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Converging to Convergence

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I. Introduction

Studies of convergence in the 1990s found no tendency for poor countries to catch up with rich ones. If anything, there was divergence: rich countries growing faster than poor. National accounts data showed weak divergence across a large set of countries since the 1960s (Barro 1991), whereas historical data, for a smaller set of countries, showed stronger divergence starting as early as the sixteenth century, with the ratio of per-capita incomes between the richest and the poorest countries increasing by a factor of five from 1870 to 1990 (Pritchett 1997). The lack of convergence was a major challenge to models where growth is based on accumulation of capital subject to decreasing returns or where copying technology is easier than developing new technologies. It led to two responses: first, a rejection of the neoclassical growth models and the development of poverty trap models and AK endogenous growth models, some of which predict divergence (Romer 1986); second, an emphasis on underlying determinants of steady-state income, such as human capital, policies, and institutions, leading to growth regressions and tests of convergence conditional on them (Barro and Sala-i-Martin 1992; Durlauf, Johnson, and Temple 2005).

To update the stylized facts of convergence, we revisit these empirical exercises with 25 years of additional data. We consider global trends in income and growth, as well as factors that might determine them—which we term *the correlates of growth*—such as human capital, policies,

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institutions, and culture. We find substantial changes since the late 1980s in growth, in its correlates, and in the cross-country relationship between them. Although we do not provide a full analysis of the reasons, or causal determinants, we think this is still useful, as any understanding of development should match the cross-country patterns.

We begin with absolute convergence—poor countries growing faster than rich, unconditionally—and document convergence in income per capita in the last 2 decades. To study the trend in convergence, we regress 10-year growth in income per capita on income per capita and consider the evolution of the relationship since 1960. Doing so shows a steady trend toward convergence since the late 1980s, leading to absolute convergence since 2000, precisely when empirical tests of convergence fell out of fashion. In terms of magnitude, from 1985 to 1995 there was divergence in income per capita at a rate of 0.5% annually, whereas from 2005 to 2015 there was convergence at a rate of 0.7%.[1] Although lower than the 2% "iron law of [conditional] convergence" (Barro 2012), this still represents a substantial change. Looking further back to 1960, when the widespread collection of national income data began, the trend in convergence was initially flat, with neither convergence nor divergence, followed by a decade of a trend toward divergence in the late 1970s and early 1980s.

Breaking down the trend toward absolute convergence since 1990, by subsets of countries, provides a fuller picture of the change. There has been both faster catch-up growth and a slowdown of the frontier. The richest quartile of countries had the fastest growth in the 1980s but the slowest growth since, being flat in the 1990s and then declining since 2000. In contrast, the three other quartiles all experienced substantially accelerating growth through the 1990s and early 2000s, inconsistent with certain poverty trap explanations for the change in convergence, in which countries catch up once above a certain income threshold. Fewer lower-income countries have had growth disasters since the mid-1990s—but removing them has little effect on the recent trend toward convergence; instead, it removes the divergence in the late 1970s and early 1980s. The trend is also not driven by any one specific region, and convergence becomes stronger upon removing sub-Saharan Africa or the bottom quartile of the income distribution from the data set.

Is convergence in the last 20 years just a blip, or does it represent a turning point in world history? It certainly could be a blip, as others have argued (Johnson and Papageorgiou 2020), for example due to high commodity prices. Yet the trend has lasted for 25 years and is robust to removing resource-rich countries, so we entertain the idea that it represents a turning point and consider its potential causes.

Within the framework of conditional convergence, we classify possible causes into two broad groups. First, those that lead to faster convergence conditional on growth correlates, which could include faster spread of technologies due to globalization, as well as greater capital and labor mobility. Second, our main focus, convergence in the growth correlates themselves—human capital, policies, institutions, culture—may close the gap between unconditional and conditional convergence. Although recent literature on economic growth and institutions emphasizes the stability and persistence of such correlates, using their historical determinants to identify their causal effects on economic outcomes (Acemoglu, Johnson, and Robinson 2001; Nunn 2008; Dell 2010; Michalopoulos and Papaioannou 2013), the finding that certain determinants of growth are highly persistent is not inconsistent with others changing, potentially rapidly, and being subject to global influences on policies and culture, for example.

To study whether growth correlates have changed, we classify them into four groups: (a) enhanced Solow fundamentals (investment rate, population growth rate, and human capital)—variables that are fundamental determinants of steady-state income in the enhanced Solow model (Mankiw, Romer, and Weil 1992); (b) short-run correlates—variables considered by the 1990s growth literature that may change in a relatively short time scale, typically policies; (c) long-run correlates—those that change slowly if at all, and for which we will not have time variation, typically historical determinants of institutions and geography; and (d) culture. Far from being static, even among highly persistent correlates we find that many have undergone large changes and themselves converged substantially across countries, toward those of rich countries.

For the Solow fundamentals and short-run correlates, we examine 35 variables in six categories: Solow fundamentals, labor force, political institutions, governance quality, fiscal policy, and financial institutions. To tie our hands over which variables we include, and hence reduce the risk of specification search, we started from a list of variables commonly used in growth regressions, from the *Handbook of Economic Growth* chapter entitled "Growth Econometrics" (Durlauf et al. 2005). We then constrained ourselves to those variables that were available for at least 50 countries by 1996, and we chose to focus on the period 1985–2015 as a compromise between the number of countries and the number of time periods. Among the 20 variables that are comparable across time, we find significant β-convergence (a negative slope of growth regressed on level) in 17. Only credit to the private sector diverged. Moreover, of the 18 variables that were correlated with income in 1985, 15 "improved" on average, meaning they converged toward those associated with higher income. For a subset of correlates, we are also able to look further back, and we find similar, albeit slower, trends in 1960–85.

Using different rounds of the World Values Survey (WVS), we also find evidence of convergence in culture. While culture does show persistence, eight out of the 10 cultural variables we consider have been converging since 1990. For example, views on inequality, political participation, the importance of family, traditions, and work ethic have all been converging. While limited, the results of the exercise are consistent with papers in sociology and psychology studying cultural convergence (Inglehart and Baker 2000; Santos, Varnum, and Grossmann 2017). In contrast, convergence was unlikely or impossible for long-run correlates, and we do not have time variation to test for it.

Are these two changes since the late 1980s related: the trend toward convergence in income and the convergence of many of the correlates of growth? We are naturally unable to do a full causal analysis, and causality can run both ways. On the one hand, an extensive empirical literature argues that such correlates are important for economic development (Glaeser et al. 2004; Acemoglu, Johnson, and Robinson 2005), and the convergence literature itself turned toward convergence conditional on correlates (determinants of the steady state). On the other hand, modernization theory suggests that causation may run the other way, with converging incomes causing policies, institutions, and culture to converge. While recent literature uses instrumental variables to provide evidence on both directions of causation (Acemoglu et al. 2001, 2008, 2019; Dell 2010; Michalopoulos and Papaioannou 2013), these studies build on earlier analysis that focused on stylized facts from empirical cross-country relationships (Barro 1996; Sala-i-Martin 1997; Durlauf et al. 2005; Rodrik 2012), facts that any theory of growth should fit and which we revisit and update.[2]

To link the trends in growth and its correlates, we develop a simple empirical framework, revisiting two central cross-country relationships and documenting how they have changed since the 1980s. First, regressing correlates on income; a cross-sectional representation of the modernization hypothesis. Second, regressing growth on correlates, controlling for income; the basic specification for both growth regressions and tests of conditional convergence. By the omitted variable bias formula, the gap between absolute convergence and conditional convergence is then given by the product of the slopes of these two relationships (correlate-income slopes and growth-correlate slopes), allowing us to break down the trend in absolute convergence into trends in these slopes, together with any trend in conditional convergence. In the main exercise, we do so comparing 1985 to the present, as that is when we have the best data and can run a balanced panel exercise. In supplementary analysis, we also present trends since 1960, which is important as we want to understand why there was a change in income convergence in the late 1980s.

While the cross-sectional relationships between income and the correlates have changed in levels, their slopes have mostly remained stable, despite large changes in both income and the short-run correlates. Among 32 Solow and short-run correlates, regressing the cross-sectional correlate-GDP slope of 2015 on that of 1985 gives coefficients of 0.90 and 0.89, respectively, and R^2 of 0.90 and 0.70. Moreover, although there is substantial prediction error by individual correlate, on average Solow and short-run correlates themselves have changed as much as would have been predicted by the changes in income, given the baseline cross-country relationship between the two.

In contrast, growth-regression coefficients have shrunk substantially across the period and show relatively little autocorrelation. The coefficients of the Solow fundamentals have remained the most stable, with a slope of 0.86 and an R^2 of 0.95 when regressing coefficients in 2005 on those in 1985. The coefficients of short-run correlates have shrunk the most, such that there is almost no correlation in coefficients between the periods (slope 0.18, R^2 0.06). For example, in 1985, a 1 standard deviation higher Freedom House political rights score predicted 0.6% higher annual gross national product (GDP) growth for the subsequent decade, yet the predictive power is negligible in the decade 2005–15. Long-run correlates and culture fall somewhere between the two, with coefficients that are somewhat stable across the periods, although on average they also shrank.

As a result of the flattening of the growth-correlate relationships, absolute convergence converged toward conditional convergence, by the omitted variable bias formula. This helps to explain the trend toward absolute convergence but has conditional convergence itself also become faster? While conditional convergence regressions typically condition on multiple correlates, our baseline specification conditions on one variable at a time, because of the difficulty in forming a balanced panel with multiple correlates and to tie our hands in terms of specification search. In our multivariate analysis, although not our main focus, we find no obvious trend in conditional convergence itself, which held throughout the period.

These results suggest an interpretation that is consistent with neoclassical growth models. Conditional convergence has held throughout the period. Absolute convergence did not hold initially, but as human capital, policies, and institutions have improved in poorer countries, the difference in institutions across countries has shrunk, and their explanatory power with respect to growth and convergence has declined. As a result, the world has converged to absolute convergence because absolute convergence has converged to conditional convergence.

However, this narrative leaves a key question unanswered: Why did the growth-regression coefficients shrink? One interpretation, consistent with a Fukiyama end of history view, is that policies and institutions used to matter, but now that they have converged, they matter less—their effects are nonlinear. For example, perhaps terrible institutions are bad for growth, but so long as institutions are not disastrous, they matter much less, and there is convergence. However, our results could also be viewed as demonstrating the limits of our collective understanding: many of the policies that were significant in growth regressions in the 1990s no longer significantly predict growth today, and basic patterns of divergence that held for centuries have not held for the past 20 years. Consistent with this, perhaps earlier growth-regression specifications suffered from an overfitting problem and are now failing an out-of-sample test using subsequent data? Relatedly, it is natural to think that there is a very large number of factors that determines steady-state income—some observable, many unobservable. The correlation between the observable and unobservable determinants may have shrunk. While these alternatives would also explain the shrinking of the gap between absolute and conditional convergence, they cannot explain the trend toward absolute convergence, although that could result from faster conditional convergence. The multitude of possible interpretations acts as a reminder of the difficulty of projecting the current trends we document forward, and the dangers of extrapolating from trends over the past quarter century, especially considering rising authoritarian populism, climate change, and pandemic threats, a theme we return to in the conclusion.

This paper describes trends in major macroeconomic variables and the relationships between them, some of which have changed substantially in the last 20 years. The goal is descriptive, not causal. The first literature we contribute to is that regarding convergence, which flowered in the 1990s. Despite absolute convergence being a central prediction of foundational growth models, multiple papers found no evidence for absolute convergence in incomes across countries (Barro 1991; Pritchett 1997) but evidence of convergence within countries and across countries conditional on similar institutions (Barro and Sala-i-Martin 1992). While we identify off cross-country variation, Caselli, Esquivel, and Lefort (1996) and Acemoglu and Molina (2022) argue that countries should have fixed effects in convergence regressions, corresponding to their individual steady-state incomes. The tradeoffs are discussed at length in Durlauf et al. (2005), and we discuss our specification choice in Section II. In short, we think that the country fixed effects absorb exactly the variation relevant for studying convergence. Consistent with this, if we allow country fixed effects to vary by decade, then they themselves have converged since the 1990s, so that our results do still appear in that framework but are just absorbed into the "nuisance" parameters. More recently there have been several important additions to the classic convergence findings. Rodrik (2012) looks specifically at manufacturing and shows that within manufacturing, there has been absolute convergence. In a paper closely related to ours, Grier and Grier (2007) also consider convergence both in income and in policies and institutions from 1961 to 1999. They contrast convergence in policies and institutions with divergence in incomes, arguing that this difference is hard to reconcile with neoclassical growth models. We agree with their conclusion for the period 1960–90 but benefit from 20 years of additional data, and we argue that convergence changed around 1990 and is since consistent with models of neoclassical growth and inconsistent with a class of endogenous growth theory models that predict divergence, such as AK models (Romer 1986) or some poverty trap models.

This is not the only paper to revisit the question of convergence with updated data. Roy, Kessler, and Subramanian (2016), in particular, make the point that there has been absolute convergence in the last 20 years, and in concurrent work to ours, Patel, Sandefur, and Subramanian (2021) emphasize how this is in contrast to the previous stylized facts about convergence. Johnson and Papageorgiou (2020), in contrast, also use the latest data and conclude that there is still no absolute convergence. The difference results in part from Johnson and Papageorgiou (2020) considering convergence from a fixed base date (1960), while we consider the trend in convergence over a moving time interval, and in part because we are willing to speculate that the trend in the last 25 years represents a fundamental change. Indeed, although we find a sustained trend toward convergence, we only find actual convergence for a relatively short period, whereas historically divergence has been the norm for several hundred years (Pritchett 1997).

The paper also adds to the literature on the effects of culture and institutions. Recent papers use historical variation to identify the effect of institutions and culture on income, using either instruments (Acemoglu et al. 2001; Algan and Cahuc 2010) or spatial discontinuities (Dell 2010), and generally find that both play a central role. That empirical strategy requires focusing on long-run, persistent components of steady-state determinants, which can easily slide into a pessimistic view: the things that matter for growth can only change very slowly. However, although some, such as legal systems and trust, have deep historical roots and may change very slowly (Michalopoulos and Papaioannou 2013), many change rapidly, and there is no contradiction in culture both having a long-run effect and being subject to recent change. For example, gender roles have deep and important historical determinants (Alesina, Giuliano, and Nunn 2013), but they have also changed substantially in the last 50 years, differentially across countries. While historical determinants continue to persist, we should also remain open to asking how recent changes in policies and institutions have affected growth, especially when considering policy changes.

Our growth-regressions exercise also provides an out-of-sample test of sorts for the predictive power of policies and institutions: with a limited sample size and many potential covariates, the growth-regressions literature is vulnerable to overfitting; events since the publication of earlier papers provide a (limited) out-of-sample data set (Hastie, Tibshirani, and Friedman 2009).

Finally, in studying changes to, and convergence in, policies, institutions, and culture, the paper adds to expansive literatures in political science, sociology, and psychology whereby the diffusion and convergence of numerous policies, institutions and cultural traits have been documented and studied (Dobbin, Simmons, and Garrett 2007).[3] Some of the changes in correlates have been gradual, possibly consistent with modernization theory (Inglehart and Baker 2000; Acemoglu et al. 2008), and indeed we do find that on average changes in correlates are consistent with predictions from income growth, based upon the cross-country relationship. However, many recent changes in policies and institutions are dramatic, such as global trends in the adoption of VATs, or marriage equality, or the Me Too movement, which may be better thought of as technology adoption through information diffusion. This technology diffusion may be passive or may, for example, result from the work of international organizations, which provide norms and information on perceived best practices (Clemens and Kremer 2016) and sometimes directly incentivize the adoption of different policies through conditionality. For example, the Washington Consensus encouraged lower tariffs, lower inflation, and privatization of state-owned firms, all of which have been broadly adopted since. The end of the cold war ushered in a period of growth in democracy. In a closely related paper, Easterly (2019) argues that such Washington Consensus reforms may have been better for growth than previously believed, as growth has been higher recently in countries that adopted them. Finally, convergence and diffusion of culture are central topics in sociology and psychology. Two recent examples studying them, using the WVSs (among other data sources) as we do, are Inglehart and Baker (2000) and Santos et al. (2017).

The paper proceeds as follows. In Section II, we present the results on absolute convergence in income per capita and document a trend toward convergence since the 1990s. In Section III, we consider global trends in the correlates of growth—policies, institutions, human capital, and culture—and document considerable convergence across multiple dimensions. In Section IV, we relate the trend toward convergence in income to the convergence in the correlates of growth, first considering the cross-country relationships between income and correlates (modernization theory), which have remained stable, then turning to the cross-country relationships between correlates and growth (growth regressions), which have flattened, and finally turning to the gap between unconditional and conditional convergence, which has shrunk. Section V concludes.

II. Convergence in Income

Neoclassical growth models predict convergence toward steady-state income: poor countries should catch up with rich countries, at least among countries with similar underlying determinants of steady-state income. Empirical tests in the 1990s of absolute convergence—convergence across countries without conditioning on determinants of steady-state income—found little evidence for it: if anything, rich countries were growing faster than poor (Barro 1991). We begin by revisiting these tests of absolute convergence, with 25 additional years of data. We use the same data sources and focus mainly on β-convergence, defined below.[4]

A. *Empirical Setup: Measuring Convergence*

The convergence literature in the 1990s used three different data sets. First, standard cross-country sources such as the World Development Indicators (WDIs) and the Penn World Tables (PWT), which covered a sizeble span of countries from the 1960s onward. Second, the Maddison data set, which collected many sources of data to derive income per capita going back much further in time, for a smaller set of countries, which showed that divergence had been the norm for several hundred years (Pritchett 1997). Third, within-country panel data sets, to look at convergence within countries. For example, Barro and Sala-i-Martin (1992) examined convergence within the United States.

Our goal is to document what has happened to global cross-country convergence since the heyday of the literature in the 1990s. As such, we use the standard cross-country data sources, which cover 1960 to the present. In the main specification, we use the GDP per capita, adjusted for Purchasing Power Parity (PPP), from the Penn World Tables v10.0.[5] It is an unbalanced panel, as for many countries GDP per capita data only becomes available partway through the period. Nevertheless, we use the unbalanced panel for our main specification so as not to drop many of the poorer countries that become available later in the period (we also show robustness to using balanced panels, which make little difference to our results). We also drop very small countries and those that are extremely reliant on natural resource rents, as is common in studies of convergence. Specifically, we drop countries whose maximum population during the period was <200,000 and those for whom natural resources accounted for at least 75% of GDP (as reported in the WDIs) at some time during the period.[6]

We examine both β-convergence and σ-convergence. β-convergence is when poor countries grow faster on average than rich, whereas σ-convergence is when the cross-sectional variance of (log) income per capita is falling over time. The relationship between the two notions of convergence is well documented (Barro and Sala-i-Martin 1992; Young, Higgins, and Levy 2008). We focus on β-convergence for most of the analysis, with equivalent results for σ-convergence reported in the appendix.

Formally, the β-convergence coefficient from time t to time $t + \Delta t$ is the coefficient β in the following country-level regression:

$$\log(\text{GDPpc}_{i,t+\Delta t}) - \log(\text{GDPpc}_{i,t}) = \alpha + \beta \log(\text{GDPpc}_{i,t}) + \epsilon_{i,t}$$

where $\log(\text{GDPpc}_{i,t})$ is log GDP per capita of country i at time t. To show how β-convergence has changed over time, we plot β_t versus t, where β_t comes for the following country-year level regression, clustered at the country level (μ_t is a year fixed effect on growth):

$$\log(\text{GDPpc}_{i,t+\Delta t}) - \log(\text{GDPpc}_{i,t}) = \beta_t \log(\text{GDPpc}_{i,t}) + \mu_t + \epsilon_{i,t}. \tag{1}$$

Much of the existing empirical convergence literature plots how β varies when holding the starting point t fixed (often at 1960) and varying the end point, $t + \Delta t$. Since we are interested in how the process of convergence may itself have changed over time, we instead hold Δt fixed and vary t. In the main specification, we use 10-year growth averages, that is, $\Delta t = 10$.[7]

B. *Results: Converging to Convergence*

Figure 1 shows the scatter plot and regression of equation (1) for each decade since 1960. Convergence corresponds to a negative slope, and the shift to convergence since 2000 can clearly be seen in the raw data. Figure A2 presents summary boxplots of these basic scatter plots, plotting the average growth by income quintile for each decade.

Figures 2*A* and 2*B* show the β- and σ-convergence coefficients from these regressions over the whole period of 1960–2007. The first striking result is that there has been absolute convergence since the late 1990s, precisely when the best-known empirical tests of convergence were published. The point estimate for β-convergence becomes negative in the early 1990s, becoming significant in the late 1990s and staying significant since. Table 1 shows a point estimate of –0.65 in the 2000s, and –0.76 in the 10 years after 2007, the most recent period we can consider. σ-convergence, represented by a negative slope in panel *B* of figure 2, started slightly later, with the standard deviation in GDP per capita falling since the early 2000s. The difference in timing is consistent with β-convergence being a function of subsequent 10-year average growth.

The second result is that there has been a trend toward β-convergence—converging to convergence—since 1990. The coefficient started at around

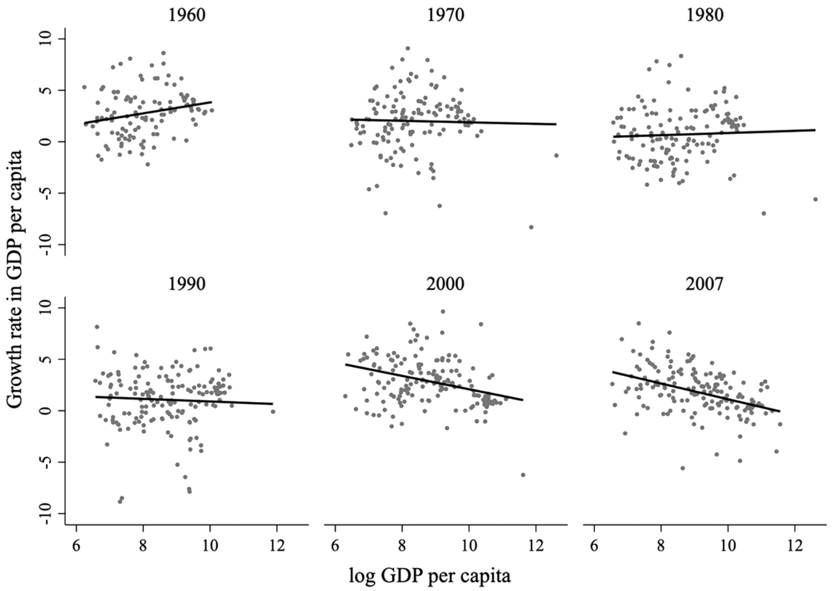


Fig. 1. Income convergence by decade. This figure plots, by decade, the raw scatter plots for the decade's β-convergence regression, as well as the regression line itself. $100\,(\log(\text{GDPpc})_{i,t+10} - \log(\text{GDPpc})_{i,t}/10) = \alpha_t + \beta_t \log(\text{GDPpc})_{i,t} + \epsilon_{i,t}$. The income measure is income per capita, adjusted for PPP, from the Penn World Tables v10.0. The sample is all countries for which data are available, excluding those with a population less than 200,000 or for whom natural resources account for >75% of their GDP. Data availability means that the number of countries is growing over time. For 2007, the period considered is 2007–17. A color version of this figure is available online.

0.5 in 1990 and has trended down toward −1 today. Looking further back to 1960, initially there is no clear trend, and then there is a trend toward divergence in the 1980s.[8] Table 1, column 2, reports the results of our basic absolute convergence regression, equation (1), with the addition of a linear year variable interacted with $\log(\text{GDP}_{i,t})$. The interaction terms, representing the "convergence toward convergence," is negative and significant, with a point estimate of –0.025. The trend toward convergence is also apparent in the σ-convergence figure, where it is represented by a gradual decrease in slope, that is, concavity of the plot.

This trend toward convergence is consistent with models of growth in which capital is subject to diminishing marginal returns, or where catch-up growth is easier than growth at the frontier. It is inconsistent with models of growth that predict long-run divergence, such as AK models, or some poverty trap models.

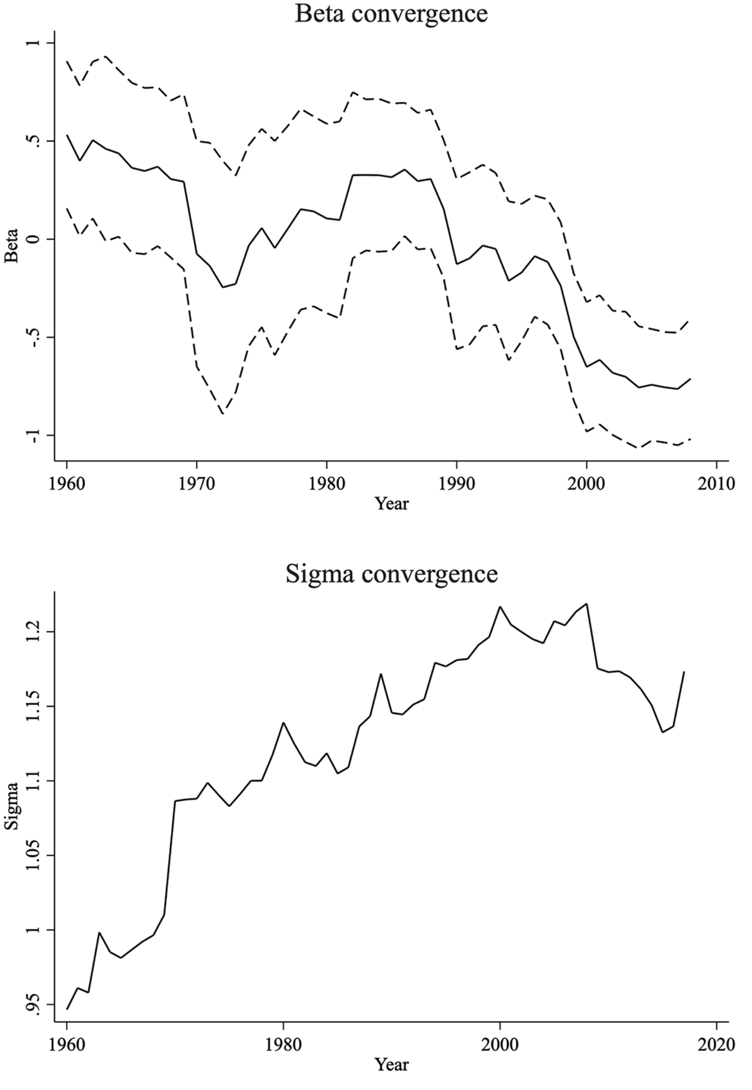


Fig. 2. Trend in income convergence, 1960–2007. These figures show the trend in convergence from 1960 to 2007. The top panel plots the β-convergence coefficient, for growth in the subsequent decade, over time. It is the coefficient from equation (1)—regressing, across countries, the average growth in GDP per capita in the next decade (in %) on the log of GDP per capita, with year fixed effects, and with standard errors clustered by country. Income per capita is adjusted for PPP and comes from the Penn World Tables v10.0. The sample is growing over time and excludes countries with a population less than 200,000 or for whom natural resources account for >75% of their GDP, as in figure 1 (neither exclusion has a meaningful effect on the trend). The bottom panel plots the evolution over time of the cross-country standard deviation in GDP per capita. σ-convergence corresponds to a negative slope. Equivalent panels using balanced panels are in figure A5.

Table 1
Converging to Convergence. Absolute Convergence 1960–2017

	Average Annual Growth in Next Decade		
	(1)	(2)	(3)
log(GDPpc)	−.270**	.449**	
	[.118]	[.224]	
log(GDPpc) × (1960)		−.025***	
		[.006]	
log(GDPpc) × 1960s			.532***
			[.191]
log(GDPpc) × 1970s			−.075
			[.293]
log(GDPpc) × 1980s			.106
			[.246]
log(GDPpc) × 1990s			−.127
			[.221]
log(GDPpc) × 2000s			−.651***
			[.168]
log(GDPpc) × 2007s			−.764***
			[.146]
Year FE	Y	Y	Y
Observations	863	863	863

Note: This table reports absolute convergence regressions, equation (1). The independent variable is the average annualized GDP per capita growth (%) for the subsequent decade, in PPP (from the Penn World Tables v10.0), and the sample contains the data for the first year of each decade since 1960, with 2007 replacing 2010. We exclude countries with population <200,000, and for which natural resources account for >75% of GDP. Specification (1) pools the data since 1960. Specification (2) includes a time trend of absolute convergence β. Specification (3) estimates the absolute convergence β by decade. Year fixed effects (FE) are included in all three specifications. Standard errors, clustered at the country level, are reported in the parentheses.
*$p < .05$.
**$p < .01$.
***$p < .001$.

C. *Econometric Considerations and Robustness to Alternative Specifications*

There is an extensive literature on the tradeoffs of different econometric specifications to test for convergence, summarized in Durlauf et al. (2005). We follow the most standard approach, testing for β convergence using OLS with fixed effects for year, clustered at the country level. This approach is not without limitations, which we discuss below, but it is transparent and captures the cross-country variation that is our main focus.

We begin by replying to the three main critiques of the specification noted in the comment of Acemoglu and Molina (2022): unobserved country fixed effects, cross-country heterogeneity in convergence rates, and using annual growth rather than 10-year growth. We then discuss several additional considerations and robustness questions, such as whether measurement error may drive toward convergence through mean reversion, whether results are driven by panel imbalance, in particular the larger number of poor countries entering the panel over time, and whether results depend on the macroeconomic data set used.

Specification, Country Fixed Effects, and Heterogeneity

Our regression specification assumes homogeneous rates of convergence across countries and does not account for potential differences in steady-state income, as discussed in Acemoglu and Molina (2022). We agree with the empirical finding of the authors and Caselli et al. (1996): the coefficients on current income change substantially when incorporating heterogeneity and country fixed effects, with strong convergence toward countries' individual steady-state income levels throughout, at a rate of at least 10%. However, we disagree that their specification is more economically meaningful for the question of convergence (or, in particular, that the coefficient on income in these specifications can be interpreted as causal). It is a different exercise, and one that is not without its own econometric issues (Durlauf et al. 2005).

We are interested in what has been happening across countries, over time; by definition, country fixed effects absorb cross-country differences and treat them as nuisance parameters. We agree that there are likely to be cross-country differences in steady-state income, but we wish to know how these differences have evolved. A priori, we do not know whether convergence to a fixed steady state, or evolution of country-level "steady-state" income itself, is likely to be a more important determinant of growth, so we do not want to assume away the latter. Investigating the evolution of the potential determinants of the country-level steady states is precisely our exercise below, when we turn to conditional convergence, and to whether the potential determinants of steady-state income have converged. We view doing so with variation that we can explain—changes in correlates—as providing additional insights, but we can also do so with a fixed effects approach, which can be interpreted as another form of conditional convergence. To do so, however, we need to allow for the possibility that country "fixed effects" vary over time. Specifically, we modify the framework of Acemoglu and Molina (2022) to allow country fixed effects to vary by decade:

$$\log(\mathrm{GDP}_{i,t+\Delta t}) - \log(\mathrm{GDP}_{i,t}) = \beta_d \log(\mathrm{GDP}_{i,t}) + \mu_t + \gamma_{i,d} + \epsilon_{i,t}, \tag{2}$$

$\gamma_{i,d}$ being a country-decade fixed effect.

Table A1 reports the β_d estimated with average decade growth in panel A and annual growth in panel B, confirming the results of Acemoglu and Molina (2022). The coefficient stays strongly negative since 1960. The magnitude is quite stable and does not exhibit any declining pattern over time. We also find that using annual growth gives stronger convergence, and we speculate below that annual GDP measurement errors might bias upward a short-term reversal pattern.

In this paragraph in an earlier version of this paper, in analysis undertaken to respond to Acemoglu and Molina's discussion at the National Bureau of Economic Research (NBER) Annual Conference on Macroeconomics, we incorrectly claimed that the fixed effects in this model show little stability over time. Our error was pointed out in Acemoglu and Molina (2022), their subsequent discussion paper. We thank the authors for this correction and have updated this paragraph accordingly (and removed the appendix figure that it referred to). As shown in Acemoglu and Molina (2022), the country fixed effects in this model are stable over time and have a high F-test statistic. This persistence of the fixed effects is primarily from the persistence of country income levels; country growth rates show little autocorrelation from decade to decade.

In this specification, country-decade fixed effects have converged across countries since 1990, suggesting that much of the action for studying the global income distribution may be being absorbed by these fixed effects. Figure A3 plots standard deviations of fixed effects over time with a rolling time window of 10 years. We see a fall in the standard deviation of the country fixed effects since 1990, the period in which we see a trend toward unconditional convergence in our preferred specification. This encourages us to study whether unconditional convergence has converged toward conditional convergence, the question we turn to below.

Moreover, the country fixed effects approach has its own econometric limitations, discussed further in Durlauf et al. (2005). The convergence coefficient in the country fixed effects model, β_d in equation (2), is identified from time-series variation for all years in decade d, whereas the convergence coefficient in our main specification, β_t in equation (1), is identified from cross-sectional variation in year t. Bernard and Durlauf (1996) show that the two specifications may give very different answers and argue that the time-series β_d is a good estimate of convergence only if the sample distribution is a good approximation of the true underlying growth process; if historical growth is not stable, then the time-series model can be substantially biased. Our analysis uses a large set of countries, most of which experienced substantial changes in growth correlates during the period, potentially perturbing them far away from their steady states.

Averaging Period

Many of the original convergence studies used a fixed baseline year, considering how convergence in income per capita changed when varying the endline year. We argue that to consider trends in convergence itself, rather than use a fixed baseline year, it is better to consider convergence over a fixed interval of time and how it changes when varying the baseline year. This raises a natural question of what the fixed interval of time should be and whether that interval matters. In the main results, we used a 10-year interval, considering 10 years a good trade-off between allowing us to see medium-frequency trends, without overloading the trend with annual noise. Acemoglu and Molina (2022) suggest we should use annual data. We think that annual data gets at high-frequency phenomena (e.g., weather streaks, business cycles), whereas 10-year data gets at lower-frequency phenomena, such as long-run growth. Annual data is likely to introduce substantial noise. If this noise is measurement error in GDP, then growth regressions will be biased toward convergence and this bias will be larger over shorter periods, via mean reversion. Figure A4 shows how the convergence coefficient varies when using 1-, 2-, 5-, and 10-year averages. Ten-year averages show the clearest trend toward convergence. Once we get to 1-year averages, the year-to-year variation dominates, and the trend that is apparent in 5- and 10-year averages is much less apparent.

Balanced Panel

Since the number of countries in the data set is growing over time, our results could reflect the inclusion of the new countries over time, rather than global trends. To investigate this, we show, by decade, what convergence looks like from that decade until present day, among the balanced panel of countries whose data is available from the start of that decade. So, for example, for the 1970s, we plot the 10-year average convergence coefficient, from 1970 to present, for the set of countries that have been in the data set since 1970.

Figure A5 displays the results of these investigations that hold the set of countries fixed over time. It shows that the change in convergence has little to do with the expansion of the set of countries over the time period—results are remarkably robust to different balanced panels, showing that the original results do indeed reflect a trend toward convergence since 1990.

While the trend toward convergence began around the time of the dissolution of the Soviet Union, the repercussions of which may have been an important driver of the change in convergence, the robustness of the trend to countries that existed before 1990 shows that the change was not mechanical from the addition of the former Soviet countries.

Measure of Income

Figure A6 shows that our finding of a trend toward convergence is not specific to looking at income per capita (as opposed to per worker), nor to using income per capita in PPP-adjusted terms from the Penn World Tables v10.0. Namely, we find a broadly similar pattern using income per worker instead of income per capita, using different measures of income from the PWT, and using the WDIs data with income measured in constant 2010 US dollars. Indeed, in the latter, the trend is more apparent and seems to start from 1960, again with a decade of regression in the 1980s.

D. Which Countries Have Driven the Change?

To provide more details on the trend to absolute convergence, and to take a first step toward understanding its causes, we consider which countries have driven the change. We do so mainly by showing how the trend in convergence changes when removing different groups of countries.

Faster Catch-up Growth and a Slowdown of the Frontier

Two very different and popular narratives could each lead to the observed trend to convergence: stagnation of the frontier (a drop in the growth rate of richer countries), or faster catch-up growth (a rise in the growth rate of poorer countries).

Figure 3 shows average 10-year growth rate by income quartile, where income quartile is recalculated each year. The richest quartile of countries had the highest growth rate of all quartiles in the 1980s and then switched position entirely to have the lowest growth rate since 2000. The shift was driven both by a slowdown of growth at the frontier—the richest quartile of countries experienced flat growth in the 1990s and then a growth slowdown since 2000—and by a faster catch-up growth—the other three quartiles experienced a substantial acceleration in growth in the 1990s. Removing one quartile at a time from our standard test for convergence, figure A7, it does appear that in the last decade the trend toward convergence is driven by the richest quartile versus the other quartiles, and that

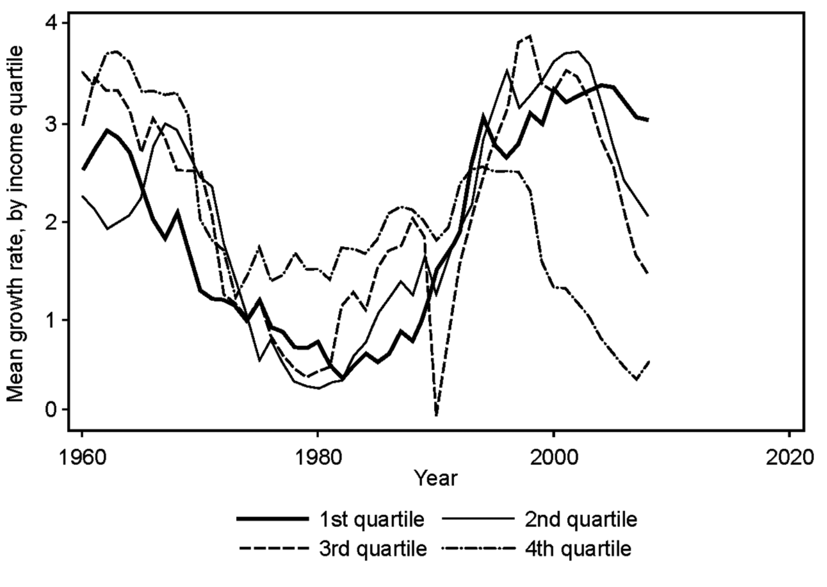


Fig. 3. Trend in income growth by income quartile, 1960–2007. The plots show the average annual growth in GDP per capita, PPP, for the subsequent decade, averaged by income per capita quartile. Income per capita quartile is classified based on GDP per capita in that year, with the first quartile being the lowest income and the fourth quartile the highest. A color version of this figure is available online.

the poorest quartile has, if anything, been a drag on the trend toward convergence within the other quartiles.

Fewer Growth Disasters and More Growth Miracles

Figure A8 presents the trend in coefficients from equation (1) when excluding countries that experienced disasters or growth miracles. The trend toward convergence remains robust, whether we drop episodes of especially low or episodes of especially high growth. Interestingly, the reversion in the 1980s disappears when excluding countries that had a negative 10-year growth rate.

Which Regions Are Driving the Change?

Figure A9 presents the trend in coefficients from equation (1) when excluding countries from different regions. Again the trend remains robust, although the trend toward convergence in the last 20 years becomes stronger upon excluding sub-Saharan Africa.

E. Club Convergence

Convergence among OECD countries (or rich countries), a group of relatively homogeneous countries (Barro and Sala-i-Martin 1992), has been documented as evidence for club convergence—convergence among groups of countries that have similar institutions and culture. We revisit this result and show that convergence among the rich countries has slowed and shifted toward the general global convergence pattern.

Figure A10 plots the convergence coefficients in the country subsample with income above the *X*th percentile.[9] Three decades from 1965 to 1995 yield a similar pattern—strong convergence among high-income countries (above the 60 percentile), whereas overall there was little absolute convergence. This pattern has changed in the period from 1995 to 2005, and in the most recent decade convergence holds across a sample containing all countries, whereas convergence among the top 40% of countries by income has stopped.

These results, together with the above finding that growth has increased across the bottom three quartiles, are inconsistent with certain poverty trap explanations for the trend toward absolute income convergence. Namely, we see no evidence of there being an income threshold above which there is convergence, with more countries crossing the threshold over time.

III. Convergence in Correlates of Income and Growth

We next consider global trends in factors that might be determinants of growth—policies, institutions, human capital, and culture—using the same empirical approach as above. While much recent literature emphasizes the persistence of institutions over time (Acemoglu et al. 2001; Dell 2010; Michalopoulos and Papaioannou 2013), we find substantial change and convergence. Overall, 17 out of the 32 Solow fundamentals and short-run correlates for which we have temporal variation exhibit β-convergence from 1985 to 2015, and the correlates have generally converged in the direction of those of more advanced economies, toward what we term development-favored institutions. Moreover, culture has also convergence, with eight out of 10 measures of culture we consider displaying β-convergence in the WVS data.

A. *Policies, Institutions, Measures of Human Capital, and Cultural Traits Considered*

We divide such potential correlates of income and growth into four groups: (a) enhanced Solow fundamentals (investment rate, population growth rate, and human capital)—variables that are fundamental determinants of steady-state income in the enhanced Solow model (Mankiw et al. 1992); (b) short-run correlates—other policy and institution variables considered by the 1990s growth literature that may vary at relatively high frequency; (c) long-run correlates—institutions and their historical determinants that do not change or only change slowly, which have been the focus of the recent institutions literature, and geographic correlates of growth; and (d) culture.

To tie our hands, we started from a list of variables commonly used in growth regressions, from the *Handbook of Economic Growth* chapter titled "Growth Econometrics" (Durlauf et al. 2005), constraining ourselves to those variables that covered at least 40 countries from 1996. We then added to this list numerous cultural variables and historical determinants of institutions that have played a central role in the empirical growth literature since Durlauf et al. (2005). While we obviously cannot consider convergence for historical or geographic variables—they are, however, included in the empirical exercises in the next section—we are able to study convergence of multiple cultural variables, albeit with a smaller country sample than for the policy and institutional variables.

Table 2 summarizes the data sources and sample period of the resulting correlates. There are five enhanced Solow fundamentals and 27 short-run correlates divided into four broad categories: political institutions, governance, fiscal policy, and financial institutions. Not all the short-term correlates are comparable over time; for example, the World Governance Indicators and Heritage Freedom Scores are standardized each year. We obviously cannot study convergence or average changes for such variables, but we include them in the table as we do use them for our analysis of the gap between unconditional and conditional convergence, in Section IV of the paper. For certain figures in the paper, we pick one representative variable from each category, displayed in bold in the table: Polity 2 score, the Worldwide Governance Indicators (WGI) rule of law, government spending (% GDP), credit provided by the financial sector (% GDP). Equivalent figures with the other variables can be found in the appendix.

To help interpret the direction of change of correlates, table 3, column 2 shows which correlates were "development-favored" in 1985 (or the earliest available year), defined by their correlation with log GDP in 1985. Correlates are defined as high (or low) development-favored if the coefficient from regressing the correlate on log GDP is positive (or negative), with statistical significance at a 10% level. A high-income country tends to have a higher Polity 2 score, higher rule of law score, higher government spending (as a % of GDP), more financial credit, and higher education attainment. Five correlates cannot be signed: taxes on goods and services, tax burden score, military expenditure, inflation, and central bank independence (CBI).

We first supplement Solow fundamentals with two measures about the labor force: gender inequality in education (male minus female in educational attainment) and labor force participation rate. High-income countries enjoy more gender equality in education and lower labor force participation.

Then, we use five variables to measure political institutions: the Polity 2 score from the Center of Systematic Peace (1960–2018), the Freedom House political rights score (1973–2018), the Freedom House civil liberty score (1973–2015), the Press Freedom score (1979–2018),[10] and the political stability score (1996–2018) from WGI.

Governance variables—distinct from political institutions—measure whether the public system functions well. We use four variables (1996–2018) from the WGI Project: government effectiveness, regulatory quality, the rule of law, and control of corruption; and five variables (1995–2019) from the Index of Economic Freedom by the Heritage Foundation: Overall economic freedom, government integrity, business freedom, investment freedom, and property rights. The sample size of countries in the Economic Freedom database rises from 97 in 1995 to 145 in 2005, and then 159 in 2015. Variables under the governance and political institutions categories are all positively correlated with economic development.

The fiscal policy category mainly captures the following three dimensions: taxation, tariffs, and government interventions/expenditures. Taxation measurements include taxes on income and capital gains (percentage of total tax revenue), taxes on goods and services (percentage of total tax revenue), and a tax burden score. Equal-weighted and value-weighted tariffs are measures of the policy-induced barriers to trade. A state with strong government interventions and expenditures tends to have a lower private investment (% total investment), more government spending (% spending), and higher military expenditure. In general, high-income countries are more likely to adopt free trade and low government intervention, but there is not a clear pattern in our data on taxation.

The financial institutions category includes six variables: a CBI index constructed by Garriga (2016); inflation, credit to the private sector (% GDP), and credit provided by the financial sector (% GDP), all from the WDIs; and financial freedom and investment freedom scores from the Index of Economic Freedom. Higher financial development is positively associated with economic development, whereas CBI and inflation are ambiguous according to our approach. The high inflation of 1990 was not constrained to developing countries but was a global issue. CBI adoption rose over time and inflation was brought under control (Rogoff 1985; Alesina 1988; Grilli, Masciandaro, and Tabellini 1991; Alesina and Summers 1993; Alesina and Gatti 1995; Fischer 1995).

The following sections examine average changes in correlates from 1985 to 2015 as well as their rate of convergence, β_{Inst}, estimated from the following equation:[11]

$$\Delta_{1985\rightarrow 2015} Inst_i = \beta_{Inst} Inst_{i,1985} + \alpha_{\text{Inst}} + \epsilon_i.$$

The country sample is time-varying (mostly increasing) as data sets add new countries into the sample. In the appendix, we also plot the

Table 2
List of Solow Fundamentals, Growth Correlates, and Cultural Variables

Category	Variable	Data Source	Data Period
Enhanced Solow fundamentals	**Gross Capital Formation (% GDP)**	WDI	1960–2017
	Population Growth Rate	WDI	1960–2017
	Barro-Lee Years of Education Age 25–29	Barro-Lee Data	1950–2010
Labor force	Education Gap (Male-Female)	Barro-Lee Data	1950–2010
	Labor Force Participation Rate	WDI	1960–2017
Political Institutions	**Polity 2 Score**	Polity IV Project	1960–2018
	Freedom House Political Rights	Freedom House	1973–2018
	Freedom House Civil Liberty	Freedom House	1973–2018
	Media Freedom Score	Freedom House	1979–2018
	WGI Political Stability	WGI	1996–2018
Governance Quality	**WGI Rule of Law**	WGI	1996–2018
	WGI Government Effectiveness	WGI	1996–2018
	WGI Regulatory Quality	WGI	1996–2018
	WGI Control of Corruption	WGI	1996–2018
	Overall Economic Freedom Index	Heritage Freedom	1995–2019
	Government Integrity	Heritage Freedom	1995–2019
	Business Freedom	Heritage Freedom	1995–2019
	Property Rights	Heritage Freedom	1995–2019

Fiscal Policies	Taxes on Income & Cap. Gains (% of Revenue)	WDI	1972–2017
	Taxes on Goods and Services (% of Revenue)	WDI	1972–2017
	Equal-weighted Tariff	WDI	1988–2017
	Value-weighted Tariff	WDI	1988–2017
	Tax Burden Score	Heritage Freedom	1995–2019
	Private Investment (% Total Investment)	IMF	1960–2015
	Government Spending (% GDP)	WDI	1960–2017
	Military Expenditure (% GDP)	WDI	1960–2017
Financial Institutions	Inflation	WDI	1960–2017
	Central Bank Independence (Weighted)	Garriga (2019)	1970–2012
	Credit to Private Sector	WDI	1960–2017
	Credit by Financial Sector	WDI	1960–2017
	Financial Freedom	Heritage Freedom	1995–2019
	Investment Freedom	Heritage Freedom	1995–2019
Culture	Power Distance	Hofstede VSM	–
	Individualism	Hofstede VSM	–
	Masculinity	Hofstede VSM	–
	Uncertainty Avoidance	Hofstede VSM	–
	Indulgence vs Restraint	Hofstede VSM	–
	Long-term Orientation	Hofstede VSM	–
Long-Run Variables	Population in 1900	Maddison Project	–
	Legal Origin (UK)	LaPorta et al. (2008)	–
	Legal Origin (France)	LaPorta et al. (2008)	–
	Legal Origin (Germany)	LaPorta et al. (2008)	–
	Legal Origin (Scandinavia)	LaPorta et al. (2008)	–
	Legal Origin (Socialist)	LaPorta et al. (2008)	–
	Log Settler Mortality Rate	Acemoglu et al. (2001)	–
	Mean Temperature	Acemoglu et al. (2001)	–
	100 km of the Coastline	Acemoglu et al. (2001)	–

Table 2
Continued

Category	Variable	Data Source	Data Period
	Ethno-linguistic Fractionalization	Acemoglu et al. (2001)	–
	Landlocked	Acemoglu et al. (2001)	–
	Absolute Latitude	Acemoglu et al. (2001)	–
	Tropical Climate	Sachs and Warner (1997a)	–

Note: This table summarizes all enhanced Solow fundamentals, growth correlates, and cultural variables considered in the analysis, which we divide into four broad groups: enhanced Solow fundamentals, short-run correlates (comprising political institutions, governance, fiscal policy, financial institutions), long-run correlates, and culture. Columns 3 and 4 report the data source and data period for each variable. The variables in bold are the representative correlates reported in figures A14 and 4. Some of the correlates are not directly comparable across time; for example, the WGI indicators are standardized each year. In subsequent analysis, we only consider such variables for conditional-versus-absolute convergence, where such standardization does not matter.

standard deviations of the correlate metrics as the σ-convergence for correlates (figs. A11–A13).

Before presenting results for individual correlates, we test the convergence of all of our short-run correlates jointly in table A2, which presents the joint significance of each category using seemingly unrelated regressions. All variables are available since 1996. Thus we report results for 1996–2006 in panel A and 2006–16 in panel B. For both decades, we confidently hypothesize that convergence in correlates does not exist.

B. Enhanced Solow Fundamentals

Human Capital

Human capital is a robust predictor of income growth, as emphasized in the seminal literature from Lucas (1988), Barro (1991), Mankiw et al. (1992), Sala-i-Martin (1997), and Barro and Lee (1994).[12] Education augments labor productivity (Lucas 1988), facilitates technological progress (Romer 1990), and can help promote structural transformation into industry (Squicciarini and Voigtländer 2015).[13]

We measure time-varying human capital with the Barro-Lee average schooling years of population—ages 20–60. Figure A14, panel *C* reports the β-convergence. The convergence in human capital starts in 1975. Beginning in 1975, poor countries start to gain faster growth in educational attainment and gradually catch up with rich countries. In addition, education levels in some well-educated populations have stagnated, and the data imply that 13 average years of education appears to be a soft cap for many countries.[14] We also observe a meaningful shrinking in education attainment inequality across gender. The education gender gap reduced by 8.1% per decade on average.

Investment

Investment is development-favored, according to our definition, and we observe a moderate growth from 22.07% in 1985 to 24.18% in 2015, which translates to 0.23 standard deviations in 1985. Figure A14, panel *B* indicates that convergence in investment has been stable (around –6) since 1985. Figure 4, panel *B* exhibits strong mean reversion, with 1% higher investment in 1985 corresponding to a negative growth of 2.98% per decade. With most countries slowly decreasing their investment, certain

Table 3
Change and Convergence in Enhanced Solow Fundamentals and Growth Correlates from 1985* to 2015*

	Dev-Favored	Mean in 1985*	Mean in 2015*	Change (in σ_{1985}) Estimate	Change (in σ_{1985}) p-value	Convergence β
Gross Capital Formation (% of GDP)	High	22.07	24.18	.23	.06	–2.98***
Population Growth (Annual %)	Low	1.99	1.42	–.43	0	–1.53***
Barro-Lee Education Age 20–60	High	6.19	8.80	.86	0	–.16
Average of Solow Fundamentals						–1.56
Education Gap (Male-Female)	Low	.97	.33	–.66	0	–.81***
Labor Force Participation Rate	Low	62.48	62.61	.01	.79	–.66***
Polity 2 Score	High	–.87	4.69	.73	0	–2.03***
Freedom House Political Rights	High	5.86	6.53	.30	0	–1.39***
Freedom House Civil Liberty	High	5.72	6.56	.41	0	–1.36***
Media Freedom Score	High	52.63	49.93	–.12	.02	–.88***
WGI Political Stability	High	–	–	–	–	–
WGI Government Effective	High	–	–	–	–	–
WGI Regulatory Quality	High	–	–	–	–	–
WGI Rule of Law	High	–	–	–	–	–
WGI Control of Corruption	High	–	–	–	–	–
Overall Economic Freedom Index	High	–	–	–	–	–
Government Integrity	High	–	–	–	–	–
Property Rights	High	–	–	–	–	–
Business Freedom	High	–	–	–	–	–
Equal-weighted Tariff	Low	9.46	4.36	–.47	0	–3.46***
Value-weighted Tariff	Low	8.11	3.09	–.70	0	–3.38***
Taxes on Income and Capital Gain	High	25.54	28.79	.20	.06	–1.61***
Government Spending (% GDP)	High	15.90	15.96	.01	.90	–1.61***
Taxes on Goods and Services	N/A	28.47	31.38	.21	.17	–2.51***
Tax Burden Score	N/A	–	–	–	–	–
Private Investment	High	.63	.63	0	.99	–1.60***
Military Expenditure (% GDP)	N/A	3.38	1.89	–.47	0	–2.10***
Inflation	Low	16.19	2.25	–.54	0	–3.07***

Table 3
Continued

	Dev-Favored	Mean in 1985*	Mean in 2015*	Change (in σ_{1985}) Estimate	p-value	Convergence β
Central Bank Independence	N/A	.38	.60	1.77	0	–2.56***
Credit to Private Sector	High	31.46	55.60	.95	0	.89**
Credit by Financial Sector	High	49.42	69.15	.47	0	–.98
Financial Freedom	High	–	–	–	–	–
Investment Freedom	High	–	–	–	–	–
Average of Short-Run Correlates						–1.66

Note: This table presents the average correlate in 1985 (or the earliest available year, denoted 1985*) and 2015 (or the latest available year, denoted 2015*) and convergence rate over the 3 decades. Column 2 reports the development-favored correlates determined by their correlation with GDP per capita in 1985. "N/A" refers to the potential correlates that are not significantly correlated with income in our base year 1985, that is, where δ_{1985} is insignificant. Columns 3 and 4 report the raw mean of correlates in 1985* and 2015*, respectively. Columns 5 and 6 report the change in the correlates between 1985* and 2015*, normalized by the standard deviation in 1985* and corresponding t-statistics. Column 7 is the correlate convergence β, obtained by regressing the decade-average correlate change from 1985* to 2015* on the correlate in 1985*. Missing entries correspond to correlates that are not directly comparable across time, for example, if they are standardized each year. Results for culture are in table A6.
*$p < .05$.
**$p < .01$.
***$p < .001$.

developing countries like Mozambique, Ethiopia, and Angola have increased investment.

Population Growth

Developed economies feature lower population growth. Population growth slows down from 1.99% in 1985 to 1.42% in 2015, translating to –0.43 standard deviations in 1985. Figure A14, panel *A* reports the beta convergence that fluctuates between –4 and –2 before 2000, after which we witness a sharp decline toward –6. After 2000, population growth has fallen for poor countries, whereas it has stagnated for most of the rich countries. Figure 4, panel *A* reports that most countries in our sample witnessed a decrease in population growth from 1985 to 2010.

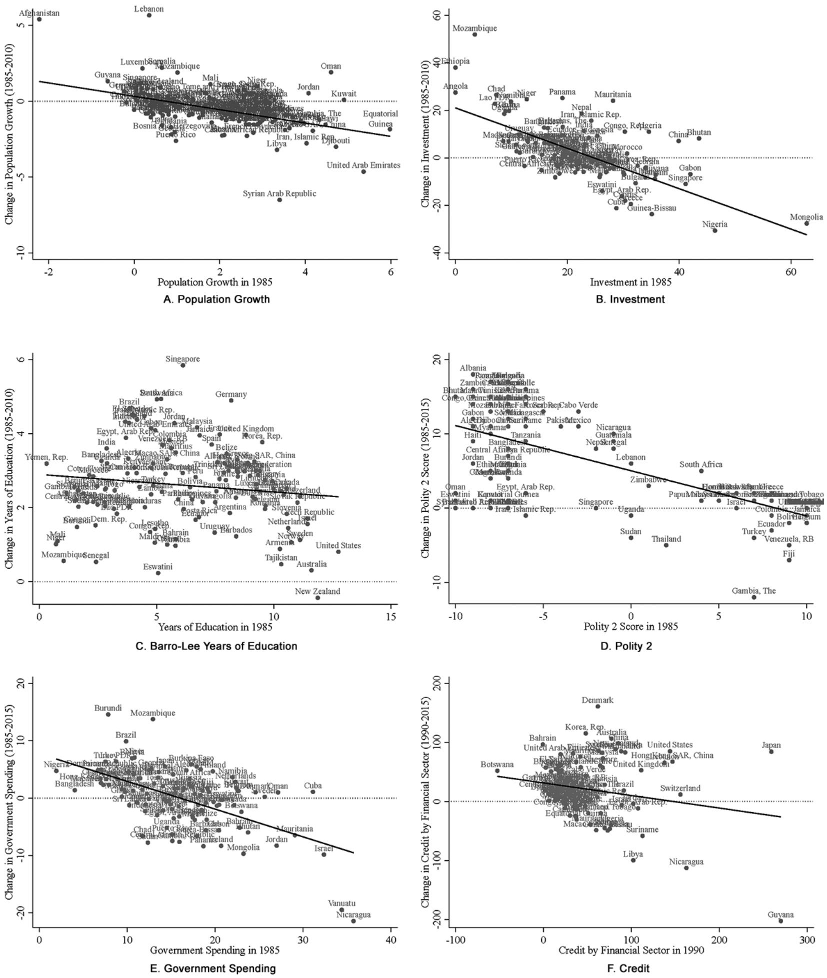


Fig. 4. Convergence in growth correlates: level in 1985 versus change 1985–2015. This figure plots β-convergence for growth six representative correlates (potential determinants of steady-state income) from 1985 (or the earliest available year) to 2015 against the baseline correlate level in 1985. We include six of the correlates, which are comparable over time, for illustration: population growth rate (%), investment rate (% of GDP), Barro-Lee average years of education among 20-to-60-year-olds, Polity 2 score, government spending (% of GDP), and credit by the financial sector. The sample for each figure is the complete set of countries for which the relevant data are available in 1985 and 2015. A color version of this figure is available online.

C. *Short-Run Correlates*

Labor Force

Education attainment became more gender-balanced from 1985 to 2015. Male education was 0.97 years more than women in 1985, and the number reduces to only a 0.33-year advantage. Not surprisingly, countries with larger gender differences experienced more gap reduction. The labor force participation rates remain stable around 62.5% in the recent 3 decades, but β-convergence also holds—1% higher labor participation rate correlates with a 0.66 % reduction in 1985–2015.

Political Institutions

Political institutions exhibit pervasive β-convergence and σ-convergence, with particularly strong convergence in the 1990s. We use the Polity 2 score from the Polity IV project as our primary democracy measure, which ranges from –10 to 10; –10 represents dictatorship and 10 represents perfect democracy. Figure A15 shows that the average Polity 2 score hits its low point in 1978, at below –2, then the score gradually climbs back to zero in 1990. Then, the average democracy score jumps up to 2 after the dissolution of the Soviet Union and persistently improves to above 4 in the next 25 years.

Figure A11 shows the plot of coefficients for β-convergence in political institutions. Polity 2 score, political rights, and civil liberty yield similar results, including in the rate of convergence. The long-run average of coefficients is around –0.2. The deep institutional reforms in the 1990s lead the coefficients to drop below –0.3 in that decade and then gradually move back the historical average of –0.2. The institutional convergence is statistically significant in any single year's cross-sectional regression. β-convergence in media freedom and political stability also holds since 1995, and the convergence pattern is very stable in the recent 2 decades.

Panel *B* of Figure A11 reports the standard derivation of the four political institutions.[15] The σ-convergence of democracy starts in 1990. The standard deviation of Polity 2 score fluctuates around 7.5 before 1990, sharply declines to 6.5 in 2000, and persistently decreases to 6 in 2015. The four other variables show a similar pattern: the standard deviation after 2000 is lower than that prior to 1990.

The broad adoption of democracy is a central aspect of the convergence of political institutions. Figure 4 plots the change in the democracy score from 1990 to 2010 against the democracy score in the baseline year 1990. The spread of democracy is a global phenomenon, not just constrained to Soviet Union countries. Many countries with a Polity 2 score below 5 radically shift their political institutions toward democracy.

Meanwhile, movements away from democracy are also relatively common. Table A3 summarizes the proportion of countries with increases and downgrades in democracy scores. Even after 1980, in each decade roughly 10% of countries experienced falls in their democracy scores. If we focus, admittedly somewhat arbitrarily, on countries with a Polity 2 score reduction of at least 3 in a decade, then most democracy degeneration events happen in countries with positive democracy scores—6 out of 8 in the 1980s, 5 out of 5 in the 1990s, 7 out of 7 in the 2000s, and 4 out of 5 in 2010–15.

Developing countries are much more likely to experience political reforms, both toward democracy and against democracy, whereas rich countries successfully maintain their democratic politics. Table A4 shows logit regressions of increases or decreases in Polity 2 score on income level for the 6 decades. Panel A reveals that low-income countries are only more likely to gain democracy in the 1960s and 1990s but not much in other periods. However, in panel B, low-income countries are also more exposed to democracy setbacks, except in the 1990s.

Fiscal Policy

Despite a lack of consensus on optimal fiscal policy, global average government spending stayed close to 16% of GDP throughout 1985–2015. Moreover, there was sizeble and statistically significant beta convergence in government spending. Figure 4, panel *E* shows that 1% higher government spending in 1996 predicts 1.61% reduction in the next 2 decades, where a high t-stat of 9.6 and the R^2 are as high as 41%.

This pattern is not unique to government spending but is common to all fiscal policy variables. The convergence β ranges from –3.46 (equal-weighted tariff) to –1.60 (private investment), significant at the 1% level.

A large empirical literature argues that lower policy-induced barriers to trade are associated with faster economic growth (Frankel and Romer 1999). We document a significant trade liberalization from 1990 to 2010—equal-weighted tariffs drop from 9.46% to 4.36%, and value-weighted tariffs drop from 8.11% to 3.09%—more than a 50% cut on average. The β-convergence coefficient fluctuates around –6 but gradually moves to –4 in recent decades. The magnitude is notably large compared with other correlates, in both equal-weighted and value-weighted tariff data. Figure A12, panel *B3* shows that the variance of tariffs sharply reduces in 1995 and that trade liberalization expands internationally. The standard deviation of tariffs stays below 5 after 2010.

Financial Institutions

We see mixed evidence regarding financial credit convergence: there is modest convergence, although there is also substantial credit growth in a few large highly leveraged developed economies.[16] Credit is development favored, according to our definition, and we do observe substantial credit expansion from 49.4% of GDP in 1990 to 69.15% of GDP in 2010, which translates into 0.47 standard deviations in 1990. One percent higher credit in 1990 corresponds to a –0.98% decrease per decade. However, the convergence pattern is less persistent over time—figure A14, panel *F* shows the convergence is particularly concentrated in the 1980s and 1990s.

Figure 4, panel *F* implies that convergence happens in both directions. Underleveraged economies, such as Denmark, Australia, and South Korea, expanded their financial sector. At the same time, many countries deleveraged: out of 123 countries in our sample, 40 reduced the amount of credit. Highly leveraged economies were more likely to contract credit, potentially to manage the risk of recessions. In total, 12 countries held credit-to-GDP ratio above 100% in 1990; they reduced credit by 23% on average after 2 decades.[17] At the other extreme, 17 countries with credit below 15% of GDP in 1990 expanded their credit by 21% through 2010.

Financial stability also increased significantly. For example, episodes of high inflation became much less frequent. Figure A13, panels *A1* and *B1* report the convergence pattern for inflation. We do not find robust convergence until 1980, when episodes of very high inflation were still widespread. The β-convergence coefficients have stayed significantly negative since 1980. σ-convergence has happened since 1990: the standard deviation runs from the peak above 30 to the trough below 5 in 2010. Modern monetary policy reduced the occurrence of hyperinflation and contributed to the convergence in inflation. Figure A16 plots the proportion of countries that experience (a) inflation above 200%, (b) inflation above 100%, (c) inflation above 50%, and (d) inflation above 15% in a specific year. All the four lines start to decline starting in 1995. From 1972 to 1995, about 35% of countries had annual inflation above 15% and 10% countries experienced inflation more than 100%. After 2000, almost no country had inflation above 50% whereas less than 10% countries had inflation above 15%.

D. Culture

We adopt two data sources to measure culture. The WVS allow us to study the evolution of culture. To best match the time horizon considered for other correlates, we pick countries surveyed in wave 3 (1995–1998) and wave 6 (2010–14), leaving us with 33 countries in our sample to test cultural convergence. To expand the country sample, we turn to the Hofstede dimensions of national culture, which are available for 69 countries. Section IV studies the culture-growth relationships using the Hofstede data.

Each cultural variable constructed from the WVS aggregates responses from age groups 20 to 40, using population weights.[18] For each country, we compare perceptions held by those aged 20–40 in wave 6, to those aged 20–40 in wave 3. We compute the annualized cultural change between waves 3 and 6 and adjust for the survey year difference in a given wave. We then regress the annualized cultural change on the wave 3 level to obtain the cultural convergence β.

We report our results in table A6, which shows that β-convergence holds for eight out of 10 cultural variables. In political views, the willingness to participate in boycotts converges by 6.4% annually, interest in politics by 2.7%, opinions on the importance of politics by 1.8%, and the recognition of authority by 1.8%. In views on work-life balance, the importance of family and work converge by 4.4% and 3.3%, respectively. Also, the younger generation reaches more agreements on social issues than the older generation. Between the waves, perceptions on the importance of tradition and of reducing inequality also converged by 7.1% and 2.7% per year, finding them less and more important on average, respectively. Finally, on two deep cultural variables, the level of trust and the importance of religion, we find no convergence.

IV. Linking Converging Income with Convergence of Its Correlates

Are these two changes since the late 1980s related—the trend toward convergence in income and the convergence of many of the correlates of income and growth? We are naturally unable to do a full causal analysis, and causality can run both ways. On the one hand, an extensive empirical literature argues that such correlates are important for economic development (Glaeser et al. 2004; Acemoglu et al. 2005), and the convergence literature itself turned toward convergence conditional on correlates (determinants of the steady state). On the other hand, modernization theory suggests that causation may run the other way, with converging incomes causing policies, institutions, and culture to converge. Recent literature uses instrumental variables to provide evidence on both directions of causation, using historical determinants of institutions to establish their effect on long-run growth (Acemoglu et al. 2001, 2019; Dell 2010; Michalopoulos and Papaioannou 2013), and using instruments for income to test modernization theory (Acemoglu et al. 2008). These studies build on earlier analysis that focused on stylized facts that any theory of growth should fit, either from growth regressions (Barro 1996; Sala-i-Martin 1997; Durlauf et al. 2005; Rodrik 2012) or from the observation that rich countries often share a common set of policies and institutions: on average, they are more democratic, less corrupt; they have robust financial systems, more effective governance, better social order, and the like. It is these earlier analyses—of empirical cross-country relationships—that we return to in this section, updating their findings with 20 years more data.

We revisit the cross-sectional relationships between correlates and income levels and growth rates, detailing how the relationships have changed since 1985 and linking these changes to the emergence of absolute convergence in the past 2 decades. First, we consider the relationship between income levels and correlates, a simple cross-country representation of modernization theory. Then, we turn to the relationship between income growth and correlates, controlling for income levels—the classic growth regressions. Finally, we turn to conditional convergence—the prediction of neoclassical growth models. A simple decomposition, combining the two cross-country relationships via the omitted variable bias formula, of the gap between unconditional and conditional convergence provides a partial answer to the question of whether the trend to absolute convergence occurred because absolute convergence has converged to conditional convergence, or because conditional convergence itself has become faster?

A. Simple Empirical Framework

For our simple empirical investigation of the link between income, correlates, and growth, we consider two basic cross-country regressions.

First, the cross-country relationship between income and correlates, a simple test of modernization theory:

$$I_{i,t} = \nu_t + \delta_t \log(\mathrm{GDPpc}_{i,t}) + \epsilon_{i,t}, \tag{3}$$

where δ_t is the slope of the relationship, and ν_t is a year-t fixed effect.

Second, the relationship between correlates and growth, controlling for income—the classic growth regression and the standard formulation of conditional convergence:

$$\Delta_t \log(\mathrm{GDPpc}_{i,t}) = \alpha_t + \beta_t^* \log(\mathrm{GDPpc}_{i,t}) + \lambda_t I_{i,t} + \epsilon_{i,t}, \tag{4}$$

where $I_{i,t}$ can be an individual correlate or a set of correlates; λ_t is the growth-regression coefficient(s) of the correlate(s), when controlling for baseline income; and β_t^* is the conditional convergence coefficient, controlling for the correlate(s).

In this framework, when conditioning on a single correlate, the omitted variable bias formula allows us to decompose the difference between absolute convergence (β) and conditional convergence (β^*) as the product of the income-correlate slope, δ_t, and the growth-regression coefficient, λ_t:

$$\beta_t - \beta_t^* = \delta_t \times \lambda_t. \tag{5}$$

In turn, we can decompose any change in absolute convergence $(\beta_{t_2} - \beta_{t_1})$ into changes in four components: the underlying process of conditional convergence $(\beta_{t_2}^* - \beta_{t_1}^*)$, the income-institution relationship $(\lambda_{t_1}(\delta_{t_2} - \delta_{t_1}))$, the income-growth relationship $(\delta_{t_1}(\lambda_{t_2} - \lambda_{t_1}))$, and the interaction term.

Data availability varies substantially across different correlates, making it difficult to construct a balanced panel with many correlates. This has two implications for our analysis. First, we largely focus on univariate versions of the growth regression, that is, equation (4) including one correlate at a time. This misses the effect of changes in the relationships across correlates, so we also run several multivariate analyses trading off the number of correlates with the size of the panel. Second, in the main analysis we focus on the time period 1985–2015, because that is the period over which the majority of our correlate variables are available for a large number of countries. We also present trends in results since 1960, for those correlates for which we have the data to do so.

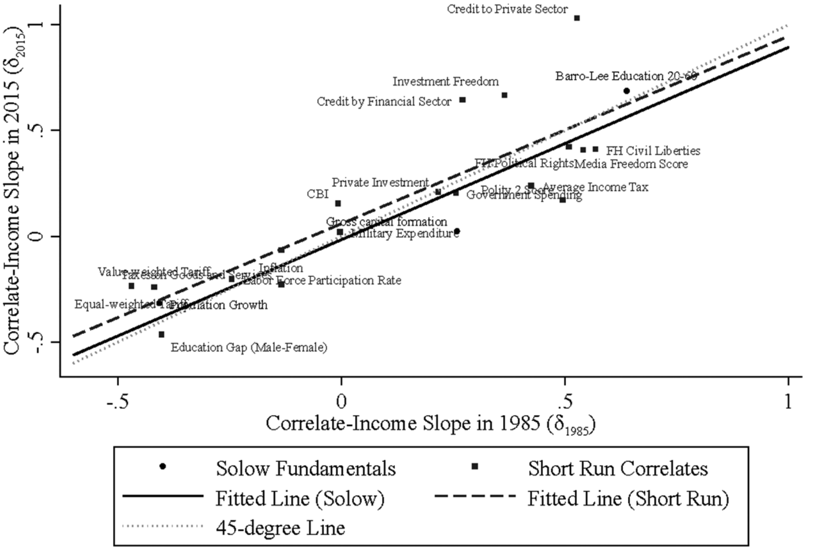
B. Correlate-Income Relationship and Modernization Theory

Prosperity is correlated with the rule of law, democracy, fiscal capacity, and education, among others. We have shown above that income has started to convergence and that correlates have converged substantially. Are these changes related? Did countries simply shift along the lines in the cross-country relationship between income and correlates, in line with the predictions of modernization theory, or did the lines themselves change?

Figure A17 investigates this, plotting whether changes in correlates are as would be expected from changes in income, given the baseline cross-country relationship between the two. Overall, we see that actual changes are on average in line with those predicted from income growth: the fitted line is approximately on the 45-degree line. This can be viewed as modernization theory passing a (weak) out-of-sample test for the correlates specified in the 1990s, using new data. It also suggests that overall, levels of correlates conditional on income have remained constant.

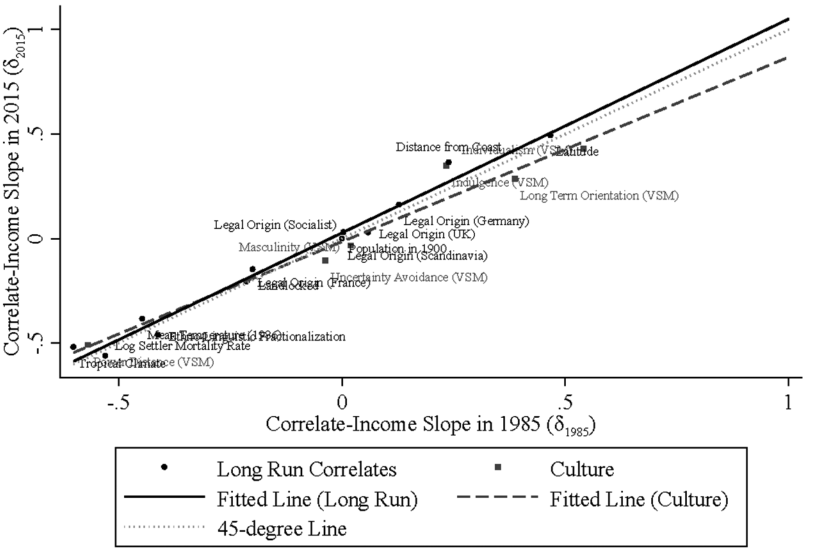
However, for individual correlates, the actual changes are generally quite far from those predicted by baseline relationships, pushing back on the explanatory power of a simple modernization theory explanation. Education and financial development have improved by much more than predicted by income growth. Education has increased, and the gender gap in education became significantly smaller. Many "best practices" of financial institutions have been broadly pursued as well: well-managed inflation, CBI, credit expansion as a crucial part of the economic stimulus package, and lower tariffs to embrace globalization. Political institutions improved almost as much as predicted. Meanwhile, from 1985 to 2015, measures of governance stagnated or even declined: property rights protection, investment freedom, business freedom, and political stability experienced a sizable decline.

We have shown correlates have changed as predicted by their cross-country relationship with income, on average, but what has happened to these cross-country relationships themselves? Figure 5, which normalizes correlates by their standard deviation in 1985 shows the slopes of these correlate-income regressions, the δ_t in equation (3), changed remarkably little. The slopes in 1985 are sufficient to explain the 69% of variation in slopes 3 decades later. The explanatory power (R^2) rises to 87.5% if three outliers (financial credit, credit to private sector, and tertiary education) are excluded. The other 30 correlates scatter precisely along the 45-degree line. The results are also reported in table 4.



Slopes of fitted lines: Solow = 0.897; Short-Run = 0.886

A: Enhanced Solow fundamentals and short-run growth correlates



Slopes of fitted lines: Long-Run = 1.024; Culture = 0.884

B: Long-run growth correlates and culture

Fig. 5. Correlate of growth-income slopes, 1985 versus 2005. This figure is a scatter plot of the coefficients from regressing correlates on (log) income per capita, plotting the coefficient in 1985 versus 2015. The correlates are normalized by their standard deviation in

While the 1985-versus-2015 comparison is our main specification, in figure A18 we also report the trends in the correlate-income slopes since 1960, averaged within each group of correlates. To make the average meaningful, we first renormalize the correlates such that their correlate-income slope is positive in 1985 (i.e., we multiply the correlate by −1, throughout, if the slope is negative in 1985). The signs of the correlate-income relationships are highly stable, so this normalization does not bias our results for the average slope in 1985 relative to other years. Also, as many correlates are not available before 1985, and the set of countries for which correlates are available is growing, we repeat the exercise for several different balanced panels. In particular, for each decade, we trace one plot holding constant the set of correlates and the set of countries for which they were available at the start of the decade. The exercise shows the robustness of the correlate-income slopes over time for each of the four correlate types.

C. *Growth-Correlate Relationship and Growth Regressions*

Recent empirical growth papers use historical variation to identify the effect of institutions and culture on income, using either instruments (Acemoglu et al. 2001; Algan and Cahuc 2010) or spatial discontinuities (Dell 2010), and generally find that both play a central role. Such an approach can only identify the effect of persistent institutions and cultural traits, and although some, such as legal systems and trust, have deep historical roots and appear to change very slowly (Michalopoulos and Papaioannou 2013), many change rapidly as we have shown above, and there is no contradiction in institutions both having a long-run effect and being subject to recent change. While historical determinants continue to persist, we should also remain open to asking how recent changes in policies and institutions have affected growth, especially when considering policy changes.

Here we return to the basic growth-regression specification, cognizant of its limitations as a causal framework. For this question—the

1985. Namely, the y-axis is δ_{2015}, and the x-axis δ_{1985}, from equation (3), which is the following regression: $Inst_{i,t}/SD(Inst_{1985}) = \delta_t \log(\text{GDPpc})_{i,t} + \nu_t + \epsilon_{t,i}$. δ_{1985} and δ_{1985} are estimated using a balanced panel, balanced separately for each correlate. The solid lines are the fitted lines of the scatter plot; the numbers beneath the plots refer to their slopes. The dashed lines are the 45-degree line, as a benchmark. Panel *A* presents results for Solow fundamentals and short-run correlates; panel *B* presents results for long-run correlates and culture. We exclude those correlates that are normalized each period and hence are not comparable over time. A color version of this figure is available online.

Table 4
Correlate-Income and Growth-Correlate Relationships

	δ_{1985}	δ_{2005}	λ_{1985}	λ_{2005}	$\delta\lambda_{1985}$	$\delta\lambda_{2005}$	*N*
Gross Capital Formation (% of GDP)	.276**	.109+	.253	.382+	.070	.042	115
Population Growth (Annual %)	–.384**	–.192**	–.636**	–.656**	.244*	.126	136
Barro-Lee Education Age 20–60	.656**	.639**	.963*	.700*	.632*	.447*	118
Average of Solow Fundamentals					.32	.20	
Education Gap (Male-Female)	–.412**	–.501**	–.550*	–.257	.227*	.129	118
Labor Force Participation Rate	–.268**	–.257**	–.424	.367*	.114	–.094	160
Polity 2 Score	.494**	.197**	.891**	.340	.440**	.067	124
Freedom House Political Rights	.540**	.353**	1.107**	.189	.598**	.067	132
Freedom House Civil Liberty	.568**	.351**	.959**	.173	.544**	.061	132
Media Freedom Score	.517**	.468**	.117	.004	.061	.002	152
WGI Political Stability	–	–	–	–	.069	.069	159
WGI Government Effective	–	–	–	–	–.115	.262	158
WGI Regulatory Quality	–	–	–	–	–.270	.044	159
WGI Rule of Law	–	–	–	–	–.175	.075	159
WGI Control of Corruption	–	–	–	–	–.173	–.032	159
Overall Economic Freedom Index	–	–	–	–	–.267+	–.150	97
Government Integrity	–	–	–	–	–.113	–.042	97
Property Rights	–	–	–	–	–.106	–.125	97
Business Freedom	–	–	–	–	–.012	–.120	97
Equal-weighted Tariff	–.758**	–.271**	.298	–.265	–.226	.072	45
Value-weighted Tariff	–.696**	–.256**	.026	–.799	–.018	.205	45
Taxes on Income & Capital Gain	.416**	.280*	–.113	.082	–.047	.023	48
Government Spending (% GDP)	.262**	.237**	–.192	–.245	–.050	–.058	111
Taxes on Goods and Services	–.182	–.155	–.579+	.185	.106	–.029	49
Tax Burden Score	–	–	–	–	.017	.004	97
Private Investment	.234**	.195**	.026	.121	.006	.024	133
Military Expenditure (% GDP)	.034	.044	.089	–.565	.003	–.025	110
Inflation	–.156+	–.043+	–.081	–1.117*	.013	.048+	124
Central Bank Independence	–.022	.339**	–.606*	.023	.013	.008	100
Credit to Private Sector	.549**	.963**	.761*	.170	.418**	.164	104
Credit by Financial Sector	.267**	.574**	.371	.132	.099	.076	104
Financial Freedom	–	–	–	–	–.059	–.069	97
Investment Freedom	–	–	–	–	.133	.005	97
Average of Short-Run Correlates					.04	.03	
Population in 1900	–.230+	–.145	.472	.472*	–.109	–.068	58
Legal Origin (UK)	.059	.039	.533*	.056	.031	.002	136
Legal Origin (France)	–.213**	–.191**	–.600**	–.308+	.128+	.059	136
Legal Origin (Germany)	.127*	.137*	.187	.480*	.024	.066*	136
Legal Origin (Scandinavia)	.283**	.234**	–.076	–.065	–.022	–.015	136
Legal Origin (Socialist)	–.132	–.089	.007	.345*	–.001	–.031	136
Log Settler Mortality Rate	–.610**	–.569**	–.774*	–.426	.473*	.243	84
Mean Temperature (1986)	–.583**	–.476**	.024	.381	–.014	–.181+	60
Distance from Coast	.239+	.329**	.806*	.130	.192	.043	61
Ethno-linguistic Fractionalization	–.413**	–.441**	–.555*	.029	.229+	–.013	124
Landlocked	–.200**	–.142*	.301	.183	–.060	–.026	129
Latitude	.494**	.481**	.618*	.059	.305*	.029	129
Tropical Climate	–.601**	–.518**	–.083	.752**	.050	–.390*	89

Table 4
Continued

	δ_{1985}	δ_{2005}	λ_{1985}	λ_{2005}	$\delta\lambda_{1985}$	$\delta\lambda_{2005}$	N
Average of Long-Run Correlates					.09	−.02	
Power Distance	−.588**	−.513**	−.017	.679**	.010	−.348**	60
Individualism	.573**	.459**	−.574⁺	−.626**	−.329⁺	−.287*	60
Masculinity	.023	−.006	−.247	−.092	−.006	.001	60
Uncertainty Avoidance	−.040	−.105	−.492⁺	−.114	.020	.012	60
Indulgence	.242*	.292**	.783**	.458*	.190⁺	.134*	69
Long-term Orientation	.412**	.297**	−.092	−.268	−.038	−.080	70
Average of Culture Determinants					−.03	−.09	

Note: This table reports the coefficients of the cross-sectional regressions of correlates on income and of (10-year average) growth on correlates, in 1985*–2005*. In particular, the coefficients δ and λ are estimated from the following regressions: $\Delta \log(\text{GDPpc}_{i,t}) = \beta_t \log(\text{GDPpc}_{i,t}) + \lambda_t I_{i,t}/SD(I_{1985}) + \alpha_t + \epsilon_{i,t} I_{i,t}/SD(I_{1985}) = \delta_t \log(\text{GDPpc}_{i,t}) + \nu_t + \epsilon_{i,t}$. Columns 2 and 3 report the cross-section relationship δ estimated estimated in 1985* and 2005*. Columns 4 and 5 report regressions of income growth in the next decade on correlates, controlling for income at the start of the decade, in 1985*–95 and 2005*–15. Columns 6 and 7 report the difference between absolute converge and conditional convergence constructed using the standard omitted variable bias formula by constructing the product $\lambda\delta$. Column 8 reports the number of observations in the specifications, respectively. The sample only includes countries with nonmissing correlate variables in 1985. Missing entries correspond to correlates that are standardized each year: the standardization makes comparisons over time of λ and δ difficult to interpret but cancel out for the product $\lambda\delta$.
$^{+}p < .10$.
$^{*}p < .05$.
$^{**}p < .01$.

effect of correlates on growth—we are more sympathetic to the view of Acemoglu and Molina (2022) and agree that including country fixed effects may make sense, although our results in Section II point to shortcomings of that framework too. Our exercise, without country fixed effects, has the advantage of providing an out-of-sample test of sorts for the predictive power of policies and institutions identified as important in the 1990s literature. With a limited sample size and many potential covariates, the growth-regressions literature is vulnerable to overfitting; events after the publication of papers provide an out-of-sample data set. In 20 years, we could run a similar exercise to test the correlates and identification strategies proposed more recently.

Growth-regression coefficients, the λ_t in equation (4), fell somewhat in magnitude over time for human capital and other Solow fundamentals (the investment rate and the population growth rate), but they were correlated. Education, for example, strongly predicts higher economic growth at a roughly similar magnitude in decades 1985–95 and 2005–15. A 1-standard deviation increase in educational attainment predicts 0.96% annualized GDP growth in 1985–95, and the number falls to 0.70% in 2005–15. Countries in which females and males have more equal access to education resources have grown faster: a 1-standard deviation reduction in the gender gap (in schooling years) predicts 0.55% higher GDP growth in 1985–95 and 0.26% in 2005–15.

In contrast, coefficients on short-run correlates beyond the enhanced Solow fundamentals (those correlates that can change over relatively short horizons) fell more substantially from 1985 to 2005, with essentially zero correlation between the two periods. Table 4, columns 4 and 5 report λ_{1985} and λ_{2005}.[19] Figure 6 plots λ_{2005} reestimated with the same country sample[20] 2 decades later (2005–15). The slope of the correlate-growth relationships has shrunk toward zero and the slope of fitted line in figure 6 is only 0.206.

Long-run correlates (those that can only change slowly, if at all) and culture fall in between Solow fundamentals and short-run correlates in the persistence of their correlation with growth. Figure 6, panel *B* shows that the slope of the long-run correlate-growth relationship has shrunk toward zero with 0.408 as the slope of the fitted line. However, the correlate-growth relationship is more stable for culture with 0.739 as the slope of the fitted line.

As we did for correlate-income slopes, whereas the 1985-versus-2005 comparison is our main specification, in figure A19 we also report the trends in the growth-correlate slopes since 1960, averaged within each group of correlates. We apply the same normalization as for correlate-income slopes, namely we first renormalize the correlates such that their correlate-income slope is positive in 1985 (i.e., we multiply the correlate by −1, throughout, if the slope is negative in 1985). Again, as many correlates are not available before 1985, and the set of countries for which correlates is available is growing, we repeat the exercise for multiple balanced panels, one from the start of each decade. The figures support the results above, showing that the flattening of growth-regression coefficients from 1985 to 2005 reflects a gradual trend over that period. It also appears that growth-regression coefficients peaked around the 1980s, but we do not place too much weight on that result, as data availability is sparse prior to then, especially for short-run correlates.

Why did growth-regression coefficients shrink as correlates converged? We provide two hypotheses, for future work. First, many correlates, both observable and unobservable, are likely correlated with each other, so that the regression coefficient on any one will reflect not just its underlying causal impact but also its correlation with others. The rapid convergence in correlates may have been associated with a reduction in the correlation between them, and hence a reduction in this omitted variable bias. Second, correlates may have nonlinear effects: perhaps policies and institutions used to matter when there were large differences across countries, but now that they have converged, any remaining differences matter less.

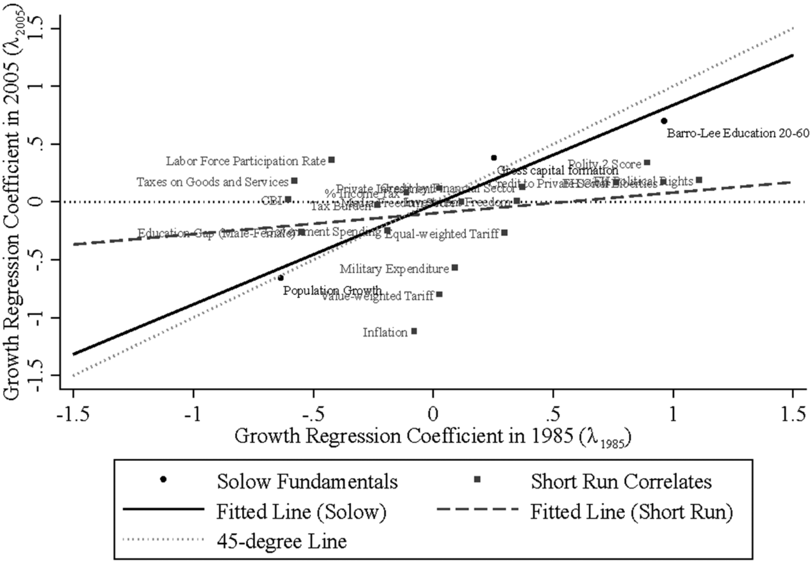
D. Shrinking Gap between Conditional and Unconditional Convergence

One response to the failure of unconditional convergence was to move to the idea of conditional convergence—convergence conditional upon possible determinants of steady-state income, such as policies and institutions (Barro and Sala-i-Martin 1992)—which has been widely supported in the data (Durlauf et al. 2005). This suggests a natural question: does the shift toward unconditional convergence represent a shrinking of the gap between conditional and unconditional convergence, for example, due to rapid convergence of correlates, or did conditional convergence itself became faster? Globalization could have resulted in either. For example, international institutions have promoted convergence across many policies, and higher capital mobility has increased capital inflows into some lower-income countries, potentially reducing the effect of conditioning on such correlates, whereas at the same time the spread of technology and of production processes through increased trade may have made convergence conditional on correlates faster.

Univariate

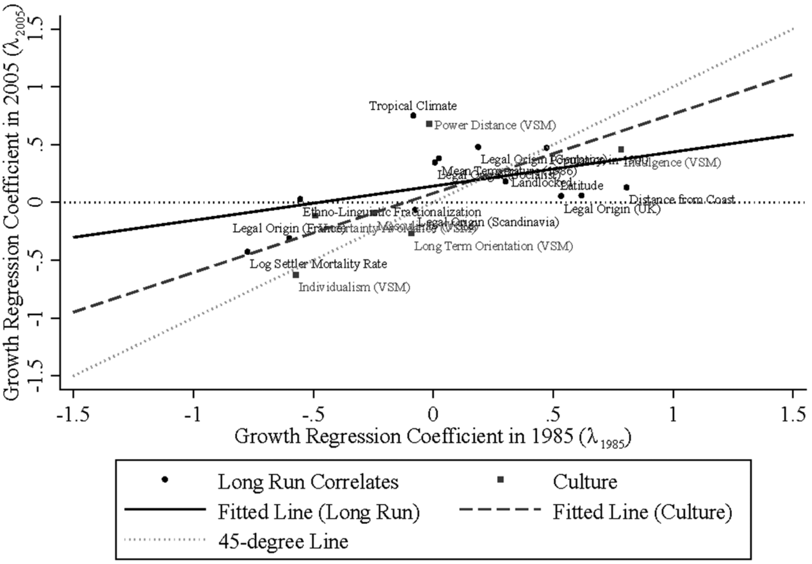
While conditional convergence regressions often condition on multiple correlates, our baseline specification conditions on one variable at a time, because of the difficulty in forming a balanced panel with multiple correlates, and to tie our hands in terms of specification search. When conditioning on a single correlate, according to the omitted variable bias formula, the gap between unconditional and conditional convergence can be written as the product of the correlate-income slope δ and the growth-correlate slope λ.

Figure 7 and table 4 report the changes in this gap from 1985 to 2005. Correlate-by-correlate, qualitatively the trend in the effect of conditioning



Slopes of fitted lines: Solow = 0.861; Short Run = 0.180

A: Enhanced Solow fundamentals and short-run growth correlates



Sples of fitted lines: Long-Run = 0.296; Culture = 0.685

B: Long-run growth correlates and culture

Fig. 6. Growth-correlate of growth slopes, 1985 versus 2005. This figure is a scatter plot of the growth-regression coefficients for different correlates, in 1985 versus 2015, that is, the coefficients from regressions of average growth in (log) income per capita in the next

is similar to that of the growth-regression coefficients: Solow fundamentals have the most stable effect, long-run correlates and culture are intermediate, and short-run institutions have the least stable effect. However, what is harder to see from this figure but can be seen clearly in figure A20, is that the effect on conditioning has on average shrunk to around zero for short-run and long-run correlates since 1980, whereas for Solow fundamentals and culture it has remained more steady. The same figure also shows that the effect of conditioning on correlates increased substantially between 1960 and 1980, although for a much smaller set of countries and correlates.

Multivariate

Many of the classic conditional convergence regressions control for a large set of policies and institutions. In attempting to run such multivariate regressions, there is a harsh trade-off in constructing the country-year sample, between the number of observations and the number of available correlates, which is why we consider the univariate results our main results in this section. However, to attempt to run a multivariate version, we (somewhat arbitrarily) selected a sample of 72 countries and include the following institutional variables: Polity 2 score, Freedom House political rights, Freedom House civil liberty, private investment ratio, government spending, inflation, credit provided to the private sector, credit by the financial sector, Barro-Lee educational attainment, and gender gap in schooling years.

Figure 8 plots both the conditional and unconditional convergence coefficients, from 1985 to 2007. We see that although the unconditional convergence coefficient has trended down, there has been no clear trend in the conditional convergence coefficient, and the gap between the two has closed substantially. Thus, in terms of what has driven the change in unconditional convergence, unconditional convergence has become

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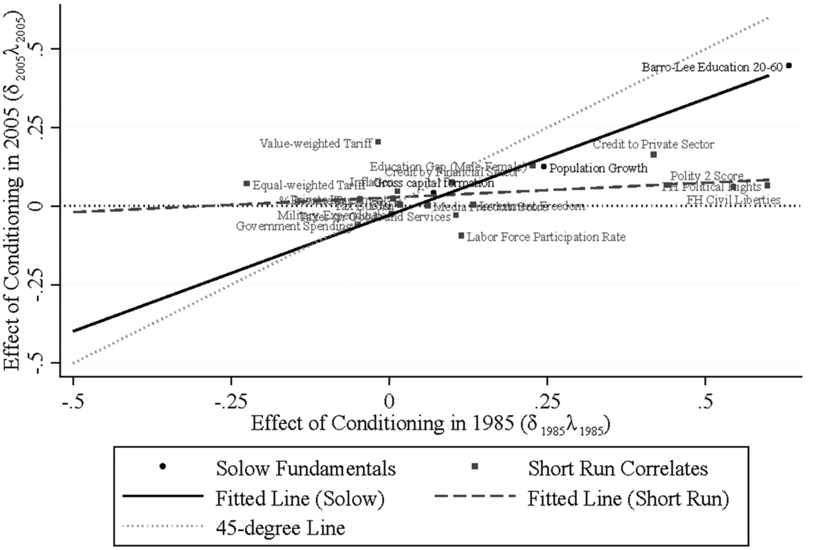
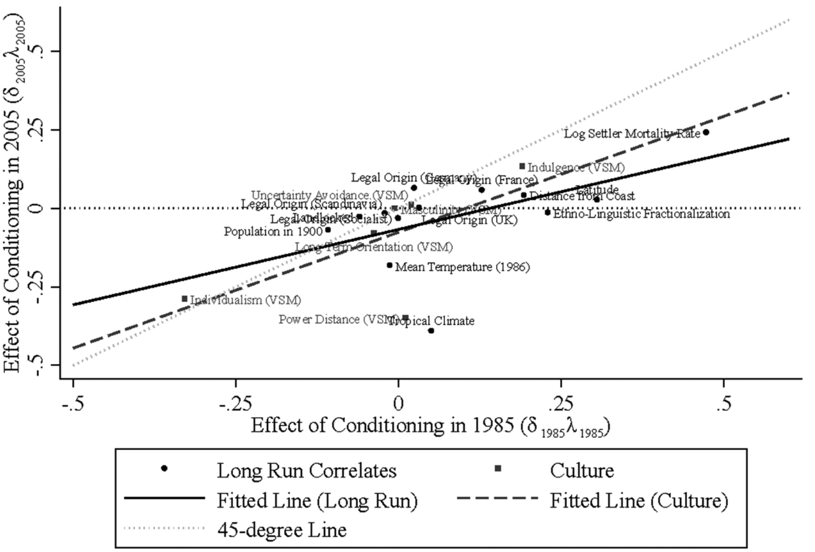
decade, on correlates, controlling for baseline (log) income per capita. Namely, the y-axis is λ_{2005}, and the x-axis λ_{1985}, from equation (4), which is the following regression: $100\{[\log(\text{GDPpc})_{i,t+10} - \log(\text{GDPpc})_{i,t}]/10\} = \beta_t \log(\text{GDPpc})_{i,t} + \lambda_t[I_{i,t}/SD(I_{1985})] + \alpha_t + \epsilon_{i,t}$. λ_{1985} and λ_{2005} are estimated using a balanced panel, balanced separately for each correlate. The solid lines are the fitted lines of the scatter plot; the numbers beneath the plots refer to their slopes. The dashed lines are the 45-degree line, as a benchmark. Panel *A* presents results for Solow fundamentals and short-run correlates; panel *B* presents results for long-run correlates and culture. We exclude those correlates that are normalized each period and hence are not comparable over time. A color version of this figure is available online.



Slopes of fitted lines: Solow = 0.740; Short Run = 0.093

A: Enhanced Solow fundamentals and short-run growth correlates



Slopes of fitted lines: Long-Run = 0.480; Culture = 0.739

B: Long-run growth correlates and culture

Fig. 7. Gap between unconditional and conditional convergence (univariate), 1985 versus 2005. This figure plots the gap between unconditional and (univariate) conditional convergence, in 1985 versus 2005, across different correlates. In particular, it plots

closer to conditional convergence. We do not find clear trends in conditional convergence itself, although that is not our focus.

Table 5 reports the coefficients for growth in 3 decades from 1985 to 2015. From 1985 to 1995, correlates explain substantial variation in economic growth and convert absolute divergence to conditional convergence. The 10 correlates jointly take down the coefficient from 0.42 ($t = 1.67$) to −0.816 ($t = -1.79$). In 2005–15, the unconditional economic growth rate is −0.79% ($t = -5.16$). Correlates still effectively cut the convergence rate to −1.14% ($t = -4.63$), however, no sign indicates conditional convergence is faster than 2 decades ago.

These results suggest an interpretation that is consistent with neoclassical growth models. Conditional convergence has held throughout the period. Absolute convergence did not hold initially, but, as policies, institutions, and human capital have improved in poorer countries, the difference in institutions across countries has shrunk, and their explanatory power with respect to growth and convergence has declined. As a result, the world has converged to absolute convergence because absolute convergence has converged to conditional convergence.

V. Conclusion

We document a trend toward absolute convergence since the late-1980s, resulting in absolute convergence since 2000. This trend is consistent with neoclassical growth models and with models in which catch-up growth is easier than growth at the frontier, and inconsistent with the set of endogenous growth models, which predict divergence. While incomes have diverged across countries for centuries (Pritchett 1997), the rapid trend to convergence over the last 20 years suggests something important has changed. Breaking down convergence by income quartiles shows both a growth slowdown at the frontier and a broad increase in the rate of catch-up growth away from the frontier, the breadth of which does not support an explanation in which countries catch up only above a certain income threshold, with more countries recently crossing

$\delta_{1985}\lambda_{1985}$ and $\delta_{2005}\lambda_{2005}$, which link together unconditional and conditional convergence through the omitted variable bias formula, equation (5): $\beta_t = \beta_t^* + \delta_t\lambda_t$. Coefficients are estimated using a balanced panel, balanced separately for each correlate. The solid lines are the fitted lines of the scatter plot; the numbers beneath the plots refer to their slopes. The dashed lines are the 45-degree line, as a benchmark. Panel *A* presents results for Solow fundamentals and short-run correlates; panel *B* presents results for long-run correlates and culture. A color version of this figure is available online.

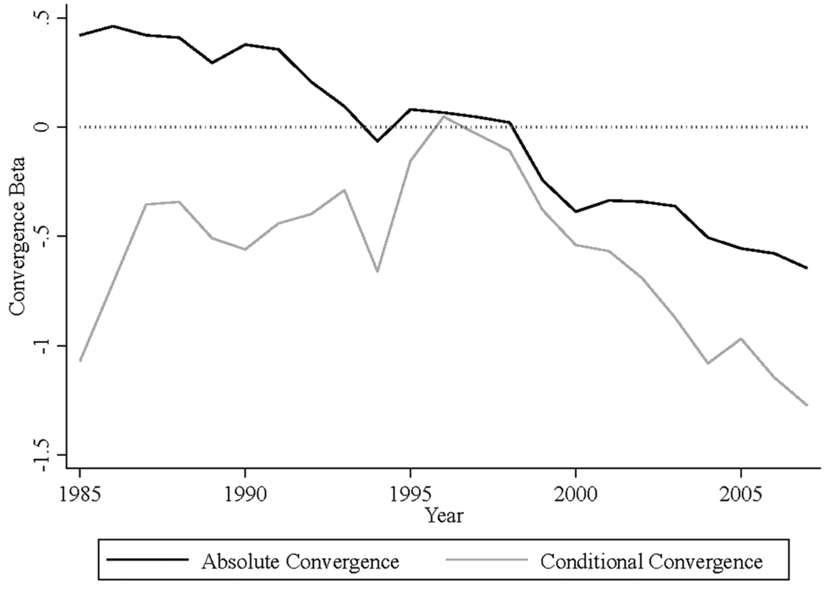


Fig. 8. Absolute convergence converging to conditional convergence (multivariate). The black line represents the absolute convergence β-coefficient, and the gray line represents the conditional convergence β^*-coefficient, using one particular set of correlates to condition on. Choosing the set of correlates is a trade-off between sample size and number of correlates, which leaves a lot of choice to the researcher—one of the reasons we view the univariate results as our main specification. The particular choice here gives a sample of 72 countries, using the following set of correlates: Polity 2 score, Freedom House political rights, Freedom House civil liberty, private investment ratio, government spending, inflation, credit provided to private sector, credit by financial sector, Barro-Lee education attainment, and education gender gap. Minor imputations apply: missing values in institutions are imputed with the latest available data point. The dotted line is the benchmark of no convergence. A color version of this figure is available online.

the threshold, as might be suggested by certain poverty trap models. What could have driven this change: faster catch-up conditional on correlates, for example due to the globalization of production, improved communication, faster technology flows, greater access to (international) finance, and migration; or the convergence of correlates themselves, which could also have followed not only from globalization but also from the end of the Cold War, trends in democratization, the reduction in conflict, and the adoption of the Washington Consensus, among other reasons?

Most correlates of growth and income—policies, institutions, and culture—have converged during the same period, toward those of rich countries. Some of these changes have been gradual, such as changes

Table 5
Absolute and Conditional Convergence in 1985 and 2005

	Annual Growth in GDPpc (1985–1995)				Annual Growth in GDPpc (2005–2015)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log GDP PC	.420+	–.447	–.435	–.816	–.794**	–1.215**	–.791**	–1.139**
	(.252)	(.661)	(.457)	(.619)	(.154)	(.205)	(.233)	(.246)
Investment		.298		–.0469		.384		.416
		(.377)		(.478)		(.319)		(.300)
Population growth		–1.034		–1.024		–.392**		–.415**
		(.626)		(.661)		(.129)		(.148)
Barro-Lee Education 20–60		.428		.492		.463+		.535*
		(.525)		(.619)		(.270)		(.267)
Polity 2 Score			–.558	–.916			.693+	.0514
			(.704)	(.728)			(.378)	(.400)
FH Political Rights			1.304	1.567+			–.193	.378
			(.989)	(.931)			(.464)	(.428)
Private Investment			–.184	–.267			.223	.143
			(.332)	(.329)			(.394)	(.344)
Government Spending			–.0168	.0773			–.551*	–.764**
			(.386)	(.415)			(.275)	(.256)
Inflation			–.0994	–.0284			–1.438+	–1.273+
			(.235)	(.243)			(.772)	(.722)
FH Civil Liberties			.0958	–.481			–.0784	–.333
			(.647)	(.749)			(.782)	(.724)
Credit to Private Sector			.915+	.875			.483	.494+
			(.467)	(.531)			(.313)	(.291)
Credit by Financial Sector			–.394	–.546			–.733+	–.798*
			(.507)	(.573)			(.376)	(.368)
Constant	–2.172	5.546	1.213	6.644	9.387**	11.42**	10.90**	12.31**
	(2.230)	(5.458)	(3.313)	(4.687)	(1.471)	(1.732)	(2.277)	(2.306)
Observations	73	73	73	73	113	113	113	113
R^2	.0283	.155	.152	.228	.214	.333	.306	.417

Note: This table reports absolute and conditional convergence regressions, for 1985*–95 and 2005*–15, for the fullest list of Solow and short-run correlates that allow a reasonable sample size of 72 in 1985. The covariates include investment, population growth, Barro-Lee education attainment, Polity 2 score, Freedom House political rights, Freedom House civil liberty, private investment ratio, government spending, inflation, credit provided to private sector, credit by financial sector, and education gender gap. Columns 1–4 report regressions for 1985–95, and columns 5–8 for 2005–15. Column 1 is the absolute convergence regression. Column 2 conditions on the enhanced Solow fundamentals—the fundamental determinants of steady-state income in the Solow model. Column 3 conditions on other policies and institutions and column 4 conditions on both. Robust standard errors are reported in parentheses.
$^+p < .10$.
$^*p < .05$.
$^{**}p < .01$.

in government spending and in fertility, consistent with modernization theory (Inglehart and Baker 2000), and on average the size of the changes has been as predicted by income growth, under the cross-country correlate-income relationship. However, other changes have happened remarkably quickly, such as the adoption of VATs, or marriage equality, or the spread of democracy after the fall of the Soviet Union, and these more rapid changes may be better explained with theories of contagion or technology adoption (Dobbin et al. 2007). While some aspects of convergence happened independently of external forces, international institutions played a role in other aspects of convergence; for example, the International Monetary Fund (IMF) and the World Bank encouraged the adoption of the Washington Consensus (Easterly 2019), and the World Health Organization provides technical guidance and best practice for health policy.

As correlates and growth have changed, so have the relationships between them: the coefficients of growth regressions. All types of correlates considered—Solow fundamentals, other short-run correlates, long-run correlate, and culture—have seen their growth coefficients shrink. Most robust are the Solow fundamentals, for which a regression of the coefficients in 2005 on those of 1985 has a coefficient of 0.86. Long-run correlates and culture were somewhat stable, whereas short-run correlates' coefficients in 2005 bore little relation to their coefficients in 1985.

As a result of this shrinking in growth-regression coefficients, the gap between unconditional and conditional convergence has also shrunk substantially. Absolute convergence has converged toward conditional convergence, a central prediction of neoclassical growth theory that has held throughout the period. In the parlance of club convergence, policies and institutions have (partially) converged, so that now more countries are "in the convergence club."

What drove these changes since the late 1980s? Why was there not also a trend toward convergence in the preceding 2 decades, when correlates were already converging? And why have growth-regression coefficients shrunk since? While faster catch-up conditional on correlates may be part of the explanation for the trend in convergence (although not our focus, we do not find evidence of it), and the shrinkage in growth-regression coefficients may in part be explained by earlier overfitting, we have focused on the convergence of correlates themselves, the potential determinants of steady-state income.

Our preferred narrative in terms of parsimony, which is admittedly speculative, is as follows. Steady-state incomes are determined by a very large number of factors, from the quality of transport infrastructure, to the quality of education systems, to the quality of bankruptcy law. Many of these determinants are correlated with each other, and although some are observable to us, many are not. As such, the regression coefficient on any observable determinant will not just reflect its underlying causal impact but also patterns of correlation with unobservable determinants. Since the fall of the Soviet Union in 1991 and the adoption of the Washington Consensus, there has been rapid convergence in observable policies and institutions (perhaps endogenously as policy makers reacted to the 1990s growth literature), explaining the shrinking gap between absolute and conditional convergence. If they have simultaneously become less correlated with the unobservable determinants, it would also explain the shrinking growth-regression coefficients, although then it would also likely predict slower conditional convergence, counterfactually. However, unobserved factors might also be converging, pushing toward faster convergence conditional on observables: just as international institutions like the World Bank and IMF are promoting convergence in economic policy, a host of other international bodies are promoting convergence on policies from civil aviation, to smoking (the World Health Organization), to standardized testing in schools (the Program for International Student Assessment), and the globalization of education and media exposure of elites is likely leading to convergence across many factors. An alternative narrative is that correlates have nonlinear effects: policies and institutions used to matter, but now that they have converged, any remaining differences matter less. While we found little evidence for such nonlinearities in our exploratory work, we were underpowered, and the hypothesis merits further investigation.

Do these results give cause for optimism or pessimism regarding whether changes in policies and institutions can lead to catch-up growth? Of course, our results are not causal, so care should be taken here, and further work is needed to assess the causal consequences of the convergence in correlates documented here. Even without taking a causal stance, the results push back on an interpretation of the persistence literature, as indicating that steady-state income is determined only by deep, persistent determinants, which are hard to change. We have shown evidence of convergence in culture, suggesting that even persistent determinants may change relatively rapidly. If we do entertain that our growth regressions at least partially reflect a causal relationship, then our results suggest that malleable policies and institutions did matter for growth in the 1990s, and that when they subsequently (partially) converged, there was a shift to income convergence. Yet malleable policies now seem to have less explanatory power, whereas long-run correlates (and especially Solow fundamentals) have continued to be correlated with growth.

While we cannot predict whether absolute convergence will continue, we can discuss reasons to believe that it may or may not. On the one hand, there are at least two reasons for pessimism. First, both Acemoglu and Molina (2022) and Pande and Enevoldsen (2022) understandably point to recent deteriorations in democracy. This is of concern in its own right, but if democracy is the key correlate, from which others follows, this may undermine the convergence of other correlates. Second, as discussed in Pande and Enevoldsen (2022), the economic costs of climate change are growing and faced disproportionately by developing countries. These costs—both the direct costs and, perhaps more importantly, the indirect costs of induced conflict and emigration—will be a force against convergence going forward. While these are reasons for pessimism, there are also substantial reasons for optimism. Conditional convergence is a robust phenomenon across many settings, and so if the convergence of correlates continues, absolute convergence is a reasonable hypothesis. In the 1960s, there were the growing pains from postcolonial independence, and in the 1980s there was the breakup of the Soviet Union, both periods in which transitional forces may have eclipsed trends toward convergence. In the more stable, postcolonial world order since the 1980s, we observe rapid convergence of correlates, a shrinking of the gap between unconditional convergence and conditional convergence, and ultimately, unconditional convergence.

Appendix

Figures and Tables

A.1. Convergence in Income

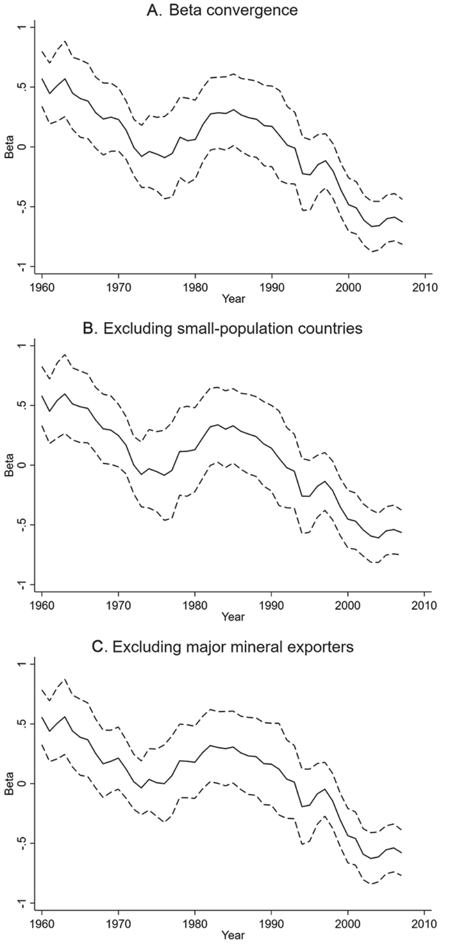


Fig. A1. Robustness of β-convergence to excluding small countries and major mineral exporters. These graphs show the robustness of the β-convergence plot to natural changes in the set of countries: (*A*) is the original, main specification; (*B*) excludes countries whose maximum population during the period was <200,000; and (*C*) excludes countries whose natural resources accounted for at least 75% of GDP (as reported in the World Development Indicators) at some time during the period. Dashed lines represent the 90% confidence intervals.

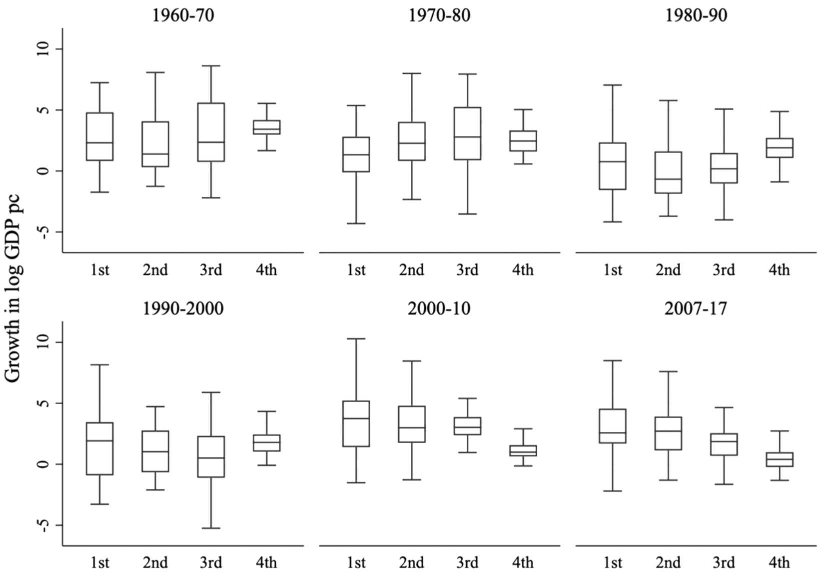


Fig. A2. Boxplot of growth versus country quartile, split by decade. These are boxplots of the country's average growth in GDP per capita for a decade. Each facet shows 1 decade. Within a facet, the plot shows how decade-average growth varied by quartile of baseline GDP per capita. The top of the box is the 75th percentile of average growth in that quartile, the center is the median (the 50th percentile), and the bottom is the 25th percentile. The whiskers represent the corresponding maximum and minimum. The last decade starts in 2007 because our data run to 2017. A color version of this figure is available online.

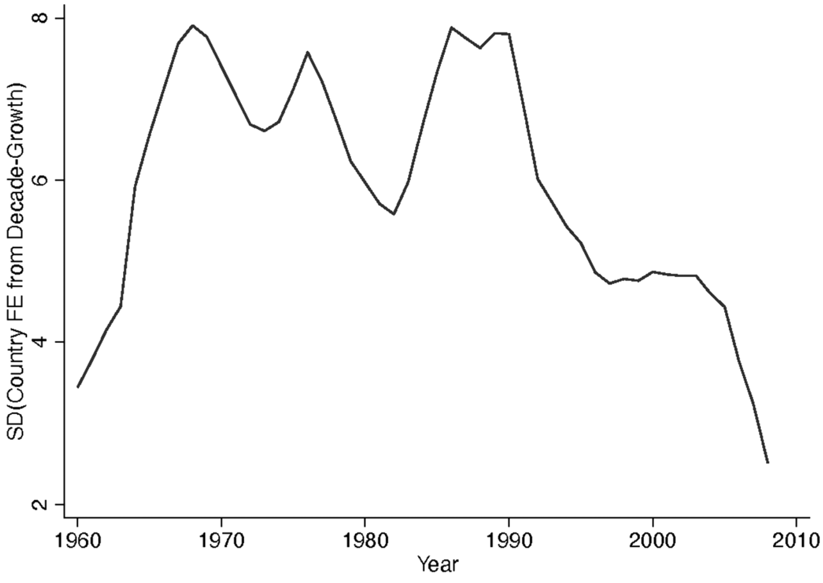


Fig. A3. σ-convergence of country fixed effects. The figure plots the standard deviations of (decade) country-fixed effects in the convergence regression, by year (eq. [2] but with a rolling 10-year window). A color version of this figure is available online.

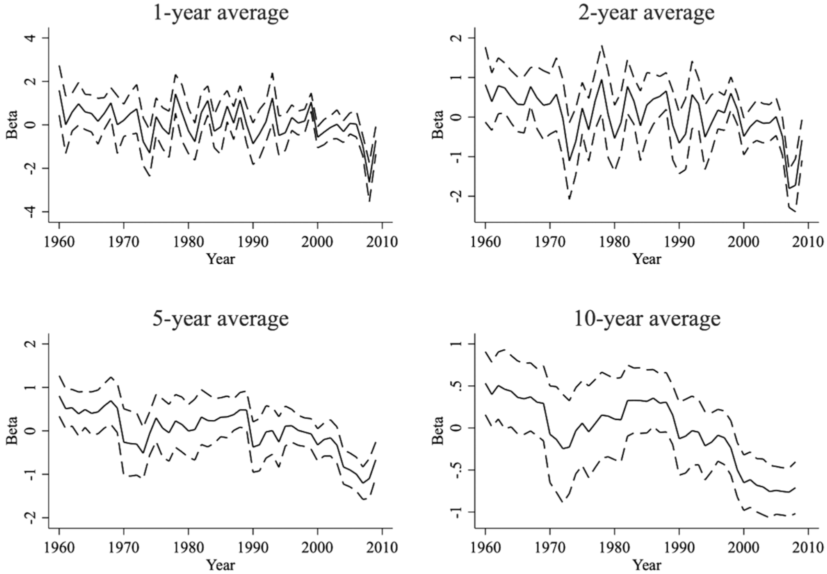
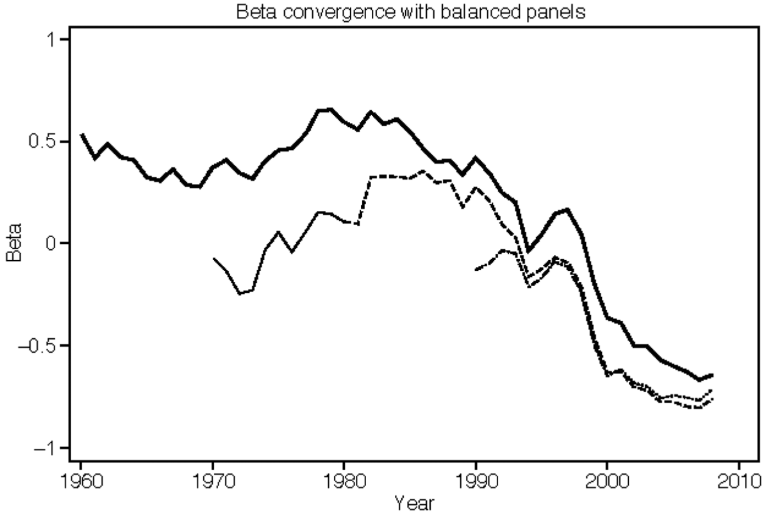
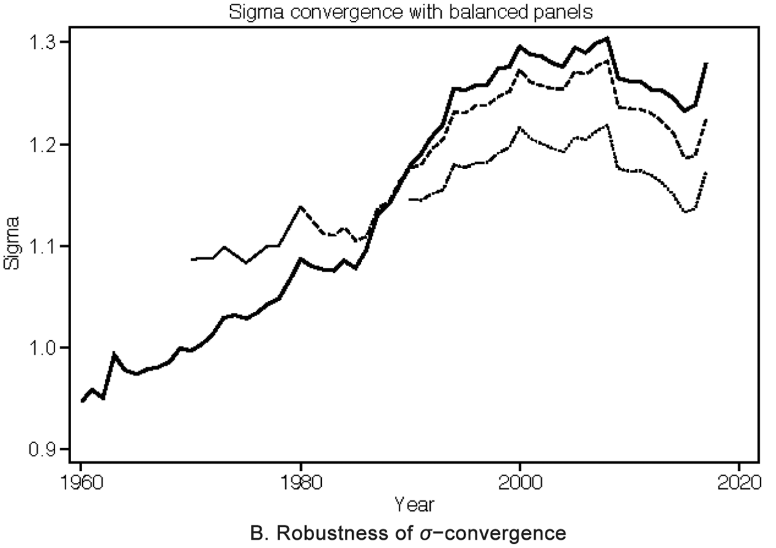


Fig. A4. Robustness of β-convergence to averaging period. This figure shows robustness to the averaging period used for β-convergence. In particular, the plots show the β-convergence coefficients using subsequent 1-, 2-, 5-, and 10-year average growth rates.



A. Robustness of β−convergence



B. Robustness of σ−convergence

Fig. A5. Robustness of convergence to balanced panel. This figure shows robustness of the convergence coefficients to using balanced panels. Since countries are joining our data set over time, we plot five different curves, one starting at the beginning of each decade. A given decades curve shows the evolution of the convergence coefficients going forward from the start of that decade, based upon the constant set of countries that were in the data set at the start of that decade. A color version of this figure is available online.

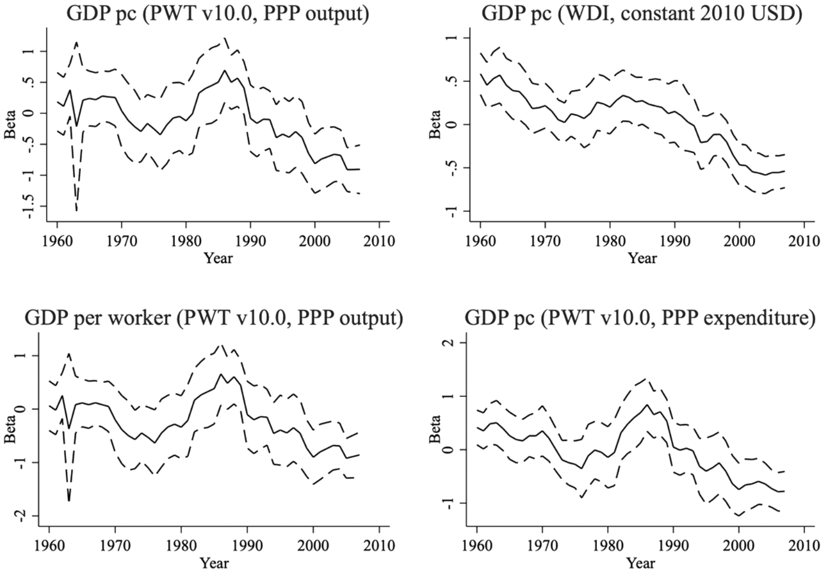


Fig. A6. Robustness of β-convergence to measure of output. This figure shows robustness to the outcome used for β-convergence. Our baseline specification uses GDP pc in constant PPP output, from the PWT v10.0.

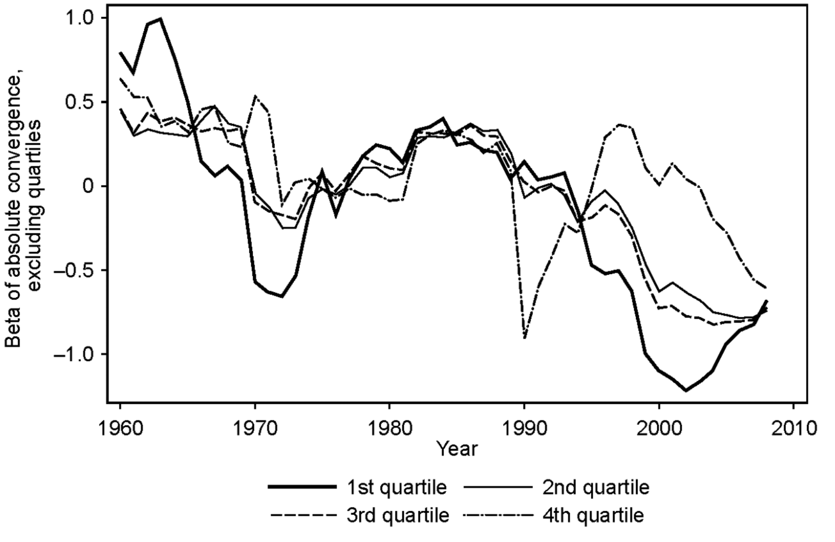


Fig. A7. Catch-up of the poor or slowdown of the rich? β-convergence when excluding countries from different quartiles of per-capita income. This figure reports the sensitivity of the absolute convergence coefficient β to excluding different quartiles of wealth from the sample. The legend refers to which wealth quartile is being dropped, where the first is the poorest. A color version of this figure is available online.

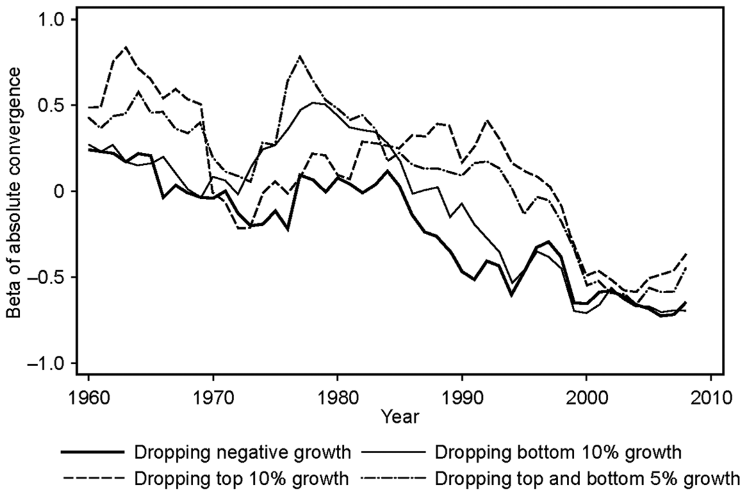


Fig. A8. Disasters, growth miracles, and stagnation. β-convergence when excluding outlying growth rates. This figure reports the sensitivity of the absolute convergence coefficient β to excluding countries based on their subsequent 10-year growth (which is conditioning on an outcome variable, but we report here for diagnostic purposes). The legend refers to which countries are being dropped. A color version of this figure is available online.

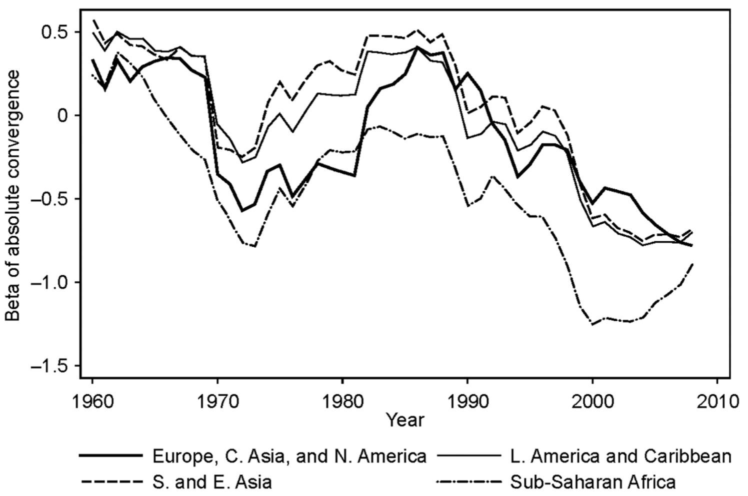
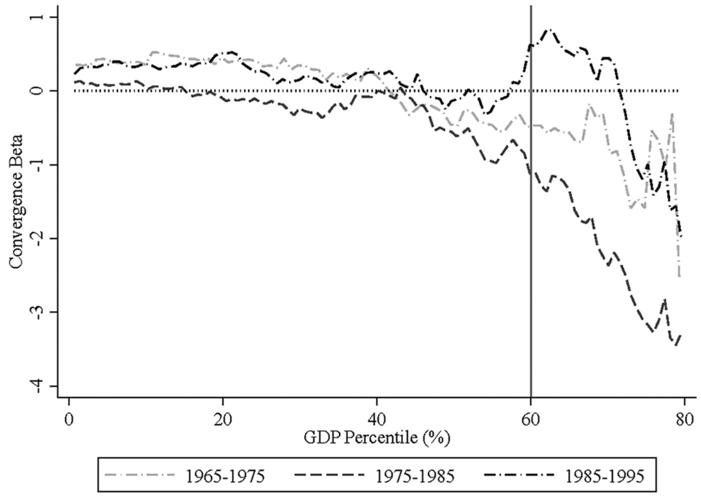
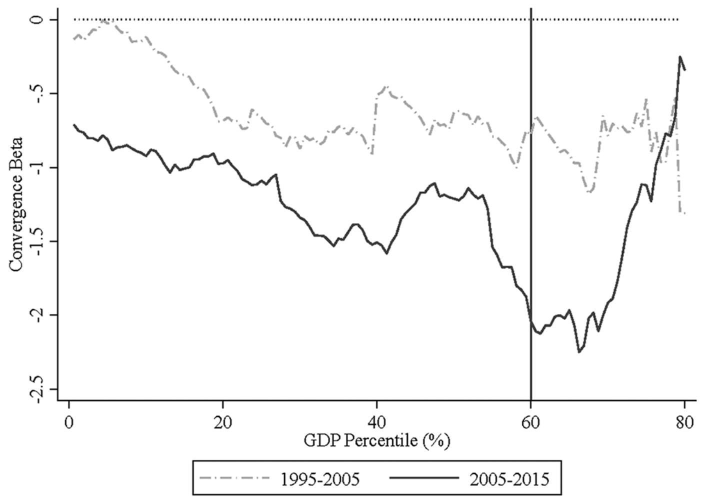


Fig. A9. Which regions are converging? β-convergence when excluding regions. This figure reports the sensitivity of the absolute convergence coefficient β to excluding different regions. The legend refers to which region is being dropped. A color version of this figure is available online.



A: Conditional convergence in decades from 1965 to 1995



B: Conditional convergence in decades 1995 to 2005

Fig. A10. Club convergence by income. This figure plots β convergence conditional on the rank of GDP per capita (>X%), from absolute convergence β ($X = 0$) to β conditional in top 20% income percentile ($X = 80$). Panel *A* reports the convergence β conditional on income for the 3 decades in the preconvergence era: 1965–75, 1975–85, and 1985–95. Panel *B* reports the β for the 2 decades in the postconvergence era: 1995–2005 and 2005–15. The vertical lines imply the cutoff for the country subsample in the top 40% income percentile. The dotted lines are the benchmark of no convergence. A color version of this figure is available online.

Table A1
Convergence β with Country Fixed Effects

	Panel A: Average Growth in Next Decade (Δt = 10)					
	1960–1969	1970–1979	1980–1989	1990–1999	2000–2007	
log(GDPpc)	–7.794***	–7.990***	–8.552***	–10.38***	–9.186***	
	(.896)	(.820)	(.685)	(.625)	(.849)	
Year FE and Country FE	Y	Y	Y	Y	Y	
Observations	1,107	1,370	1,371	1,600	1,440	
	Panel B: Growth in the Next Year (Δt = 1)					
	(1)	(2)	(3)	(4)	(5)	(6)
	1960–1969	1970–1979	1980–1989	1990–1999	2000–2009	2010–2017
log(GDPpc)	–21.56***	–15.30***	–15.76***	–19.99***	–12.86***	–11.52*
	(3.561)	(3.419)	(3.366)	(3.698)	(3.481)	(4.570)
Year FE and Country FE	Y	Y	Y	Y	Y	Y
Observations	1,107	1,370	1,371	1,600	1,600	1,120

Note: This table reports the β-convergence estimation with both country and year fixed effects (FE) included. $\log(GDP_{i,t+\Delta t}) - \log(GDP_{i,t}) = \beta\log(GDP_{i,t}) + \mu_t + \gamma_i + \epsilon_{i,t}$. The data sample is 1960–2017. Each column reports the β coefficient estimated for each decade. Panel A reports average growth in the next decade (Δt = 10), and panel B report growth in the next year (Δt = 1). Standard deviations are clustered at the country level.
*$p < .05$.
**$p < .01$.
***$p < .001$.

A.2. Convergence in Correlates of Growth

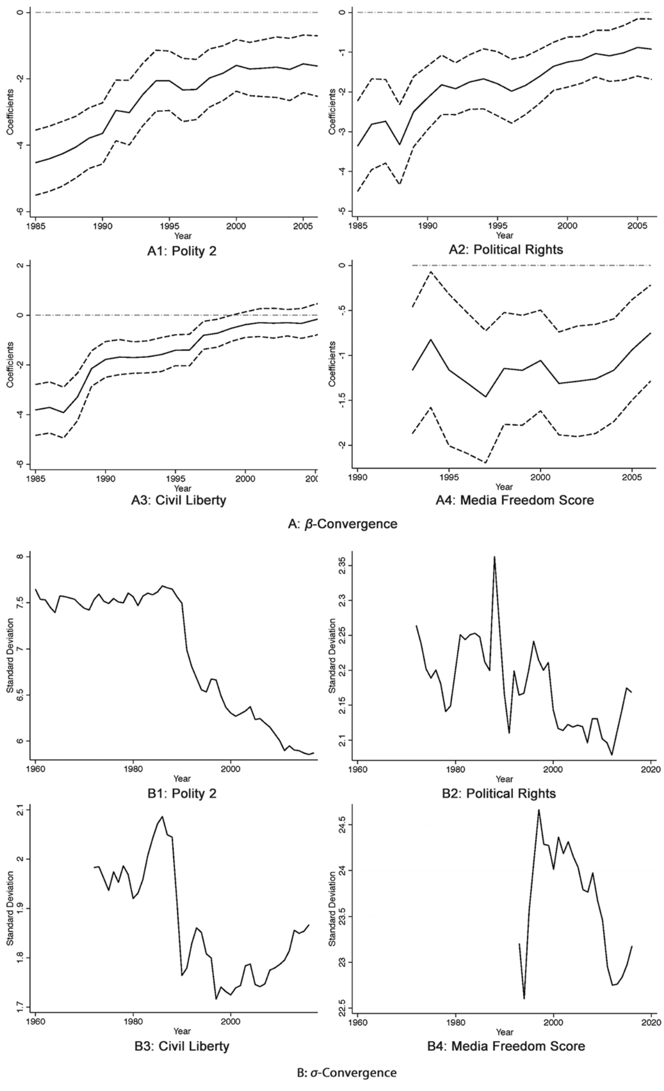


Fig. A11. Convergence in political institutions. Political institution measures include Polity 2 score from Center of Systematic Peace (1960–2015), Freedom House political rights score (1973–2015), Freedom House civil liberty score (1973–2015), Press Freedom score (1995–2015), and WGI political stability. The top panels (*A1–A4*) report results of β-convergence. The bottom panels (*B1–B4*) report results of σ-convergence. Dashed lines represent the 90% confidence intervals. A color version of this figure is available online.

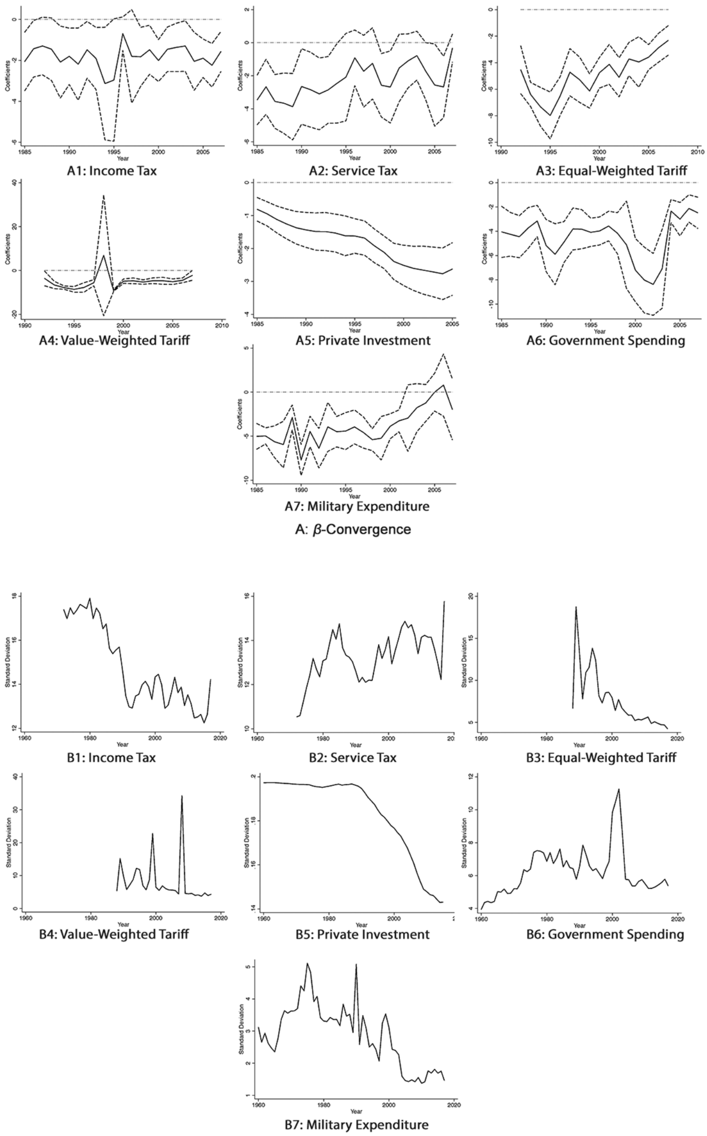


Fig. A12. Convergence in fiscal policies. Fiscal policy measures include tax on income and capital gain (% tax revenue), tax on goods and service (% tax revenue), tax burden score, equal-weighted tariff rate, value-weighted tariff rate, private investment (% total investment), government spending (% GDP), and military expenditure (% GDP). The top panels (*A1–A7*) report results of β-convergence. The bottom panels (*B1–B7*) report results of σ-convergence. Dashed lines represent the 90% confidence intervals. A color version of this figure is available online.

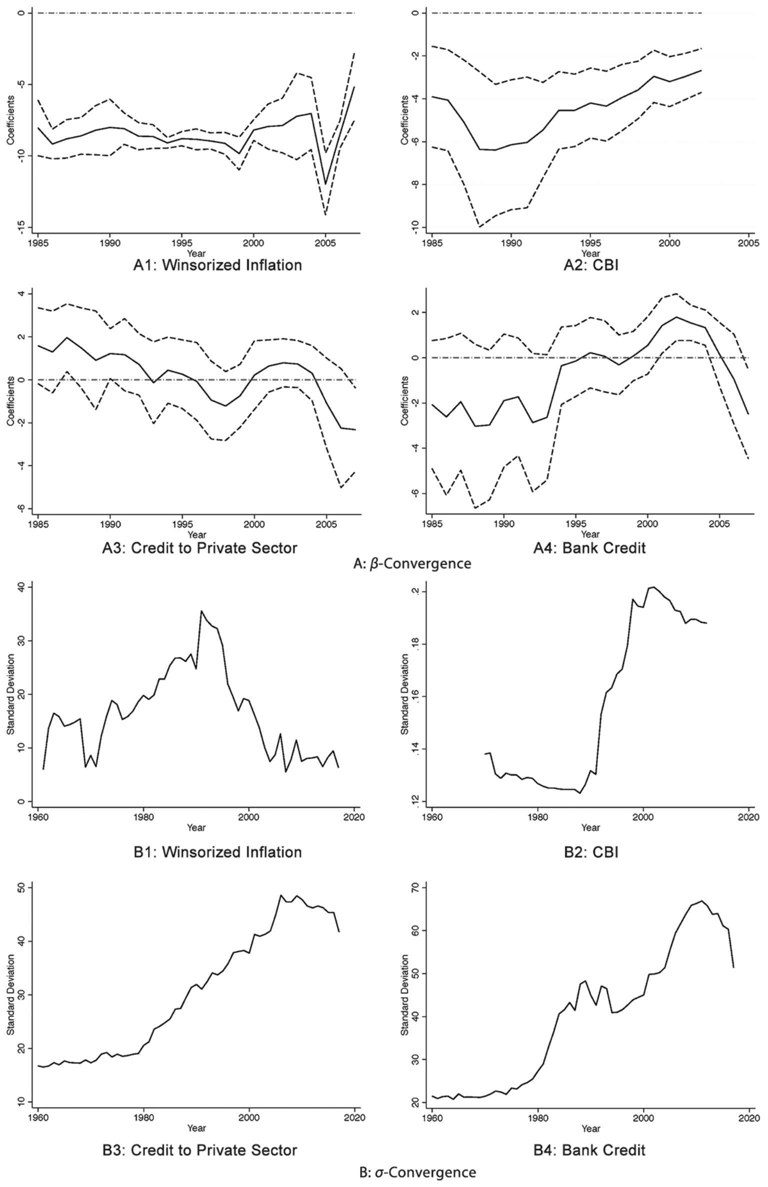


Fig. A13. Convergence in financial institutions. Financial institution measures include winsorized inflation, CBI, credit to private sector, credit by financial sector (bank credit), and financial freedom score. The annual inflation data are winsorized by 100% to reduce the impact of outliers. The top panels (*A1–A4*) report results of β-convergence. The bottom panels (*B1–B4*) report results of σ-convergence. Dashed lines represent the 90% confidence intervals. A color version of this figure is available online.

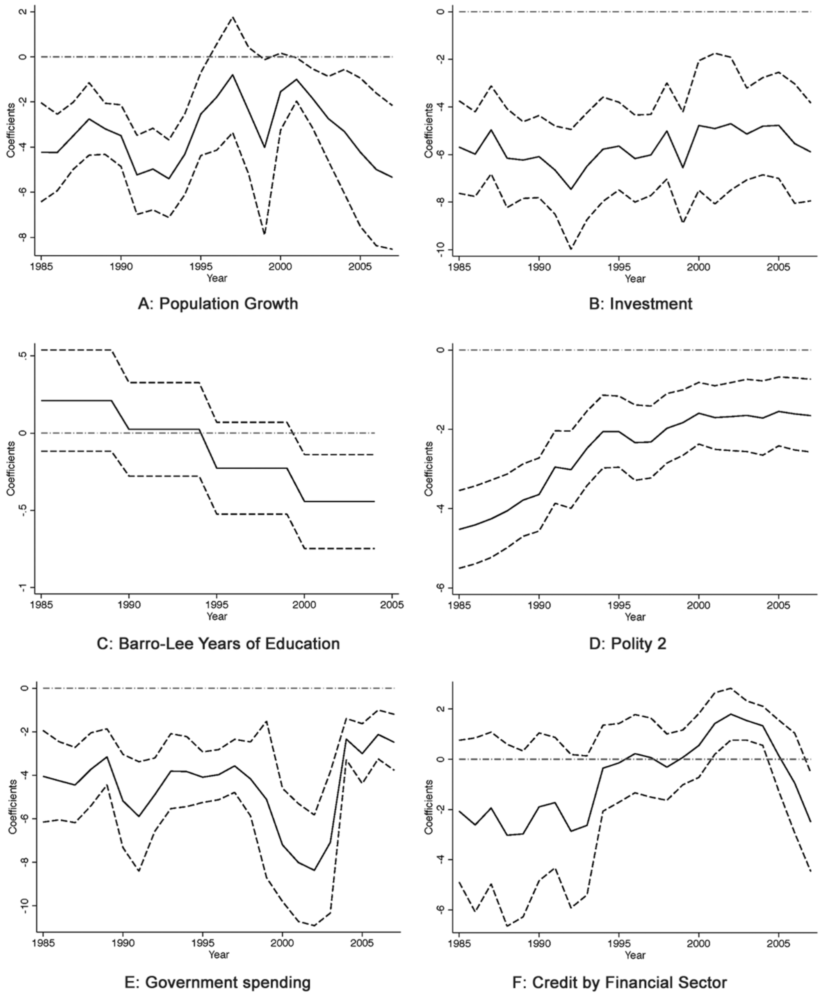


Fig. A14. Convergence in correlates of growth. This figure plots the correlate convergence β_t as a function of year t estimated from regressing the correlate change in the next decade (from year t to $t+10$) on the current correlate (in year t): 100 $[(Inst_{i,t+10} - Inst_{i,t})/10] = \beta_t Inst_{t,i} + \mu_t + \epsilon_{t,i}$. Five institutions are included: Polity 2 score, rule of law (WGI), government spending (% GDP), credit provided by the financial sector, and Barro-Lee education attainment of age cohorts from 20 to 60. The dashed horizontal lines are benchmark $\beta_t = 0$. A color version of this figure is available online.

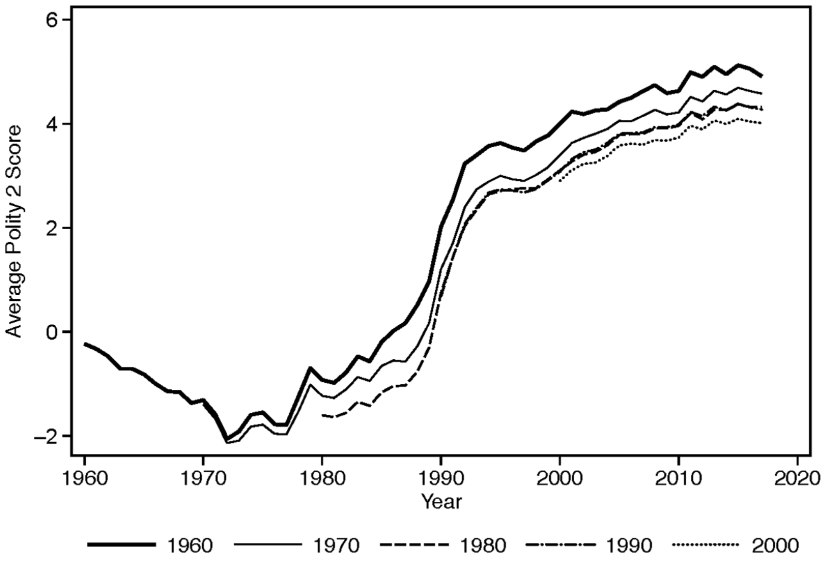


Fig. A15. Polity 2 score with fixed country samples. Average Polity 2 score with the country samples available in 1960, 1970, 1980, 1990, and 2000. A color version of this figure is available online.

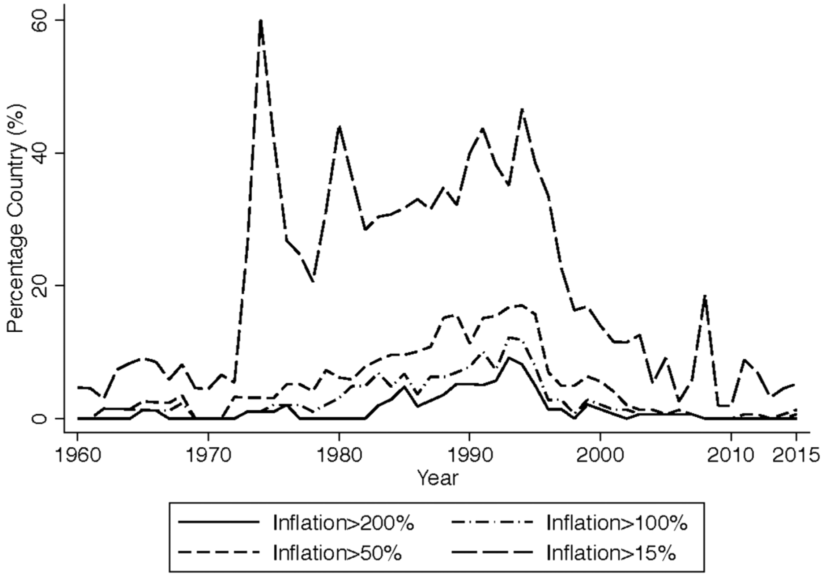


Fig. A16. Hyperinflation over time. This figure plots four series of the percentage of countries experience inflation above 200%, 100%, 50%, and 15%.

Table A2
Short-run Correlate Convergence: Joint Tests

	Chi-squared	p-value	Number of Institutions
	Panel A: 1996–2006		
Labor force	4.600	.100	2
Political institutions	139.749	0	4
Fiscal policies	512.293	0	7
Financial institutions	216.534	0	4
	Panel B: 2006–2016		
Labor force	21.405	0	2
Political institutions	65.906	0	4
Fiscal policies	239.728	0	7
Financial institutions	284.074	0	4

Note: This table reports the joint significance test for 2 decades, 1996–2006 and 2006–16. The null hypothesis is that there is no correlate convergence in all Solow fundamentals and short-run correlates (all βs are zeros). 1996 is the first year, and we have a full data for all institutional variables. Barro-Lee education and private investment are extended to 2016 with the latest value available in our data (2010 and 2014, respectively).

Table A3
Polity 2 Score Change by Decade

Decade	Increase in Polity 2 (%)	Decrease in Polity 2 (%)	Unchanged Polity 2 (%)	Observations
1960–70	19.4	30.1	50.5	103
1970–80	23.8	25.4	50.8	122
1980–90	37.3	9.7	53.0	134
1990–2000	52.9	10.1	37.0	134
2000–10	31.6	13.3	55.1	158
2010–15	19.3	6.8	73.9	161

Note: This table reports the portion of countries with an increase, decrease, and unchanged Polity 2 score for each decade: 1960–70, 1970–80, 1980–90, 1990–2000, 2000–10, and 2010–15.

Table A4
Democratization and Income by Decade

	1960–1970	1970–1980	1980–1990	1990–2000	2000–2010	2010–2015
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Dummy {Increase in Polity 2 Score}					
log(GDP)	−.403**	.0575	.0707	−.468***	−.137	−.0173
	(−2.36)	(.44)	(.63)	(−3.99)	(−1.46)	(−.18)
Observations	91	114	137	169	193	203
	Panel B: Dummy {Decrease in Polity 2 Score}					
log(GDP)	−.328*	−.690***	−.438*	−.0895	−.292*	−.280
	(−1.68)	(−3.32)	(−1.81)	(−.47)	(−1.79)	(−1.22)
Observations	68	96	114	127	154	158

Note: This table reports the logit regressions of dummies of Polity 2 score increase or decrease on log(GDP). The dependent variable in panel A is the indicator dummy of the increase in Polity 2 score, and the sample excludes the countries with perfect democracy (where the score increase is not possible). The dependent variable in panel B is the indicator dummy of the decrease in Polity 2 score, and the sample excludes the countries with perfect dictatorship (where the score decrease is not possible). *t*-statistics are in parentheses.
*$p < .05$.
**$p < .01$.
***$p < .001$.

Table A5
Culture Variables from the WVS

Variable	WVS Question ID	Question Content
Trust	A165	Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?
Perception on inequality	E035	Incomes should be made more equal/ we need larger income differences as incentives for individual effort
Politics—Respect for Authority	E018	Greater respect for authority (Good/ Don't mind/Bad)
Interest in Politics	E023	How interested would you say you are in politics?
Political actions	E026	Whether you might do the political action or would never under any circumstances do it? Joining in boycotts
Importance of politics	A004	How important it is in your life? Politics
Importance of Family	A001	How important it is in your life? Family

Table A5
Continued

Variable	WVS Question ID	Question Content
Importance of Work	A005	How important it is in your life? Work
Religion	A006	How important it is in your life? Religion
Tradition	B016/A198	Tradition is important to this person/which one is more important? Tradition or economic growth.

Note: The list of WVS questions used to study the dynamics of culture.

Table A6
Convergence in Culture using the WVSs

Cultural Variable	Convergence β	Sample Size
Trust	−.00645	
	(.008)	33
Perception on Inequality	−.0265*	
	(.0123)$^{+}$	32
Politics—Respect for Authority	−.0177*	
	(.0083)$^{+}$	32
Interest in Politics	−.0269*	
	(.0104)$^{+}$	31
Political Actions (Boycott)	−.0214**	
	(.0051)*	33
Importance of Politics	−.0184*	
	(.0078)$^{+}$	33
Importance of Family	−.0435**	
	(.0085)*	33
Importance of Work	−.0329**	
	(.0111)*	33
Religion	.00376	33
	(.0048)	
Tradition	−.0708**	
	(.0131)*	33

Note: This table reports β-convergence regressions for country-level changes in cultural traits in the WVSs. Country-level traits are calculated as the population-weighted average of the traits reported in the WVS. The sample is countries that are surveyed both in wave 3 (1995–98) and wave 6 (2010–14) of the WVS. To adjust for the different survey frequency, we take the annualized change. Robust standard errors are reported in parentheses.
$^{+}p < .10$.
$^{*}p < .05$.
$^{**}p < .01$.

A.3. Linking Converging Income with Convergence of Its Correlates

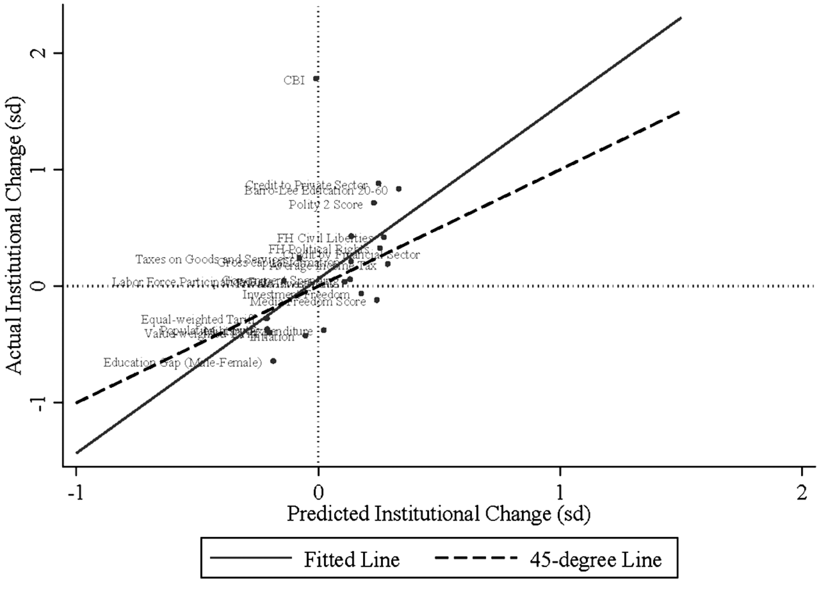


Fig. A17. Actual and predicted change in correlates of growth from 1985 to 2015. This figure plots the actual average correlate change from 1985 to 2015 versus the predicted average correlate change due to GDP growth, predicted using the GDP-correlate relationship in 1985, which is estimated by the following regression: $Inst_{i,1985}/SD(Inst_{1985}) = \delta_{1985}\log(\text{GDPpc})_{i,1985} + \nu_{1985} + \epsilon_{i,1985}$. The predicted correlate change (on X-axis) is defined as $\delta_{1985}\text{mean}_i(\log(\text{GDPpc})_{i,2015} - \log(\text{GDPpc})_{i,1985})$. The actual correlate change (on Y-axis) is defined as $\text{mean}_i(Inst_{i,2015} - Inst_{i,1985}/SD(Inst_{1985}))$. The solid line is the fitted line of all correlates. The dashed line is the 45-degree degree line as a benchmark. A color version of this figure is available online.

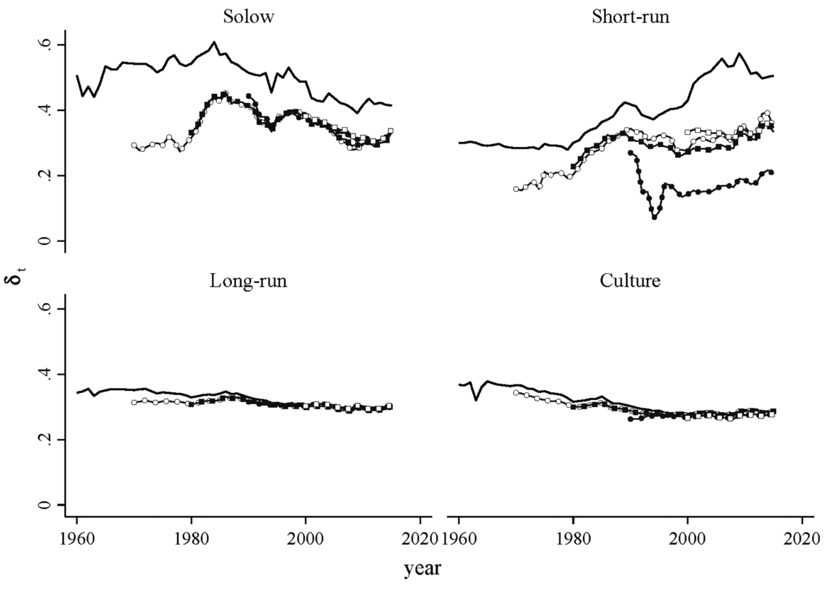


Fig. A18. Trends in relationship between income and correlates of growth (δ). These figures plot δ_t—the slope of the relationship between income and correlates of growth—averaged across the different correlates. Each line represents a balanced panel, so that, for example, the line starting in 1960 is estimated from those country-correlate pairs for which data were available in 1960. A color version of this figure is available online.

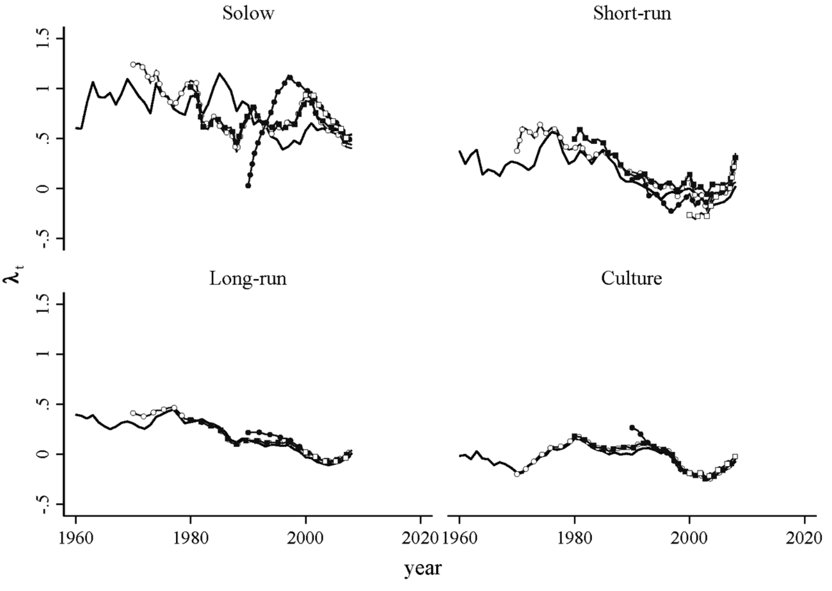


Fig. A19. Trends in relationship between growth and correlates of growth (λ). These figures plot λ_t—the growth-regression coefficient, controlling for baseline income—averaged across the different correlates. Each line represents a balanced panel, so that, for example, the line starting in 1960 is estimated from those country-correlate pairs for which data were available in 1960. A color version of this figure is available online.

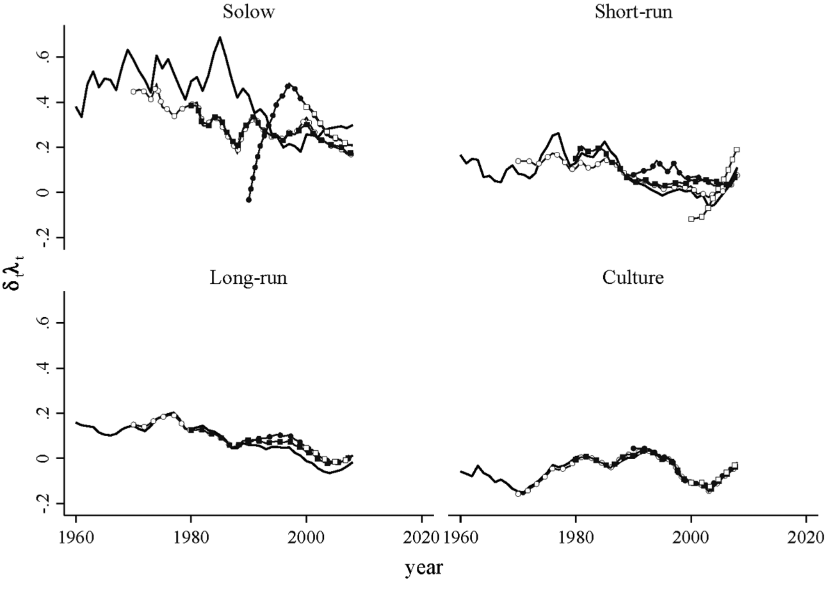


Fig. A20. Trend in difference between unconditional and conditional convergence, univariate ($\delta\lambda$). These figures plot $\delta_t\lambda_t$—the difference between unconditional and conditional convergence—averaged across the different correlates. Each line is estimated from balanced panels of correlate-country pairs, so that, for example, the line starting in 1960 is the average of those country-correlate coefficients for which data were available starting in 1960, and each country-correlate coefficient is estimated for the set of countries for which income data and that specific correlate were available in 1960. A color version of this figure is available online.

Endnotes

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1. Our base specification uses income per capita adjusted for PPP, from the Penn World Tables v10.0, but a similar trend is found using income per capita from the WDIs, measured in constant 2010 USD, and also when using income per worker.

2. Obviously we need to wait another 20 years to perform similar out-of-sample tests of the recent literature. Maseland (2021), in a related paper, studies long-run trends in the relationships between long-run correlates and income, using the trends to distinguish different models of growth.

3. The social science literature on the diffusion of policies has proposed four theories for policy diffusion: social construction, coercion, competition, or learning. See Dobbin et al. (2007) for a review.

4. Parallel results for σ-convergence are in figure 1, panel *B* and figure A5, panel *B* with a fixed country sample.

5. Specifically, for growth rates we use the variable "rdgpna," real GDP at constant 2017 national prices (2017 USD), and for growth levels we use "rdgpo," output-side real GDP at chained PPPs (2017 USD), as recommended by the PWT user guide.

6. Figure A1 shows the β-convergence after excluding small population countries and major mineral exporters.

7. The dependent variable is the annualized growth—the geometric average growth rate in the next decade.

8. In subsequent robustness exercises, not using PPP adjustments, the trend looks more like a steady trend toward convergence since 1960, except for a major reversal in the 1980s.

9. $X = 0$ corresponds to absolute convergence. X stops by 80, corresponding to the top 20% high-income countries. The sample size would be too small to obtain stable β if X rises above 80.

10. The Press Freedom score ranges from 0 to 100. A high score represents less press freedom in the original data. We transform the data as 100 minus the original data so that high score translates into more press freedom.

11. If data were not available in 1985, we use the earliest available year for the analysis. For example, the rule of law score from WGI starts in 1996. Table 3, col. 4 reports the 1996 average and the baseline year for the correlate convergence β_{Inst} in col. 7 is 1996 as well.

12. Although human capital is not something that can be directly manipulated by policy, many policies can significantly influence educational attainment, such as budgetary decisions, school-building campaigns, curriculum, and minimum school-leaving age.

13. See Krueger and Lindahl (2001) for extensive reviews on micro- and macro-empirical evidence on schooling and growth.

14. In 2010, only nine countries—Switzerland, Denmark, United Kingdom, Iceland, Japan, South Korea, Poland, Singapore, and the United States—have a population with more than 13 years of education. South Korea and Singapore are the only two nations that are above 14 years.

15. WGI political stability scores are rescaled year by year. Thus, β and σ convergences are not well redefined.

16. There is almost surely divergence if we weight countries by their credit market size. Credit growth is highly concentrated in countries with low interest rates and in reserve currencies, e.g., US dollars, Euro, and Japanese yen.

17. Three developed economies—the United States, the United Kingdom, and Japan—are notable exceptions: highly leveraged economies that continue to expand bank credit. Japanese credit was more than 200% of GDP in 1990, and the interest rate dropped below 1% in 1996. The United States and the United Kingdom were both highly leveraged, more than 100% relative to GDP, and continued to increase by approximately another 100%. Similarly, both countries lowered interest rates to near zero after the 2008 financial crisis and the 2020 COVID-19–induced recession. The unprecedented low interest rates further fueled outstanding credit.

18. Table A5 provides the survey question list for each cultural variable.

19. Our time horizon shrinks to 1985–2005 to accommodate the growth regression. Table 4, cols. 2 and 3 report δ_{1985} and δ_{2005}, instead of δ_{2015} discussed in Subsection IV.2.

20. The country sample is selected with valid GDP and correlates data in the starting year. The sample size typically decreases slightly from 1985 to 2005 because some countries vanish in the 2 decades.

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