9

The Diffusion of Institutions

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Abstract

This chapter explores the fundamental drivers of economic development and political institutions. It provides a novel empirical analysis of the determinants of institutional differences and the diffusion of institutional innovations across societies. A critical discussion of the recent literature is presented, documenting how economic and political outcomes are affected by traits that have deep historical and geographic roots and that are passed on from generation to generation. The hypothesis is presented that intergenerationally transmitted traits affect current outcomes by acting as barriers to the diffusion of technological and institutional innovations: a longer historical separation time between populations creates greater barriers. Hence, the degree of ancestral distance between a given society and the society at the frontier of institutional and technological development should be associated with higher barriers and lower adoption. This hypothesis is tested empirically with cross-country data. Empirical findings provide substantial support for the proposition that long-term historical distance from the frontier affects both current institutions and development.

Introduction

Societies vary greatly not only in their levels of material prosperity but also in the nature of their institutions, defined as the rules and norms which regulate and constrain human actions and interactions. Why do we observe such variety, both over space and time? What are the fundamental drivers of economic and institutional development across countries? Historians and social scientists have been debating these important questions for centuries, emphasizing a wide range of causes: from government policies and incentives to accumulate and innovate, to geographic features and cultural factors. Building on the work of geographers, anthropologists, and historians, economists have recently come to recognize that factors deeply rooted in geography and history are important determinants of economic and institutional development (e.g., Spolaore and Wacziarg 2009; Putterman and Weil 2010; Comin et al.

From "Complexity and Evolution: Toward a New Synthesis for Economics,"
David S. Wilson and Alan Kirman, eds. 2016. Strüngmann Forum Reports, vol. 19,
series ed. J. Lupp. Cambridge, MA: MIT Press. ISBN 978-0-262-03538-5.

2010; Ashraf and Galor 2013; for a synthesis of this literature, see Spolaore and Wacziarg 2013).

In this chapter, we provide new empirical evidence on the fundamental drivers of development and institutions. We do not seek to explain the complex interrelationships between institutions and development, the topic of a vast and growing literature. Instead, we recognize that institutional development, characterized by the protection of property rights, the enforcement of the rule of law, and the adoption of democratic forms of government, is a key component of modernity and development. We seek to characterize the deep roots of both institutions and development, with a focus on the transmission of traits that are passed on from one generation to the next over time.

At the center of our analysis is the distinction between *direct* effects and *barrier* effects. In principle, traits passed on from generation to generation throughout history could act *directly* to affect institutions and development. For example, populations may directly inherit from their ancestors social norms that facilitate cooperation and development. However, different populations may also inherit traits that make them more or less similar to other populations, in terms of habits, customs, language, and so on. Similarities or differences in such traits could then facilitate or hinder exchanges between populations. In particular, divergence in intergenerationally transmitted traits may act as *barriers* to the adoption of novel institutions and technologies across different societies. The main novelty of this analysis is that we seek to quantify the geographic and historical barriers to the adoption of institutions, defined primarily as democratic control over political decision making. We show that these barriers are both geographic and human/cultural, and highlight how the dynamics of the diffusion of democracy are consistent with barrier effects.

We begin with a survey of the empirical evidence on the relationship between geography, deep history, institutions, and development. Thereafter we discuss the mechanisms linking deep roots and current outcomes, developing a taxonomy of possible effects, and conduct an empirical investigation of the manner in which democratic institutions diffuse internationally.

The Relationship between Deeply Rooted Factors, Institutions, and Development

Complexity and the Deep Roots of Institutions and Development

A brief account of recent views on the drivers of the wealth of nations must stress the increasing complexity of the mechanisms highlighted in the economic literature. Decades ago, economists placed emphasis on proximate causes; namely, the accumulation of factors of production (such as buildings and machines) and technological innovation. These factors, which were taken

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as exogenous, entered into an economy's production function and thus represented the most proximate determinants of a society's income level.[1] Later came a recognition that these factors are endogenous, and that they depend on governmental policies affecting the incentives to accumulate capital, to innovate, and to adopt existing innovations.[2] In an increasing focus on deeper determinants, economists have come to recognize that policies themselves are endogenous; they depend on political and social institutions, either formal or informal, that create the right rules of the game, framing the decisions of policymakers and economic actors (e.g., Acemoglu et al. 2001, 2002; Engerman and Sokoloff 1997; Greif 2006; North 1990, 2005; North and Weingast 1989; Ostrom 1990, 2005). The concept of institutions has become of paramount importance as a driver of economic development in recent scholarship, although a debate rages on regarding the direction of causality linking institutions and development.[3] It is likely that causality runs both ways.

Over the last decade or so the economics literature has gone one step further back and asked: What drives the deeper determinants of institutions? The proposed answers center on geography and deep history, and even prehistory (for review, see Spolaore and Wacziarg 2013). Figure 9.1 summarizes this basic schematic view of the causal links emphasized by economists. Researchers have recognized the endogeneity of the proximate factors as well as policies and institutions. Studies have increasingly emphasized deeper and more fundamental roots that are harder to change using policy or institutional reforms. These deep roots include geographic factors and the legacy of past historical events.

The emphasis on deeper roots has created challenges of a different kind for this research. The proliferation of candidate explanations for economic development has challenged social scientists to articulate the interrelationships that exist between these variables and to estimate these complex effects econometrically. Figure 9.2 illustrates two major problems with the causal chain identified above. First, causality could run in reverse, from development to proximate factors, policies, and institutions, and from these factors among themselves. This is the problem of *endogeneity*, typified by the solid backward arrows in Figure 9.2. Second, more deeply rooted factors could affect development directly, without necessarily going through a more proximate cause. For instance the climate, a feature of geography, could affect development directly

1 The Solow growth model epitomizes the theoretical foundation of this early work with exogenous accumulation and innovation (Solow 1956). The history of growth scholarship and its effect on development policy is summarized in the early chapters of Easterly (2001).

2 For theoretical foundations of endogenous growth, see Romer (1990) and Lucas (1988). A large literature around the same time began looking at the empirical determinants of growth, starting with Baumol (1986) and Barro (1991).

3 Acemoglu et al. (2008) argue that democracy affects development and not the other way around; in contrast Barro (1999) and Murtin and Wacziarg (2014) find evidence in favor of Lipset's modernization hypothesis, i.e., that human capital and economic development lead to more democracy.

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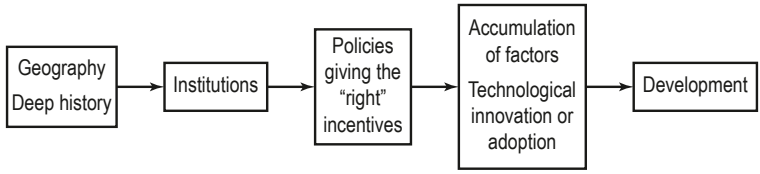

Figure 9.1 Drivers of development.

by reducing productivity without necessarily working through institutions and policies. This is the problem of *exclusion restrictions*, displayed as hatched forward arrows in Figure 9.2.[4]

So far the literature has largely skirted these issues by estimating directly the reduced form relationship between the deep roots of development (geography and the legacy of historical events) and development itself. The cost of this shortcut has been a relative lack of ability to clearly formulate mechanisms whereby geographic and historical factors work to affect current development outcomes. What have we learned from this research?

At this stage of our understanding of the wealth of nations, we must contend with some salient facts (for further details, see Spolaore and Wacziarg 2009, 2012, 2013, 2014). First, there is a lot of *persistence* in development outcomes, institutional features and technological sophistication. Past technological sophistication, going as far back as two thousand years, has predictive power for current outcomes (Comin et al. 2010), and so does past institutional sophistication (Putterman and Weil 2010).[5] Second, there has also been some dramatic *change*: the emergence of modern modes of production, the spread of new technologies, the diffusion of novel fertility behaviors and democratic institutions. There have also been some reversals in the fortunes of countries, despite the persistence of outcomes, and these reversals beg explanation. Third, both persistence and change are associated with *intergenerational links*: the long-term history of populations matters, suggesting that the factors which affected past development have been passed down from generation to generation over the long run. Fourth, there is compelling evidence that the manner in which some populations, originating in Eurasia, maintained a persistent development advantage, has to do with human and geographic *barriers* that prevented the spread of innovations, institutions, and modern behaviors to other populations. Quantifying these barriers is a key first step toward developing policies to overcome them. Our analysis here builds on these four insights to provide a quantitative account of the drivers of development and institutions, with a special focus on the role of long-term barriers to the diffusion of institutional

[4] Econometric attempts to address these issues have traditionally relied on the use of instrumental variables; see Deaton (2010) for a critical review of this approach.

[5] For an interesting archeological and historical analysis of the persistence of preindustrial agricultural practices in the Mediterranean, from a long-term perspective, see Halstead (2014).

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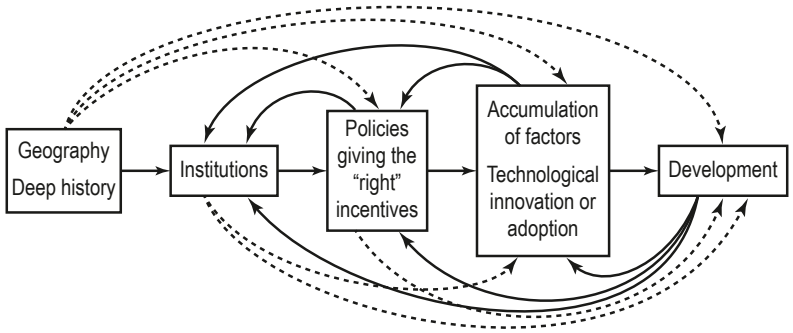

Figure 9.2 Drivers of development (with complicating factors).

innovations. We continue with a discussion of recent empirical contributions on geography and development, reversal of fortune, and the role of ancestry.

Geography

Our account of the deep roots of development begins with geography. It is widely recognized that there is a strong relationship between geographic factors and current development outcomes. In Spolaore and Wacziarg (2013) we showed that in a cross section of countries, four geographic variables account for 44% of the variation in per capita income in the year 2005: absolute latitude (by far the largest effect), the percentage of a country's land area that is located in tropical climates, a dummy for landlocked countries, and a dummy for islands. One possible interpretation of this correlation is that geographic features (climate, soil quality, etc.) have a direct effect on current productivity and wealth (Sachs 2001). An alternative interpretation is that geographic factors act indirectly, through their historical legacy. Such is the hypothesis in Diamond's (1997) influential work. He posits that specific geographic features (the shape and size of continents, the availability of domesticated animals, the variety of plant species) affected the degree of economic and institutional sophistication in the past. For instance, centralized states with organized political hierarchies were overwhelmingly a feature of agrarian societies. These early advantages, transmitted intergenerationally, created compounded and persistent advantages still detectable today.

Systematic empirical evidence for the proposition that geography works through its historical legacy, consistent with Diamond's hypotheses, is provided by Olsson and Hibbs (2005) and Ashraf and Galor (2011). Olsson and Hibbs (2005) showed that a set of geographic variables, capturing Diamond's early geographic advantages, have strong explanatory power in a regression explaining contemporary outcomes. Ashraf and Galor (2011) showed a strong correlation between population density in 1500 (a proxy for technological sophistication in Malthusian times) and the number of years since the agricultural

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transition, itself a major legacy of early climatic and biogeographic characteristics (climates conducive to sedentary agriculture, the diversity of plant and animal species, and the shape and size of continents).

In sum, the recent empirical literature, while confirming strong correlations between geographical conditions and development, has tended to interpret them not as direct causal effects of contemporary geography on current economic outcomes, but as the result of indirect effects of geography on technological and institutional outcomes, often going back centuries or even millennia, but with persistent effects on productivity and development in more recent times.

Reversal of Fortune

Further empirical evidence in favor of the indirect interpretation of the effect of geography on current economic outcomes comes from the reversal of fortune documented by Acemoglu et al. (2002). Table 9.1a, columns 1 and 2, distils such evidence: population density in 1500, an indicator of technological sophistication in Malthusian times, is strongly correlated *negatively* with per capita income in 2005 in a cross section of countries excluding Europe; this effect is even stronger for former European colonies. Presumably, if geographic features conferred a persistent direct advantage for productivity, it would have done so both in the past and today, precluding this sort of reversal. Instead, early geographic advantages could have translated into superior institutions, and colonial powers may have set up different kinds of institutions in the locations they colonized: inclusive ones in locations conducive to settlement, and extractive ones in inhospitable locations. This is precisely the interpretation of Acemoglu et al. (2001, 2002). According to their view, the reversal of fortune reflects the indirect effect of geography on institutions inherited from the colonial era, and the especially strong magnitude of the reversal for former colonies is consistent with this idea. In turn, the quality of institutions explains variation in current prosperity: the factors that caused high-quality institutions also cause high per capita incomes.

However, along with inclusive institutions, colonial powers brought with them other potential advantages for long-term development, including their human capital, culture, values, norms, and attitudes (Glaeser et al. 2004). Thus, it is not clear whether the reversal of fortune merely captures the indirect effect of geographic characteristics working through institutions alone, or the broader legacy of other human traits. The rest of Table 9.1 provides evidence consistent with this broader view. When looking at the correlation between population density in 1500 and income per capita in 2005, the evidence for a reversal disappears when considering non-European countries currently inhabited by the descendants of the populations that lived there in 1500 (Table 9.1a, column 5). The reversal is predominantly a feature of the subsample of countries *not* inhabited by their original dwellers (Table 9.1a, column 4). Moreover, when adding the European countries to the sample (Table 9.1b), the evidence

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Table 9.1 Reversal of fortune. Dependent variable: log per capita income 2005; robust *t* statistics are given in parentheses; all regressions include a constant term (estimates not reported).

	(1) Whole World	(2) Former European Colony	(3) Not Former European Colony	(4) Nonindigenous	(5) Indigenous
(a) Without European countries					
Log of population	–0.246	–0.393	–0.030	–0.232	–0.117
density in year 1500	(3.304)***	(7.093)***	(0.184)	(2.045)**	(1.112)
Beta coefficient on 1500 density	–27.77%	–47.88%	–3.08%	–32.81%	–11.72%
Observations	136	98	38	33	103
R-squared	0.077	0.229	0.001	0.108	0.014
(b) With European countries					
Log of population	0.027		0.170		0.193
density in year 1500	(0.389)		(2.045)**		(2.385)**
Beta coefficient on 1500 density	3.26%		22.34%		20.00%
Observations	171		73		138
R-squared	0.001		0.050		0.040

* significant at 10%, ** significant at 5%, *** significant at 1%

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of a reversal is actually reversed: we now uncover persistence, in the form of a *positive* correlation between past and current prosperity (for further evidence, see Chanda et al. 2014; for a review of this debate, see Diamond 2014).

The evidence of persistence when including European countries in the sample is suggestive of an important long-term role of European populations. Empirical evidence on the effect of European colonization on current development is provided by Easterly and Levine (2009). They construct a novel dataset on shares of Europeans in different countries during the early stages of colonization and find a strong and positive relationship between such shares and current development. Intriguingly, the effect is even stronger when the share of Europeans is relatively low. This fact is difficult to reconcile with the view that, when Europeans settled in small numbers in a colony (say, because of high mortality rates), their main legacy on the country's development was negative, via "bad" institutions (Acemoglu et al. 2001). Instead, this evidence is more consistent with the view that Europeans, when they settled in a country, even in small numbers, tended to bring traits that would positively affect economic development and institutions in the longer run. Easterly and Levine find that the effect of colonial European shares is robust to controlling for the current share of Europeans, but becomes insignificant when controlling for current levels of education. They interpret these results as suggestive of an important role for human capital and human-capital-promoting institutions, consistent with Glaeser et al. (2004) and Galor et al. (2009).

In sum, there is a general consensus about a secular "reversal of fortune" across regions colonized by Europeans in modern times: regions which used to have a higher population density and relatively higher technology around 1500 (e.g., Mexico and Peru) are relatively poorer than regions which used to be less populated and economically advanced around 1500 (e.g., the area now occupied by the United States and Canada). The reasons for such reversals are controversial. Some economists (Acemoglu et al. 2002) emphasize the effects of different institutions brought by the colonizers, whereas others emphasize the effects of broader intergenerationally transmitted traits, such as human capital and culture, which may include institutions but also other human and societal traits.[6]

Role of Ancestry

The evidence on the reversal of fortune for newly settled countries and persistence for countries inhabited by descendants of their aboriginal premodern populations suggests that the characteristics of a population, rather than only institutions, is of paramount importance to explain contemporary variation in

[6] This is part of a broader debate on the complex relation between institutions and cultural norms and traits, which has received increasing attention in the economic literature, including by leading economic historians such as North (2005) and Greif (2006).

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economic performance. Putterman and Weil's (2010) empirical analysis eloquently demonstrates this point. For each country in the world they construct an ancestry matrix providing the share of the population originating, since 1500, from each of the other countries in the sample. They explore the role of deep history summarized by (a) years since the agricultural transition and (b) a variable capturing a country's experience with centralized states (i.e., historical institutional sophistication). They show that deep history variables have predictive power for contemporary per capita income. But their main contribution is to show that this explanatory power increases greatly when these variables are pre-multiplied by the ancestry matrix. That is, the variables are corrected for each country to represent the weighted average of its current population's ancestral historical variables. Thus, for instance, the United States would appear with a short history of having a centralized state, but in the ancestry adjusted version, the population of the United States comes from countries which, in many cases, have had a much longer exposure to state centralization. Thus, the history of populations, not of geographic locations, explains contemporary economic performance.

In a closely related paper, Comin et al. (2010) document the strong autocorrelation of technological sophistication going back one thousand years before the Common Era. They develop several indices of technological advancement based on the use of the most efficient and sophisticated technologies in 1000 BCE, 1 CE, 1500 CE, and today. In every past date considered, they show that technological sophistication correlates significantly with current per capita income or current technological advancement. This is strong evidence of persistence. Going one step further, they show that this persistence is quantitatively stronger when past measures of technological sophistication are adjusted for ancestry in the same manner as Putterman and Weil (2010).

Finally, in two recent articles, Michalopoulos and Papaioannou (2013a, b) provide evidence on the relations between precolonial ancestral traits and economic development in sub-Saharan Africa. They use the fact that national boundaries in Africa are a recent outcome of colonization. Such "artificial" borders partition over two hundred different ethnic groups across neighboring countries, thus subjecting them to different national institutions. On average, countries with "better" national institutions (in the sense of Acemoglu et al. 2001) tend to have higher levels of development. However, the effect of national institutions disappears when ethnically homogeneous groups are considered (Michalopoulos and Papaioannou 2013a): groups which share common precolonial histories and cultures display a similar level of economic performance today, no matter whether they belong to African states with better or worse institutions. This is strong evidence that intergenerationally transmitted traits within African populations, going back to precolonial times, are still key determinants of current development. When controlling for such ancestral traits, national institutions, which reflect the legacy of more recent colonial and postcolonial history, play only a marginal or even insignificant

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role. Interestingly, Michalopoulos and Papaioannou (2013b) find that among ancestral traits associated with current development, an important effect can be attributed to measures of precolonial political centralization. Thus, institutions matter, but only those with deep roots at the ethnicity level (more akin to cultural norms and traditions passed down from generation to generation) rather than national-level institutions imposed more recently.

Overall, the evidence discussed here is consistent with the idea that traits passed on from generation to generation within populations—including, but not exclusively, a population's familiarity with certain types of political institutions inherited from deep history—are of paramount importance to explain contemporary variation in economic development.

A Taxonomy of Mechanisms

Why do deep history and ancestry matter for economic and societal outcomes? This question echoes a much broader and older debate about the effects of intergenerationally transmitted traits. Historically, much of this discussion has been on whether ancestry may matter because of *nature*, usually interpreted in terms of biological inheritance, or *nurture*, including the transmission of cultural traits (e.g., values and attitudes toward work, interpersonal trust or fertility behavior). Most scholars of evolution today view the dichotomy between nature and nurture as simplistic, because individuals inherit traits from their ancestors through a complex interaction of different inheritance mechanisms, biological and cultural, which interact with each other and with environmental and societal forces (for discussions, see Henrich and McElreath 2003; Jablonka and Lamb 2005; Richerson and Boyd 2005). An instructive example of gene–culture interaction and coevolution is the spread of lactase persistence (the genetically transmitted ability to digest milk in adulthood) in populations which domesticated milk-producing animals (a culturally transmitted innovation) (for in-depth analysis of the role of lactose tolerance in premodern development, see Cook 2014). More generally, discussions of the relation between evolution of human traits and economic and societal outcomes are provided, for example, by Seabright (2010) and Bowles and Gintis (2011). An important aspect of this evolutionary literature in economics is its focus on trust, reciprocity, and cooperation, which are crucial mechanisms for the evolution of institutions and their diffusion.

While the interactions among different inheritance mechanisms are of fundamental importance to understand the evolution of biological and cultural traits, they are conceptually and empirically difficult to disentangle. Thus they represent a major challenge when economists and other social scientists attempt to identify links between specific intergenerational traits and specific political and economic outcomes (see, e.g., Benjamin et al. 2012; Chabris et al. 2013).

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Rather than emphasizing the effects of different modes of transmission (biological, cultural, or both), our discussion focuses on a different dimension of the relation between intergenerationally transmitted traits and societal outcomes: their mode of operation. How do inherited traits (whether biological, cultural, or both) affect economic and institutional development? Somewhat surprisingly, there is not a lot of explicit analysis and discussion in the economic literature about the different channels through which inherited traits can, in principle, affect economic outcomes. This is in part because most economists and other social scientists have implicitly focused only on *direct* effects. That is, much of the research in this area has been about identifying specific individual traits (e.g., work ethic or other intergenerationally transmitted values) that directly affect income per capita and other economic outcomes. Classic examples of these direct mechanisms would be the hypotheses about the effects of the Protestant ethic on the emergence of capitalism formulated by Weber (1905) or about the relationship between "amoral familism" and underdevelopment in southern Italy (Banfield 1958).[7]

However, a direct effect of inherited traits is only one possible mechanism, and not necessarily the most important one when considering technological and institutional change in recent centuries. Another fundamental mechanism is that similarity or divergence in inherited traits between populations can facilitate or hinder the diffusion of novel technologies, institutions, norms, and behaviors across different societies. People that have inherited more similar traits (e.g., norms, habits, language) may be able to communicate more easily with each other, trust each other more, and learn more easily from each other, while divergence in those traits may create barriers to the diffusion of novel technologies and institutions across different societies.

Table 9.2 provides a summary of our taxonomy of the possible effects of deeply rooted factors.

Barrier effects are at the center of our own research on the diffusion of economic development and innovations (Spolaore and Wacziarg 2009, 2012, 2013, 2014).[8] Our key hypothesis is that when populations enter into contact with each other, differences in intergenerationally transmitted traits act as barriers to

[7] Recent work by economists on the direct effect of culturally transmitted traits on economic and institutional development includes Algan and Cahuc (2010) and Tabellini (2010). The direct effects of genetic diversity within populations on comparative economic development have been studied by Ashraf and Galor (2013). The relation between the emergence of post-Malthusian growth and the evolution of specific traits (e.g., preferences for quantity vs. quality of offspring) has been studied theoretically by Galor and Moav (2002) and historically by Clark (2007). A selection and discussion of the literature on culture, ancestry, and economic growth is provided in Spolaore (2014).

[8] An important related literature focuses on the role of cultural barriers to economic exchanges. For example, Guiso et al. (2009) find that more closely related populations in Europe tend to trade more with each other because of higher trust among them. These findings are consistent with our interpretation of the relationship between ancestry and barriers to economic and social interactions across populations.

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Table 9.2 A taxonomy.

Type of Transmission	Mechanism of Impact: Direct Effect	Mechanism of Impact: Barrier Effect
Biological: genetic or epigenetic	Galor and Moav (2002), Ashraf and Galor (2013)	Spolaore and Wacziarg (2009, 2012, 2013, 2014)
Cultural: behavioral or symbolic	Weber (1905), Banfield (1958), Tabellini (2008)	
Dual: gene–culture interaction	Boyd and Richerson (1985), Cook (2014)	

exchange, communication, and imitation. In other words, the extent to which different societies can learn from each other at a given time (i.e., the extent of *horizontal* transmission of cultural traits) should depend on the extent to which different societies have historically diverged in terms of *vertical* transmission of traits across generations. We expect that these differences are on average associated with measures of genetic distance between populations, because populations that are less closely related have had a longer time to diverge along a larger range of ancestrally transmitted traits. However, the relevant differences that constitute barriers to the spread of novel behavior and innovations can reflect traits that are mostly transmitted culturally rather than biologically, such as values, norms, preferences, and modes of communication.

Similarities and differences along these dimensions are likely to be very relevant to explain the diffusion of complex technological and institutional "macro innovations," such as those at the roots of the Industrial Revolution, which, according to Mokyr (2005:285), stemmed from novel ways to expand "the set of useful knowledge and applying natural philosophy to solve technological problems and bring about economic growth."

In our empirical work (Spolaore and Wacziarg 2009, 2012), we used measures of genetic distance from Cavalli-Sforza et al. (1994) to test our model of diffusion of economic development and technological innovations. In our empirical work we use F_{ST} genetic distance, a commonly used metric of genetic distance summarizing cross-population differences in genetic characteristics. This measure, based on a large number of neutral gene loci, is meant to measure separation times between populations (i.e., the amount of time separating two current populations from a common ancestor population) and is used to reconstruct phylogenies, the evolutionary history of human populations.[9]

We expect genetic distance to be associated with differences in a wide range of human traits passed on both biologically and culturally from parents to children, and therefore to capture the barriers or affinities that prevent these

[9] For cases of populations composed of different genetic groups, as is common in our new work in particular, we calculate expected genetic distance between populations, by accounting for the average distance between the groups composing each society.

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populations from learning about each other's institutions, technologies, and behaviors. Genetic distance is meant to capture a wide range of mechanisms that may account for barrier effects. For instance, genetic distance could pick up distances in language, family networks, religious traditions, cultural practices, and other factors essential for establishing affinity and trust in reciprocal human interactions. In our framework, these interactions promote diffusion, and they are hindered by ancestral distance.

If barriers between societies play a central role in the diffusion of technological and institutional innovations, differences in income per capita or productivity across societies should depend not so much on the absolute genetic distance between them, but more on their relative genetic distance from the innovators. For instance, to explain the spread of the Industrial Revolution in the nineteenth century, what should matter is not so much the absolute distance between two populations—say, the Italians and the Hungarians—but rather how much closer the Italians were to the English than the Hungarians were.

In fact, we found that the magnitude of the effect of genetic distance relative to the frontier (the English in the nineteenth century, the United States in the twentieth century) is several times larger than that of absolute genetic distance. In a race between the two measures (absolute and relative), the relative distance remained significant, but absolute genetic distance was not significantly different from zero, consistent with our hypothesis. Moreover, as predicted by a barriers model of diffusion, the effect of relative genetic distance from the frontier rises during the nineteenth century along with the spread of the Industrial Revolution. It reached a peak right before World War I and declined thereafter as expected in a process of gradual diffusion, where, over time, innovations percolate and are adopted across increasingly more distant societies (Figure 9.3).

The measure and estimation of barrier effects associated with ancestral distance in the spread of novel behavior are also at the center of our recent work (Spolaore and Wacziarg 2014). In a sample of European populations and regions from 1830 to 1970, we have empirically analyzed the determinants of marital fertility using a novel data set of genetic and linguistic distances between European regions. Our key hypothesis is that the fertility decline can be best understood as a process of diffusion of new social norms and behavioral changes, spreading from early adopters to imitators through a mechanism of social influence across time and space.[10] In this respect, the fertility transition was similar to the described spread of innovations associated with the diffusion of the Industrial Revolution from England to other societies. However, a key difference between the diffusion of fertility decline and the diffusion

[10] Specifically, in our analysis of the diffusion of novel social norms associated with fertility decline, we empirically test the implications of a theoretical model of social distance and social influence, partly inspired by Akerlof (1997). More broadly, our approach is connected to a large and growing interdisciplinary literature on social interactions and social networks (see, e.g., Watts 2004; Jackson 2010; Ioannides 2012).

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Figure 9.3 Standardized effect of genetic distance on the absolute difference in per capita income, over time, 1820–2005. Source: Authors' calculations.

of industrialization is that the two processes started at different frontiers. We argue that the decline of fertility was associated with the diffusion of social and behavioral changes from France, in contrast with the spread of the Industrial Revolution, where England played a leading role. Again, the mechanisms at work can be interpreted in terms of barrier effects. The diffusion of the fertility transition and the spread of industrialization followed different patterns because societies at different relative distances from the respective innovators—the French and the English—faced different barriers to social learning, imitation, and adoption.

In sum, intergenerationally transmitted traits can potentially affect societal outcomes through a diverse range of complex mechanisms, both in terms of form of transmission (biological, cultural, dual) and mode of impact (directly or as barriers). Recent empirical evidence on major societal changes, such as the spread of industrialization and the diffusion of the fertility transition, suggest a complex interaction between such channels. Divergence in ancestrally transmitted traits may act as a temporary barrier to more recent social transformation. Eventually, societies that are historically and culturally distant from the innovation frontier also end up adopting novel norms and behaviors. Are such barrier effects at work in the case of institutional diffusion and transformation? A first step toward addressing this question is taken in the next section.

The Diffusion of Institutions

The close connection between institutions and development, emphasized in the economic literature (North and Weingast 1989; North 1990, 2005; Engerman and Sokoloff 1997; Acemoglu et al. 2001) suggests that one of the channels by which prosperity may spread is through the diffusion of novel institutions (e.g., democratic governance or the protection of property rights). There are several reasons to believe that institutions may diffuse internationally. First,

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the transition toward democracy has occurred gradually, in hand with industrialization and the demographic transition (Murtin and Wacziarg 2014). As we have argued, industrialization and the demographic transition also diffused internationally from the innovation frontiers, in proportion to ancestral distance from these frontiers (Spolaore and Wacziarg 2009, 2014). Second, democratization tends to happen in waves and in regional clusters (Huntington 1993), suggesting spillover effects from one location to another.

Is the spread of institutions from the institutional innovator (i.e., earlier democracies such as England or the United States) also related to ancestral distance? Is there a barrier effect induced by the degree of relatedness between populations, limiting the spread of institutions to societies that are distant from the institutional frontier?

To investigate these questions, we adopt a research design close to the one we employed in our past research to study the spread of the Industrial Revolution and of innovations.[11] We seek to relate bilateral institutional distance to a country pair's relative distance to the institutional frontier. In the following discussion, we use the United States as the frontier, but our results are unchanged if we use England instead. To measure institutions, we use two classes of variables, all measured for 1990 (to maximize the number of available observations): (a) a commonly used index of democracy (the Polity Index), which captures constraints on the exercise of executive power and broad political participation in competitive elections; (b) a series of subjective indices that capture economic institutions: the risk of repudiation of contracts, the risk of expropriation, and an index of the rule of law.[12] For each country pair, we calculate the absolute average difference in each of these indices, a measure of their institutional distance. We then regress these dependent variables on relative genetic distance to the United States as well as a series of measures of bilateral geographic barriers.[13] The results are presented in Table 9.3.

Across all four measures of institutional quality, we find that relative genetic distance bears a positive and statistically significant relationship with absolute differences in institutions. We interpret this result as indicating that greater separation times between populations introduce barriers to the adoption of better institutions. In terms of magnitudes, the effect is sizable: a standard

[11] Our work is related to recent research on the links between culture and institutions (e.g., Tabellini 2008, 2010). For a recent survey of the bidirectional causality between culture and institutions, see Alesina and Giuliano (2015). However, these authors explored the direct link between cultural traits and institutional features. In contrast, we seek to identify whether ancestral distance, which may partly or even predominantly capture distance in cultural traits, affects the diffusion of institutions. In other words, we are concerned here with barrier effects.

[12] Data source is the International Country Risk Guide, the same source sometimes used by Acemoglu and his coauthors, and many other scholars, to capture institutional quality.

[13] To account for spatial correlation in the dependent variable, we report standard errors that are clustered two ways (at the level of the first and the second country in each pair), as has now become common in this type of application.

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Table 9.3 Determinants of institutional differences. Dependent variables appear in column 2; *t* statistics are based on two-way clustered standard errors in parentheses.

	(1) Democracy (Polity Score) 1990	(2) Repudiation of Contracts 1990	(3) Risk of Expropriation 1990	(4) Rule of Law 1990
Genetic distance relative to the U.S.A., weighted	17.747** (2.92)	7.846** (3.36)	5.748* (2.51)	3.693* (2.53)
Absolute difference in latitudes	–0.865 (–0.49)	0.170 (0.32)	0.030 (0.07)	2.315** (5.63)
Absolute difference in longitudes	–1.636 (–0.98)	–0.707 (–1.33)	–0.620 (–1.44)	0.676* (2.09)
Geodesic distance (1000s of km)	0.338 (1.83)	0.067 (1.07)	0.039 (0.77)	–0.095* (–2.37)
1 for contiguity	–2.790** (–4.94)	–0.560** (–2.66)	–0.493* (–2.26)	–0.182 (–1.72)
=1 if either country is an island	–0.041 (–0.10)	0.092 (0.60)	–0.052 (–0.50)	0.151 (1.67)
=1 if either country is landlocked	0.093 (0.31)	0.114 (0.55)	0.104 (0.45)	–0.092 (–0.82)
=1 if pair shares at least one sea or ocean	–0.223 (–0.50)	–0.104 (–0.74)	–0.096 (–0.65)	0.032 (0.39)
Constant	6.134** (9.32)	1.995** (7.45)	1.805** (6.93)	1.134** (9.38)
# observations (# countries)	8,911 (134)	6,216 (112)	6,216 (112)	6,216 (112)
R-squared	0.043	0.061	0.048	0.139
Standardized beta (%)	12.83	18.79	15.70	14.19

* $p < 0.05$, ** $p < 0.01$

deviation increase in genetic distance is associated with an increase in institutional differences contained between 12.8% and 18.8% of each of these dependent variables' standard deviation. Geographic barriers also matter. While results vary somewhat across columns of Table 9.3 and across measures of distance, we generally find that geographic proximity is associated with smaller differences in institutions.

To further investigate the existence of barrier effects, in Table 9.4 we exploit the time dimension. We now focus on the index of democracy (the Polity Index) since the other indicators are not available for as long a time span. We seek to examine the diffusion of democracy around the third wave of democratization (Huntington 1993). Table 9.4 illustrates the diffusion process. In

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Table 9.4 Determinants of institutional differences. Dependent variable: absolute difference in Polity 2 democracy score; *t* statistics based on two-way clustered standard errors in parentheses; all regressions run on a sample of 4,560 country pairs from 96 countries.

	1960	1970	1980	1990	2000	2005
Genetic distance relative to the U.S.A., weighted	7.136	16.619*	25.478**	39.331**	16.563*	14.839*
	(1.13)	(2.29)	(2.97)	(4.49)	(2.46)	(2.36)
Absolute difference in latitudes	3.826*	7.399**	5.457**	–3.132	–4.074**	–3.846**
	(2.34)	(3.71)	(2.94)	(–1.65)	(–3.37)	(–3.13)
Absolute difference in longitudes	2.358*	3.839*	3.401*	–3.195	–1.625	–1.027
	(2.06)	(2.55)	(2.26)	(–1.76)	(–1.11)	(–0.74)
Geodesic distance (1000s of km)	–0.324*	–0.510**	–0.439*	0.458*	0.242	0.198
	(–2.41)	(–2.79)	(–2.32)	(2.26)	(1.61)	(1.38)
1 for contiguity	–2.354**	–1.562*	–2.474**	–3.821**	–2.139**	–2.348**
	(–3.58)	(–2.01)	(–3.69)	(–5.93)	(–3.80)	(–3.90)
= 1 if either country is an island	0.839	1.570*	1.078	–0.631**	–1.388**	–1.397**
	(1.48)	(1.98)	(1.62)	(–2.77)	(–5.48)	(–5.86)
= 1 if either country is landlocked	0.219	–0.442	–0.584	0.599	–0.308	–0.030
	(0.51)	(–1.07)	(–1.55)	(1.36)	(–0.41)	(–0.05)
= 1 if pair shares at least one sea or ocean	–0.566	–0.174	0.011	–0.225	–1.177*	–1.269**
	(–1.47)	(–0.32)	(0.03)	(–0.57)	(–2.49)	(–2.64)
Constant	8.047**	6.718**	6.835**	5.774**	6.825**	6.714**
	(16.58)	(10.65)	(10.58)	(8.43)	(8.92)	(9.01)
R-squared	0.018	0.053	0.048	0.089	0.038	0.037
Standardized beta (%)	4.327	9.796	14.45	24.10	11.24	9.954

* $p < 0.05$, ** $p < 0.01$

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1960, at the time of decolonization, many countries adopted nominally democratic institutions, only to revert soon thereafter to their institutional steady state (Barro 1999). This was the case for many formerly colonized countries in sub-Saharan Africa. Correspondingly, ancestral distance to the institutional frontier did not initially matter. By 1970, the fundamental determinants of democracy (low levels of income and education, a history of authoritarianism) had reimposed themselves, and democracy levels fell throughout much of the formerly colonized world. At this point, the effect of ancestral distance could be detected. As the third wave began with the democratization of Portugal in 1974, the standardized magnitude of the effect of genetic distance started to rise, reaching a peak in 1990 when the third wave was itself in full swing. As increasingly more countries, at successively greater ancestral distances from the institutional frontier, joined the democratic bandwagon, the effect of genetic distance fell again, although as of 2005 it has not yet disappeared. A prediction of our diffusion model is that, insofar as ancestral distance captures barriers across societies, ultimately it should no longer have an effect at the end of the diffusion process.[14]

More work needs to be done to establish fully the proposition that institutions diffuse internationally in proportion to a society's distance from the earlier institutional innovators (i.e., the institutional frontier). The empirical results from Table 9.4 show, however, that at least when it comes to the most recent wave of democratization, separation times from the institutional frontier do predict the dynamics of democratization. As with other outcomes from our past research, it is useful to think of the effect of deep-rooted factors on current institutions as resulting from barrier effects between societies, resulting from having undergone divergent histories.

Finally, as mentioned, there is an ongoing debate on the extent to which specific institutions have had a causal effect on development (for further discussion, see Spolaore and Wacziarg 2013). Here we have not attempted to estimate the effects of institutions on productivity or standards of living, but have focused directly on the determinants of the spread of institutional features (e.g., such as protection of property rights and political rights) associated with modern economic and/or political development. We do not claim, however, that these are the only institutions to have diffused across societies in recent times, or that the adoption of Western-style institutions (e.g., representative democracy) is a necessary or sufficient condition for modern economic growth, as shown by the experience of a few economically successful but undemocratic countries such as China. In principle, our approach could indeed be used to study the diffusion of alternative (and possibly economically deleterious)

[14] This is precisely what we found for the diffusion of the fertility transition in Europe, where we had the luxury of observing the entire span of the diffusion process, from the initial innovation in France to the ultimate adoption by all regions of Europe by the second half of the twentieth century (Spolaore and Wacziarg 2014).

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institutions, such as fascism or communism. We leave this intriguing line of inquiry for further research.[15]

Conclusion

Much has been learned from the recent literature on the deep roots of institutions and development. There is substantial persistence. Societies that developed centralized states, in the wake of the adoption of agriculture in the Neolithic era, transmitted these complex institutions to their descendants. Societies that adopted sophisticated technologies early in history tended to have the most advanced technologies in the preindustrial era, and then to develop and adopt industrial modes of production sooner. Yet there has also been a lot of change. Some fortunes were reversed in the wake of the colonial era, although the reversal is a feature more of locations than of populations: locations now populated by the descendants of those with advanced early institutions and technologies continue to enjoy the benefit of these early advantages. Institutions and technologies have evolved to become vastly more complex, and have diffused to locations and populations that did not benefit from initial advantages.

How can we make sense of this persistence and change? A narrative that relies exclusively on the persistent direct effects of early conditions on current outcomes would lead to a pessimistic conclusion: since one cannot change a society's history, what hope is there to alter the wealth of nations? Such a narrative would also face difficulties in accounting for change. Instead, we have focused on barrier effects. If ancestral differences in human traits introduce barriers to the diffusion of institutions and technologies, there is hope that these barriers can be overcome, and that, ultimately, even societies at a high ancestral distance from the innovator can adopt modern institutions and technologies.

The spread of economic development to East Asia is an example of how societies historically and culturally distant from the European innovators managed to adopt technological and institutional innovations in modern times. This experience is indeed consistent with the existence of long-term historical and cultural barriers, because such barriers operate on average, and societies may develop traits that make them closer to the innovator, or may even be able to sidestep barriers altogether thanks to historical contingencies. When Japan developed and modernized, it became a cultural foothold for South Korea and other neighbors. In contrast, North Korea illustrates how deleterious policies

[15] The spread of nondemocratic and totalitarian ideologies and institutions has often been the outcome of conflict and wars rather than of voluntarily adoption. Therefore, the study of their diffusion requires an explicit focus on peaceful cultural and historical barriers as well as on the determinants of conquests and wars. For an empirical analysis of the impact of cultural and historical relatedness on international conflict, see Spolaore and Wacziarg (2016).

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and institutions can kill economic and political development in a society, irrespective of historical and cultural affinities. More broadly, the study of specific instances of cultural and institutional change and diffusion across societies can shed light on the mechanisms underlying the spread of political and economic development.

In our past research, and in this chapter, we have documented how important historical and cultural barriers can be quantitatively. Measures of ancestral distance to the innovation frontier matters for a wide range of outcomes: the spread of the Industrial Revolution from England (Spolaore and Wacziarg 2009); the spread of the fertility transition from France (Spolaore and Wacziarg 2014); the more recent spread of modern technologies from advanced economies, chiefly the United States (Spolaore and Wacziarg 2012); and, documented here for the first time, the spread of democratic institutions during the third wave of democratization. The dynamic pattern of the effect of ancestral distance, in all these applications, is highly suggestive of a barrier effect: the effect of genetic distance rises during the initial phase of the diffusion process and falls later when a growing number of societies at successively greater genetic distance from the innovator adopt the institution or technology.

Policies to foster the spread of institutions and technologies should focus on reducing the barriers imposed by divergent historical paths across societies. Globalization is likely the strongest force to reduce barriers, as movements of goods, ideas, capital, and people help societies overcome the barriers to modern institutions and modern technologies. However, research also suggests that we cannot expect forces of globalization and economic integration to work automatically, irrespective of local cultures, histories, and traditions. The process of institutional and economic development is a long-term process of complex adaptation, whereby diverse societies with different cultures and histories gradually change in response to new internal and external incentives. These incentives are affected not only by economic variables, but also by factors traditionally studied by historians, linguists, anthropologists, biologists, political scientists, and sociologists. Future research needs to build on such interdisciplinary approaches to shed further light on the specific mechanisms that characterize economic and institutional development.

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