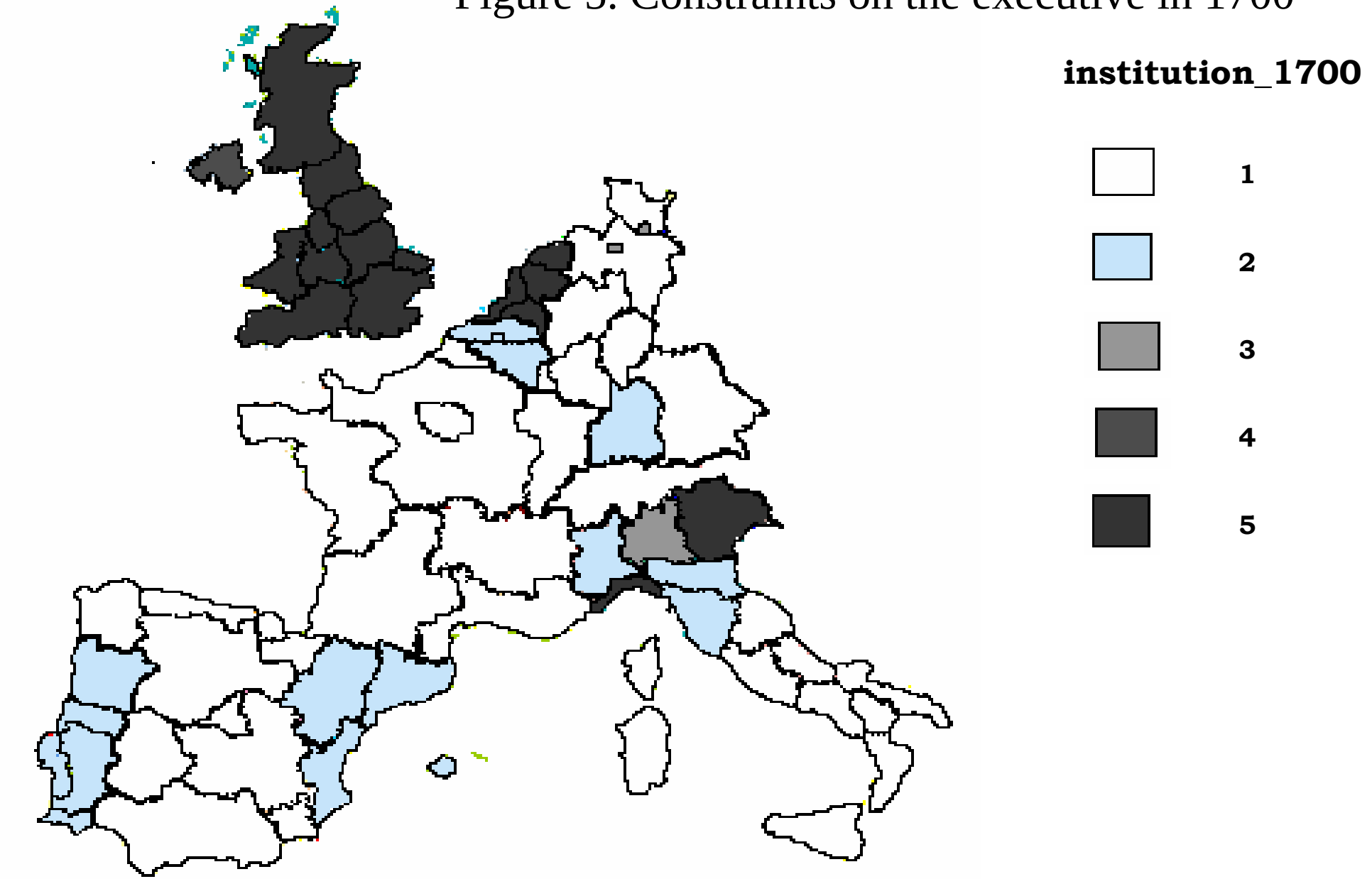


Figure 6. First principal component of political institutions (1600 – 1850)

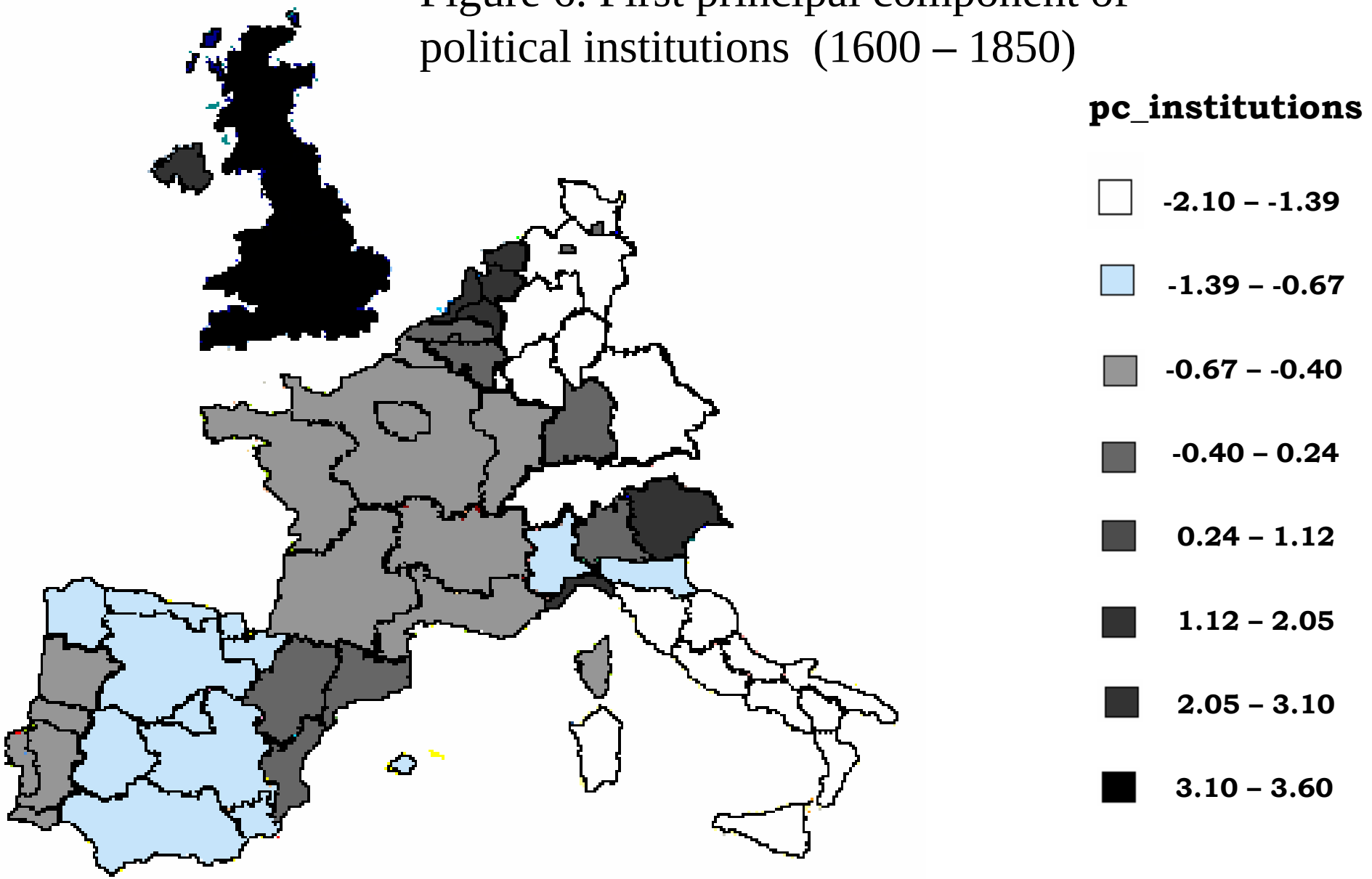


Figure 7. Distribution of boot-strappped Sargan statistics for overid test