THE ECONOMICS OF GROWTH

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11 Institutions and Nonconvergence Traps[1]

11.1 Introduction

Do institutions matter for growth? A common prediction of the growth models with endogenous innovation in the preceding chapters is that they do! For example, the analysis in chapters 3 and 4 would suggest that long-run growth would be best enhanced by some combination of good property-rights protection (to protect the rents of innovators against imitation) and a good education system (to increase the efficiency of R&D activities and the supply of skilled manufacturing labor). Our discussion of convergence clubs in chapter 7 predicts that the same policies or institutions would also increase a country's ability to join the convergence club.

That institutions should influence economic development had already been convincingly argued by economic historians, in particular by Douglas North (see North and Thomas 1973; North 1990) and subsequently by Engerman and Sokoloff (1997, 2000). Thus, North and Thomas explain how the institutional changes brought about by trade and commercial activities led to the Glorious Revolution in 17th-century England. And North (1990) argues that the development of sedimentary agriculture followed the Neolithic revolution, which introduced communal property rights.

North (1990) defines institutions as the "rules or constraints on individual behavior" which in turn may be either formal (political constitutions, electoral rules, formal constraints on the executive, . . .) or informal (culture, social norms, . . .). Greif (1994, 2006) extends the notion of institution so that it encompasses not only the rules of the game as in North, but more generally all forms of economic organizations and finally the set of beliefs that shape the interaction between economic agents.

Two research teams over the past 10 years have made pathbreaking contributions showing the importance of institutions for economic development using historical cross-country data. A first team (see La Porta et al. 1998, 1999; Djankov et al. 2003; Glaeser et al. 2004) has emphasized legal origins as a determinant of institutions such as investors' rights, debt collection systems, or entry regulations. A second team (see Acemoglu, Johnson, and Robinson 2001, 2002; Acemoglu and Johnson 2005) has focused on colonial origins as a determinant of a country's institutions. These two lines of research have spurred heated debates, which we shall reflect upon in section 11.2.

Should we recommend the same institutions to all countries? The endogenous growth models developed in previous chapters suggest we should. In particular, they call for better property-rights protection and higher education investment

1. This chapter was jointly written with Erik Meyersson.

in all countries under all latitudes. However, in *Economic Backwardness in Historical Perspective*, Gerschenkron (1962) argues that relatively backward economies could more rapidly catch up with more advanced countries by introducing "appropriate institutions" that are growth-enhancing at an early stage of development but may cease to be so at a later stage.

Thus countries like Japan or Korea managed to achieve very high growth rates from 1945 up until the 1990s with institutional arrangements involving long-term relationships between firms and banks, the predominance of large conglomerates, and strong government intervention through export promotion and subsidized loans to the enterprise sector. These policies in turn depart significantly from the more market-based and laissez-faire institutional model pioneered by the United States and currently advocated for all countries as part of the so-called Washington consensus.

In section 11.3 we reconcile new growth theories with Gerschenkron's views, thereby addressing the concern that growth theory can only deliver universal, one-size-fits-all policy prescriptions (legal reforms to enforce property rights, investment climate favorable to entrepreneurship, education, macrostability, . . .) to maximize the growth prospects of a country or sector, and does not apprehend structural transformations in the process of convergence. More specifically, we analyze some general implications of the notion of "distance-dependent" appropriate institutions, by which we mean institutions that are growth enhancing only for countries at a certain stage of technological development. Technological development in turn is measured by a country's current productivity divided by current frontier productivity (the variable a in chapter 7). In particular, we show how the failure to adapt institutions to technological development may generate nonconvergence traps whereby a country's average productivity (or per capita GDP) remains bounded away from frontier levels. The section is organized as follows: Section 11.3.1 provides empirical evidence to motivate the notion of appropriate institution. Section 11.3.2 then develops a simple model of appropriate institutions and growth, and illustrates the notion of nonconvergence traps for countries that fail to adapt their institutions and policies as they develop.

11.2 Do Institutions Matter?

In this section[2] we briefly discuss two main attempts at showing a causal relationship between economic institutions (property-rights protection, investors' protection, . . .) and economic performance measured by the aggregate income or the average growth rate of a country. The first attempt emphasizes differences in legal codes across countries. The second attempt emphasizes differences in colonial histories, in particular in the extent to which European settlers managed to adapt to local conditions, as measured by their mortality rates in the various colonization areas.

2. We encourage the student to look at the appendix at the back of the book before reading this section.

11.2.1 Legal Origins

The main idea underlying the paper "Law and Finance" by La Porta and colleagues (1998), along with its various extensions, is that differences in legal codes and organizations should influence growth-enhancing institutions such as contractual enforcement, investor protection, and entry regulations. In particular this approach stresses the differences between the French civil law code and the English common law code. The former, more centralized, relies on detailed written codes that have to be strictly followed by all judges. The latter, more decentralized, relies on broader legal principles and legal experience (so-called jurisprudence), which can be more freely interpreted by judges. The presumption is that common law systems provide a more flexible environment for firms and entrepreneurs and that such systems facilitate financing and investment by inducing more efficient and speedy debt recovery processes.

La Porta and colleagues (1998) use a sample of 49 countries to show that investors' rights and contractual enforcement are highest in countries under common law, intermediate in countries under German or Scandinavian civil law, and lowest in countries under French civil law.

Similarly, La Porta and colleagues (1999) show that countries with common law systems are also countries with better business regulations and better property-rights protection. More recently, Djankov and colleagues (2003) have used data from 109 countries to show that countries under French civil law systems show longer delays for dispute resolution (the authors refer to this as procedural formalism) and consequently lower efficiency when it comes to evicting nonpaying tenants or collecting a bounced check. Thus it is no surprise that countries under French civil law tend to have a lower degree of financial development than countries under common law systems. This correlation, pointed out by Levine, Loayza, and Beck (2000), made it possible to use legal origins as an instrument for financial development when analyzing the role of financial development in growth and convergence in chapter 7.

Finally, Djankov and colleagues (2002) showed that countries with French and German civil law systems show more regulations on product and labor markets than their common lawn counterparts, where entry regulations are measured by

the number of procedures entrepreneurs have to go through when creating a new firm.

A main limitation of this approach is that it remains cross-sectional, and in particular does not control for country or region fixed effects. Another problem with this approach is that it does not explain why France, which initiated the civil law system, performs much better than its colonial transplants. In fact, France itself performs rather well in all the above regressions. This brings us to the second approach based on colonial origins.

.2 Colonial Origins

In their paper "The Colonial Origins of Comparative Development," Acemoglu, Robinson, and Johnson (2001), henceforth AJR, found a clever instrument for economic institutions in colonized countries, namely, the mortality rate of European settlers in these countries. Their idea is that (1) European colonizers could decide the extent to which they truly wish to settle in the new colony and build institutions rather than just extract resources; (2) this decision depends upon how well colonizers could adapt to the local climate and geography, which in turn is reflected in mortality rates of European bishops, sailors, and soldiers from local illnesses; and (3) institutions created during the colonization period persist after independence.

In other words, in colonies where they could truly settle, Europeans would try to replicate their own institutions, whereas colonies where they do not settle would be primarily used as extractive states, with little investment in institutions, in particular to protect property rights. Europeans would thus typically choose to settle in colonies where the disease risk was lower. And mortality rates, recorded by soldiers, bishops, and sailors between the 17th and the 19th centuries, should reflect that risk.

More precisely, AJR perform a two-stage least-square regression[3] where (1) they regress per capita GDP of a country in the sample on expropriation risk, which is what we call the second-stage regression, and (2) they regress expropriation risk on settlers' mortality rates, which is what we call the first-stage regression. Table 11.1 shows the results from this two-stage regression procedure. The second-stage regression is shown at the top of the table; the first stage is shown at the bottom. The first two columns show the OLS regression of per capita GDP in 1995 on expropriation not instrumented by settler mortality (column 2 includes only the

3. See the appendix.

Table 11.1
Institutions and Income Per Capita 1960–2000

	(1) OLS	(2) OLS (Sample of Former Colonies)	(3) 2SLS	(4) 2SLS (Controlling for Schooling)
			Panel A. Second-stage regressions	
Expropriation risk	0.293***	0.375***	0.663**	1.908
	(0.053)	(0.063)	(0.288)	(3.848)
Years of schooling				−0.551
				(1.539)
Observations	118	63	63	60
Adj. *R*-squared	0.64	0.73		
Instrumented variable			Expr. risk	Expr. risk
Instrument			Log settler mortality	Log settler mortality
			Panel B. First-stage regressions	
Log settler mortality			−0.402**	−0.099
			(0.199)	(0.228)
R-squared			0.371	0.542
Observations			63	60

Dependent variable is log GDP per capita.

sample of former colonies) . The next columns show the regression using settler mortality as instrument for expropriation risk. This table suggests, first, that expropriation risk is highly positively correlated with economic performance in 1995 and, second, that settler mortality is a strong instrument for expropriation risk.[4,5]

However, as shown in column 4, the correlation between expropriation risk and per capita log GDP loses significance when we control for years of schooling. In fact, using the same data as AJR, one can look at what happens when one performs the symmetric exercise where (1) settler mortality is used as an instrument for schooling in the first-stage regression, and (2) income is regressed over schooling instrumented by settler mortality and over expropriation risk not instrumented. Table 11.2 summarizes the findings. As we see in column (2), settler mortality is a good instrument for schooling (first-stage regression results) and income or growth is significantly correlated with schooling but no longer with expropriation risk (second-stage regression results).

4. See the appendix.

5. AJR establish similar results when the left-hand side variable in the second-stage regression is the average growth rate of per capita GDP between 1960 and 2000.

Table 11.2
Alternative Specifications: Institutions and Income Per Capita

	(1) 2SLS (Controlling for Initial Income)	(2) 2SLS (Instrumenting for Schooling)	(3a) 2SLS (Instrumenting for Schooling and Institutions)	(3b)
		Panel A. Second-stage regressions		
Expropriation risk	0.410*	0.083	0.386	
	(0.212)	(0.102)	(0.790)	
Years of schooling		0.346***	0.214	
		(0.111)	(0.458)	
Log GDP per capita in 1960	0.641***			
	(0.237)			
Observations	57	60	59	
Instrumented variable	Expr. risk	Schooling	Expr. risk, schooling	
Instruments	Log settler mortality	Log settler mortality	(i) Log settler mortality, (ii) Pop. density in 1500	
		Panel B. First-stage regressions		
			(a) Expr. risk	(b) Schooling
Log settler mortality	–0.309	–0.624***	–0.335	–0.738***
	(0.191)	(0.227)	(0.238)	(0.208)
Log population density in 1500			–0.274**	–0.395**
			(0.106)	(0.168)
R-squared	0.517	0.732	0.447	0.700
F-test, excl. instruments (*p*-value)			6.03	10.79
			(0.004)	(0.000)
Observations	57	60	59	59

Dependent variable is log GDP per capita.

So where do we stand at the end? One interpretation, advocated by Glaeser and colleagues (2004), is that the main contribution of colonial settlers was to build physical and human capital, not so much institutions. The other interpretation, which has our preference, is that schooling *is* an institution as much as property-rights protection and entry regulations. At least one thing this discussion suggests is that more can be learned by (1) looking directly at more specific institutions and (2) moving from cross-country to more disaggregated data. This point will come out again when analyzing the relationship between growth and various policy determinants in part III.

11.3 Appropriate Institutions and Nonconvergence Traps

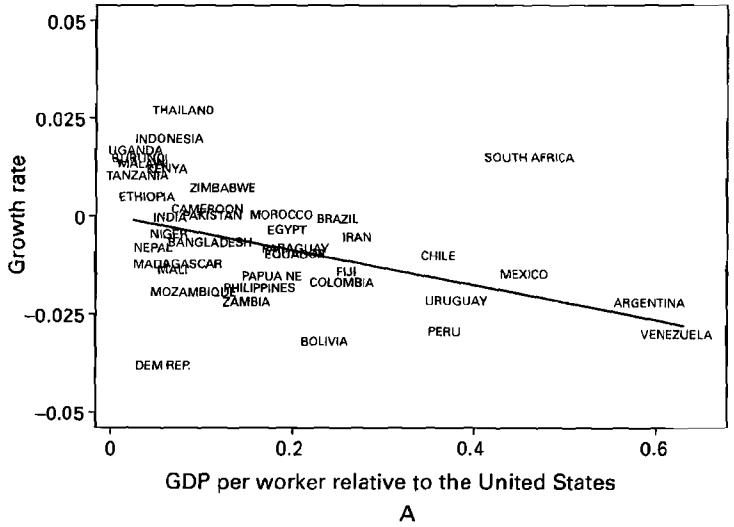
11.3.1 Some Motivating Facts

Using a cross-country panel of more than 100 countries over the 1960–2000 period, Acemoglu, Aghion, and Zilibotti (2006), henceforth AAZ, regress the average growth rate on a country's distance to the U.S. frontier (measured by the ratio of GDP per capita in that country to per capita GDP in the United States) at the beginning of the period. Then, splitting the sample of countries into two groups corresponding to countries that are more open than the median and to countries that are less open than the median, AAZ show that average growth decreases more rapidly as a country approaches the world frontier when openness is low. To measure openness, one can use imports plus exports divided by aggregate GDP. But this measure suffers from obvious endogeneity problems: in particular, exports and imports are likely to be influenced by domestic growth. To deal with this endogeneity problem, Frankel and Romer (1999) construct a more exogenous measure of openness that relies on exogenous characteristics such as land area, common borders, geographical distance, and population, and it is this measure that we use to measure openness in figure 11.1.

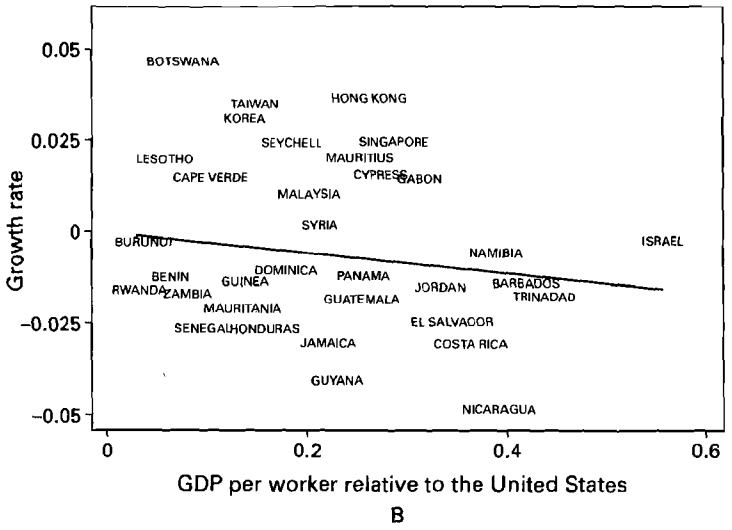
Figures 11.1A and 11.1B show the cross-sectional regressions: here, average growth over the whole 1960–2000 period is regressed over the country's distance to the world technology frontier in 1965 for less open and more open countries, respectively. As in previous chapters, a country's distance to the frontier is measured by the ratio between the log of this country's level of per capita GDP and the maximum of the logs of per capita GDP across all countries (which in fact corresponds to the log of per capita GDP in the United States).

Figures 11.1C and 11.1D show the results of panel regressions where we decompose the period 1960–2000 in five-year subperiods, and then for each subperiod we regress average growth over the period on distance to frontier at the beginning of the subperiod for less open and more open countries, respectively. These latter regressions control for country fixed effects. In both cross-sectional and panel regressions we see that while a low degree of openness does not appear to be detrimental to growth in countries far below the world frontier, it becomes increasingly detrimental to growth as the country approaches the frontier.

AAZ repeat the same exercise using entry costs faced by new firms instead of openness. Entry costs in turn are measured by the number of days to create a new firm in the various countries (see Djankov et al. 2002). Here, the country sample is split between countries with high barriers relative to the median and countries

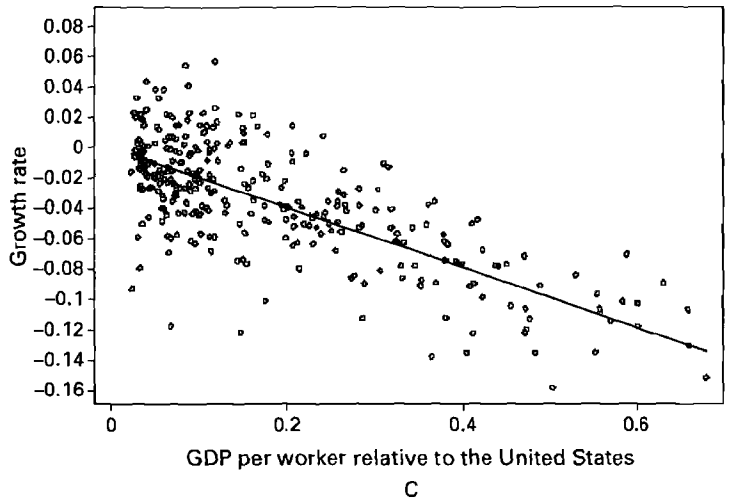


A



B

Figure 11.1
Growth and distance to frontier for more and less open countries: *A* and *C*, Closed economie *B* and *D*, Open economies; *C* and *D*, Fixed effects



C

D

Figure 11.1
Continued

with low barriers relative to the median. Figures 11.2A and 11.2B show the cross-sectional regressions, for high and low barrier countries, respectively, whereas figures 11.2C and 11.2D show the panel regressions for the same two subgroups of countries. Both types of regressions show that while high entry barriers do not appear to be detrimental to growth in countries far below the world frontier, they become increasingly detrimental to growth as the country approaches the frontier.

These two empirical exercises point to the importance of interacting institutions with level of development in growth regressions: openness is particularly growth enhancing in countries that are closer to the technological frontier; entry is more growth enhancing in countries or sectors that are closer to the technological frontier; in chapter 13 we will see that higher (in particular, graduate) education tends to be more growth enhancing in countries or in U.S. states that are closer to the technological frontier, whereas primary and secondary (possibly undergraduate) education tends to be more growth enhancing in countries or in U.S. states that are farther below the frontier.

In the next section we model the notion of appropriate growth institution, and then we analyze the possibility that a country may remain stuck with institutions that might have been growth enhancing at earlier stages of development but that prevent fast growth as the country moves closer to the world technology frontier.

11.3.2 A Simple Model of Distance to Frontier and Appropriate Institutions

11.3.2.1 The Setup

The following setup combines the innovation model in chapter 4 with the convergence model in chapter 7. In each country, a unique final good, which also serves as numéraire, is produced competitively using a continuum of intermediate inputs according to

$$Y_t = \int_0^1 A_{it}^{1-\alpha} x_{it}^{\alpha} di \tag{11.1}$$

where A_{it} is the productivity in sector i at time t, x_{it} is the flow of intermediate good i used in general good production again at time t. and $\alpha \in [0, 1]$.

As in chapter 4 (nondrastic innovation case), ex post each intermediate good producer has a constant marginal cost equal to 1 and faces a competitive fringe of imitators that force her to charge a limit price $p_{it} = \chi > 1$. Consequently, equilibrium monopoly profits (gross of the fixed cost) in sector i at date t are simply given by

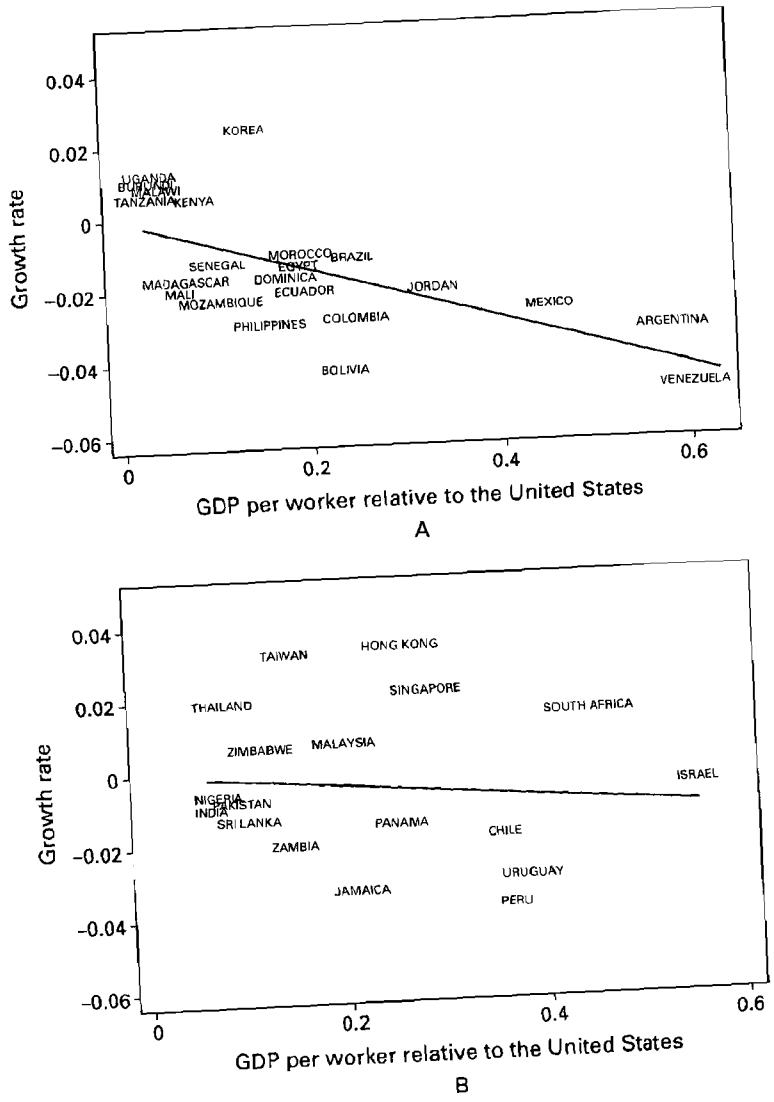


Figure 11.2
Growth and distance to frontier for high- and low-barrier countries: *A* and *C*, High barriers; *B* and *D*, Low barriers; *C* and *D*, Fixed effects