Converging to Convergence

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Abstract

Neoclassical theory predicts convergence towards steady-state income, determined by policies, institutions, and culture. Empirical tests of convergence in the 1990s found that conditioning on such correlates of growth mattered: *unconditionally* the norm was divergence, if anything. We revisit these empirical tests of convergence with 25 years of additional data. While the recent literature on institutions emphasizes historical origins and persistence, we find substantial change. First, there has been a trend towards unconditional convergence since 1990, leading to convergence since 2000, driven both by faster catch-up growth and slower growth at the frontier. Second, many of the correlates of growth and income - human capital, policies, institutions, and culture - have converged substantially in the same period, in the direction associated with higher income. Third, the slopes of cross-sectional correlate-income relationships have largely remained stable, but their intercepts have changed, so that income change alone explains little of the changes in correlates. Fourth, the growth-correlate slopes - the coefficients of growth regressions - have remained stable for the Solow fundamentals (investment rate, population growth, and human capital) but have shrunk substantially for short-run correlates, such as tax rates, government spending, and democracy scores, and to a lesser extent also for long-run correlates, such as historical institutions, geography, and culture. As such, unconditional convergence has converged towards conditional convergence.

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1 Introduction

Studies in the 1990s found little evidence of convergence, and if anything, the opposite: rich countries growing faster than poor, resulting in divergence (Barro 1991; Pritchett 1997). This led to two responses: first, a rejection of the neoclassical model and the development of endogenous growth theory, variants of which predicted divergence (Romer 1990); second, an emphasis on underlying determinants of steady-state income, such as policies, institutions, and human capital, leading to growth regressions and tests of convergence *conditional* on them (Durlauf et al. 2005). Subsequent research used historical variation in institutions to identify their causal effects on economic outcomes, emphasizing their persistence over time (Acemoglu et al. 2001; Michalopoulos and Papaioannou 2013; Dell 2010).

To update the stylized facts of convergence, we revisit the empirical exercise with twenty-five years of additional data, relative to the literature's peak. We consider global trends in income and growth, as well as factors that might determine them, such as policies, institutions, human capital, and culture. Far from being static, there have been substantial changes since the late 1980s, both in the outcomes themselves and in the relationships between them. While 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 of income, growth, and their correlates.

We begin with absolute convergence – poor countries growing faster than rich, unconditionally – and document *convergence towards convergence* in income per capita. There has been a steady trend towards convergence since the late 1980s, leading to absolute convergence since the turn of the century, precisely when empirical tests of convergence fell out of fashion. In terms of magnitudes, from 1985-1995 there was divergence in income per capita (PPP-adjusted) at the rate of 0.5%, while from 2005-2015 there was convergence at a rate of 0.7%.[1] 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 towards *divergence* in the late 1970s and early 1980s.

Breaking down the trend towards absolute convergence since the late 1980s by subsets of countries provides support for several potential explanations. 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 slow-down of growth at the frontier - the richest quartile of countries experienced flat growth in the 1990s and then a growth slowdown since 2000 – and faster catch-up growth - the other three quartiles experienced a substantial acceleration in growth in the 1990s. Since the mid-nineties, there have been fewer disaster countries – countries that are both poor and experiencing very low or even negative growth. Accounting for them by excluding countries with prolonged negative growth rates, dampens the trend towards convergence, but only slightly, and moreover it does so by removing the trend towards divergence

[1] Our base specification uses income per capita adjusted for Purchasing Power Parity, from the Penn World tales, but a similar trend is found using income per capita from the World Development Indicators, measured in constant 2010 USD, and also when using income per worker.

in the late 1970s and early 1980s, suggesting that trend was caused by such disasters. The trend is also not driven by any one specific region or set of countries, and convergence becomes stronger upon removing Sub-Saharan Africa or the bottom quartile of the income distribution, suggesting some countries may still be being left behind.

We then turn to global trends in potential determinants of growth and steady-state income, such as policies, institutions, human capital, and culture. We divide such potential correlates of income and growth into four groups: *enhanced Solow fundamentals* – investment rate, population growth rate, and human capital – variables which are fundamental determinants of steady state income in the enhanced Solow model (Mankiw et al. 1992); *short-run correlates*, other policy and institution variables considered by the 1990's growth literature which may vary at relatively high frequency; *long-run correlates*, institutions and their historical determinants which do not change or which only change slowly, which have been the focus of the recent institutions literature, as well as geographic correlates of income; and *culture*. Far from being static, we find that many correlates have undergone large changes and themselves converged substantially across countries, towards those of rich-countries.

For short-run correlates, we examine 27 variables in four categories: political institutions, governance quality, fiscal policy, financial institutions. To tie our hands over which variables we include, we started from a list of variables commonly used in growth regressions, from the Handbook of Economic Growth chapter on "Growth econometrics" (Durlauf et al. 2005). We then constrained ourselves to those variables which were available for at least 40 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 32 variables considered in enhanced Solow fundamentals and short-run correlates, we find significant beta-convergence - institutions improving faster on average in countries where they are poorer - in 29. Only credit to the private sector has diverged over time. 21 variables have sigma-converged - the cross-sectional variance has decreased over time - while five have sigma-diverged.

While convergence was unlikely or impossible for long-run correlates, and we do not time variation to test for it, we do find evidence of convergence in culture. Using the different rounds of the World Value Survey, we find that while culture does show persistence, eight out of the ten cultural variables we consider have been converging since 1990. For example, views on inequality, political participation, the importance of family, traditions, and work ethics have all been converging. While limited, the results of the exercise are consistent with numerous papers in sociology and psychology (Inglehart and Baker 2000 and Santos et al. (2017))

Are these two findings, the trend towards convergence in income and the convergence of many of the correlates of income and growth, since the late 1980s, related? On the one hand, an extensive empirical literature argues that correlates such as institutions are important for economic development (Glaeser et al. 2004; Acemoglu et al. 2005), and the convergence literature itself moved towards convergence *conditional* on correlates (determinants of the steady state), suggesting causality could run from converging correlates to converging growth. 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, using historical variation in institutions (or other instruments) to establish their effect on long-run growth (Acemoglu et al. 2001; Michalopoulos and Papaioannou 2013; Dell 2010; Acemoglu et al. 2019), and using instruments for income to test modernization theory (Acemoglu et al. 2008). These studies build on earlier analysis which focused on stylized facts, either from growth regressions (Barro 1996; Sala-i Martin 1997; Durlauf et al. 2005; Rodrik 2012) or from the observation that rich countries share a common set of policies and institutions: they are more democratic, less corrupt; they have robust financial systems, more effective governance, better social order, etc. It is these earlier analyses - of empirical cross-country relationships between income and correlates and between growth and correlates - which we return to and update, with twenty years more data and by adding in the long-run institutions and culture which have been the focus of the recent growth literature. While our analysis is purely descriptive, it is motivated by whether the changes in income, growth, and their correlates are consistent with a causal link from correlates to growth, or a causal link from income to correlates, or both?

The cross-sectional relationships between income and the correlates have changed in levels, but their slopes have mostly remained stable, despite large changes in both income and the short-run correlates. Is this evidence in support of or against Modernization theory? On the one hand the joint convergence in income and in correlates appear to have happened consistently with their baseline cross-sectional relationships, such that the slope of the cross-country regressions have changed remarkably little. Among 32 Solow and short-run correlates, there is a correlation of 0.72 between the cross-sectional correlate-GDP slope in 1985 and in 2015. Moreover, *on average* Solow and short-run correlates have changed as much as would have been predicted by the changes in income, given the baseline cross-country relationship between the two. On the other hand, *per correlate*, these predictions explain relatively little of the observed changes in the average levels of Solow and short-run correlates. For long-run correlates and culture, unsurprisingly the correlate-income relationships have changed even less.

More strikingly, growth regression coefficients have shrunk across the period. The coefficients of the Solow fundamentals have remained the most stable, with a correlation of 0.39 between 1985 and 2005. The coefficients of short-term correlates have changed the most, such that there is almost no correlation in coefficients between the periods. For example, in 1985, one additional score in Freedom House political predicted 0.6% higher annual GDP growth for the subsequent decade, yet the predictive power is negligible in the decade 2005-2015. Long-run correlates and culture fall somewhere between the two, with coefficients which are somewhat stable across the periods (correlations of around 0.3), although on average they also shrank.

Has the trend to absolute convergence occurred because absolute convergence has converged to conditional convergence, or because conditional convergence itself has become faster? We can gain intuition for what has happened by using the formula for omitted variable bias, which says that the gap between absolute and conditional convergence (when conditioning on a single variable) is the

correlate-income slope multiplied by the growth regression coefficient. The reduction of both the magnitude of growth coefficients and their correlation with correlate-income slopes *is* associated with a substantial shrinking in the gap between absolute convergence and conditional convergence. Moreover, the trend in absolute convergence can be explained by this shrinking in the gap with conditional convergence – there is 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 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.

However, this narrative leaves a key question unanswered: why did the growth regression coefficients change? A relatively interventionist interpretation is that policies and institutions used to matter, but now that they have converged, they matter less. For example, perhaps really bad institutions are bad for growth, but so long as institutions are not disastrous, they matter much less. So long as countries have reasonable institutions, there will be convergence. A less favorable interpretation is that policies and institutions have never really mattered in growth regressions: earlier specifications suffered from an overfitting problem and are now failing an out-of-sample test using subsequent data. This would also explain the shrinking of the gap between absolute and conditional convergence, but then the cause of the trend towards absolute convergence remains unknown.

This paper describes trends in major macro-economic variables and the relationships between them, some of which have changed substantially in the last twenty years. The goal is descriptive, not causal. The first literature we contribute to is that regarding convergence, which was at its apex 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), although evidence of convergence within countries (Barro and Sala-i Martin 1992) and across countries conditional on similar institutions. More recently there have been several important additions to these findings. Rodrik (2012) looks specifically at manufacturing and shows that within manufacturing, there has been absolute convergence. Grier and Grier (2007), a paper closely related to ours, also considers convergence in both income and in policies and institutions from 1961-1999. 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 1960-1990, but benefit from twenty years of additional data, and argue that convergence changed around 1990. The trend towards convergence since then, resulting in convergence since 2000, is consistent with models of neoclassical growth and inconsistent with a class of endogenous growth theory models which predict divergence, such as AK models.

This is not the only paper to revisit the question of convergence with updated data. Roy et al. (2016), in particular, make the point that there has been absolute convergence in the last 20 years and, in concurrent work to ours, Patel et al. (2021) emphasize how this is in contrast to the previous stylized facts about convergence. Johnson and Papageorgiou (2020), in contrast, also uses the latest data and concludes 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 twenty-five years represents a fundamental change. Indeed, while we find a sustained trend towards convergence, we only find actual convergence for a relatively short period, whilst historically divergence has been the norm for several hundred years Pritchett (1997). Whether the recent shift to convergence does reflect an underlying, long-term change, or whether it is just transitory due to, for example, higher commodity prices, is an important question. We argue that the gradual trend towards convergence over twenty-five years makes such transitory explanations less likely, we propose possible explanations for a long-term change, and we show that the trend is robust to excluding major commodity exporters.

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. Such an approach can only identify the effect of persistent institutions and cultural traits, and while some, such as legal systems and trust, have deep historical roots and appear to change very slowly (Michalopoulos and Papaioannou 2013), many change rapidly. There is no contradiction in institutions both having a long-run effect and being subject to recent change. For example, gender roles have deep and important historical determinants (Alesina et al. 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 provides a (limited) out-of-sample dataset.

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 et al. 2007).[2] Some of the changes in correlates have been gradual, possibly consistent with modernization theory (Acemoglu et al. 2008; Inglehart and Baker 2000), 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

[2]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.

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, who provide norms and information on perceived best practices (Clemens and Kremer 2016), and sometimes directly coerce the adoption of different policies through conditionality. For example, the "Washington Consensus" encouraged lowers tariffs, lower inflation, and more democracy, all of which have been broadly adopted since. 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 which adopted them. Finally, convergence and diffusion of culture are central topics in sociology and psychology. Two recent examples studying them using the World Value Surveys (among other data sources) as we do, are Inglehart and Baker (2000) and Santos et al. (2017).

The paper proceeds as follows. In section 2, we present the results on absolute convergence in income per capita and document what we interpret as a trend towards convergence since the 1990s. In section 3, we consider what has happened to correlates of growth - policies, institutions, human capital, and culture - across the world and document considerable convergence across multiple dimensions. In section 4, we relate the trend towards convergence in income and the convergence in the correlates of growth, first considering the implications for the cross-sectional relationship between income and correlates and modernization theory, and then turning to the implications for conditional convergence, growth regressions, and neoclassical growth theory. Section 5 concludes.

2 Convergence in income

Neoclassical growth models predict convergence towards 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.[3]

2.1 Empirical setup: measuring convergence

The convergence literature in the 1990s used three different datasets. First, standard cross-country sources such as the World Development Indicators and the Penn World Tables, which covered a sizeable span of countries from the 1960s onwards. Second, the Maddison dataset, 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

[3]Parallel results for σ-convergence are in Figure 1 Panel (b) and Appendix Figure A.3 Panel (b) with a fixed country sample

(Pritchett 1997. Third, within-country panel datasets, to look at convergence within countries. For example, Barro and Sala-i Martin (1992) examined convergence within the US.

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-present. In the main specification, we use the GDP per capita, adjusted for Purchasing Power Parity (PPP) from the Penn World Tables v10.0.[4] It is an unbalanced panel, as for many countries GDP per capita data only becomes available part way through the period. Nevertheless, we use the unbalanced panel for our main specification so as not to drop many of the poorer countries which 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 which 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 rents from natural resources accounted for at least 75% of GDP (as reported in the World Development Indicators) at some time during the period.

We examine both β-convergence and σ-convergence. β-convergence is when poor countries grow faster on average than rich, while 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 et al. 2008). We focus on β-convergence for most of the analysis, with equivalent results for σ-convergence reported in the Appendix.

β-convergence β-convergence is when poorer countries grow faster on average than richer countries. Specifically, at a given time period t, it is when the country-level regression

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

has a negative β coefficient, where $log(GDP_{i,t})$ is Log GDP of country i at time t. To show how β-convergence has changed over time, we plot β_t vs. 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):

$$log(GDP_{i,t+\Delta t}) - log(GDP_{i,t}) = \beta_t log(GDP_{i,t}) + \mu_t + \epsilon_{i,t}$$

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 averages, i.e. $\Delta t = 10$.[5]

Econometric considerations There is a large literature on the tradeoffs of different econometric specifications to test for convergence, summarized in Durlauf et al. (2005). We follow the most

[4]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.

[5]The dependent variable is the annualized growth — the geometric average growth rate in the next decade.

standard approach, testing for β convergence using OLS with fixed-effects for year, clustered at the country level. One concern is measurement error, which may drive towards convergence through mean reversion. This is one reason for which we also look at σ convergence. Another issue is data availability: income data only becomes available for some countries long after the start date. Our base analysis using an unbalanced panel, but we discuss robustness below.

2.2 Results: converging to convergence

Figure 1 shows the scatter plot and regression of Section 2.1 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 A.2 presents summary boxplots of these basic scatter plots, plotting the average growth by income quintile for each decade.

Figures 2a and 2b show the β- and σ-convergence coefficients from these regressions over the whole period 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 -0.59 in the 2000s, and -0.69 in the ten years after 2007, the most recent period we can consider. σ-convergence, represented by a negative slope in 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 towards β-convergence - converging to convergence – since 1990. The coefficient started at around 0.5 in 1990 and has trended down towards -1 today. Looking further back to 1960, initially there is no clear trend, and then there is a trend towards *divergence* in the 1980s.[6] Table 1, Column (2), reports the results of our basic absolute convergence regression, Equation 2.1, with the addition of a linear year variable interacted with $log(GDP_{i,t})$. The interaction terms, representing the "convergence towards convergence", is negative and significant, with a point estimate of -0.024. The trend towards convergence is also apparent in the σ-convergence figure, where it is represented by a gradual decrease in slope, i.e. concavity of the plot.

There are several natural robustness questions. Is the change driven by panel imbalance, in particular the larger number of poor countries entering the panel over time? Are the results robust to the averaging period? Do they depend on the macroeconomic dataset used? In the following we show that results are robust to these concerns.

Balanced panel Since the number of countries in the dataset is growing over time, the above 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

[6] In subsequent robustness exercises, not using PPP adjustments, the trend looks more like a steady trend towards convergence since 1960, except for a major reversal in the 1980s

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 who are in the dataset since 1970.

Figure A.3 displays the results of these investigations which 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 towards convergence since 1990.

While the trend towards 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 which existed before 1990 shows that the change was not mechanical from the addition of the former Soviet countries.

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. Figure A.4 shows how the convergence coefficient varies when using 1-, 2-, 5- and 10-year averages. 10-year averages show the clearest trend towards convergence. Once we get to 1-year averages, the year-to-year variation dominates, and the trend which is apparent in 5- and 10- year averages is much less apparent.

Measure of income Figure A.5 shows that our finding of a trend towards convergence is not specific to looking at income per capita (as opposed to per worker), nor to using income per capita in Purchasing Power Parity (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 World Development Indicators data with income measured in constant 2010 US dollars. Indeed, in the later, the trend is more apparent, and seems to start from 1960, again with a decade of regression in the 1980s.

Specification Figure A.6 shows that our results are however sensitive to the regression specification. Using country fixed effect or country and time fixed effects, instead of time fixed effects as in our baseline specification, we find robust convergence since 1990. However, in part due to the econometric difficulties of using country fixed effects, summarized in Durlauf et al. (2005), we prefer to use cross-country variation as in our baseline specification.

2.3 Which countries have driven the change?

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

Faster growth of poor countries or slowing-down of rich country growth? 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 re-calculated 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 slow-down of growth at the frontier - the richest quartile of countries experienced flat growth in the 1990s and then a growth slowdown since 2000 – and 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 A.7, it does appear that in the last decade the trend towards convergence is driven by the richest quartile versus the other quartiles, and that the poorest quartile has if anything been a drag on the trend towards convergence within the other quartiles.

Fewer growth disasters or more growth miracles? Figure A.9 presents the trend in coefficients from Equation 2.1 when excluding countries which experienced disasters or growth miracles. The trend towards 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 which had a negative 10-year growth rate.

Which regions are driving the change? Figure A.8 presents the trend in coefficients from Equation 2.1 when excluding countries from different regions. Again the trend remains robust, although the trend towards convergence in the last twenty years becomes stronger upon excluding Sub-Saharan Africa.

2.4 Club convergence

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

Figure A.11 plots the convergence coefficients in the country sub-sample with income above

the Xth percentile.[7] Three decades from 1965 to 1995 yield a similar pattern - strong convergence among high-income countries (above the 60 percentile) while 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 all countries, while convergence among the top 40% of countries by income has stopped.

3 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; Michalopoulos and Papaioannou 2013; Dell 2010), 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, towards what we term development-favored institutions. Moreover, culture has also convergence, with 8 out of 10 measures of culture we consider displaying β-convergence in the World Value Surveys data.

3.1 Policies, institutions, measures of human capital, and cultural traits considered

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

To tie our hands, we started from a list of variables commonly used in growth regressions, from the Handbook of Economic Growth chapter on "Growth econometrics" (Durlauf et al. 2005), constraining ourselves to those variables which covered at least 40 countries from 1996. We then added to this list numerous cultural variables and historical determinants of institutions which 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 included for the empirical exercises in the next section – we are able to study convergence of a number of cultural variables, albeit with a smaller country sample than for the policy and institutional variables.

[7] $X = 0$ 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.

Table 2 summarizes the data sources and sample period of the resulting correlates. There are 5 enhanced Solow fundamentals and 27 short-run correlates divided into four broad categories: political institutions, governance, fiscal policy, financial institutions. Not all of these 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 nor average changes for such variables, but we include them in the table as we do use them for our conditional convergence comparison, in Section 4 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 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 (3) 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.

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),[8] and the political stability score (1996-2018) from Worldwide Governance Indicators (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, control of corruption; and five variables (1995-2019) from the Index of Economic Freedom by the Heritage Foundation: Overall economic freedom index, 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

[8]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

adopt free trade and low government intervention, but there is not clear pattern in our data on taxation.

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

The labor category includes Barro-Lee average educational attainment of the age groups 20-60 (Barro and Lee 2013), gender inequality in education (male minus female in educational attainment), and labor force participation rate. High-income countries are more educated and have less gender inequality and lower labor force participation.

The following sections examine changes in correlates from 1985 to 2015 and their rate of convergence, β_{Inst}, estimated from the following equation:[9] [10]

$$\Delta_{1985 \longrightarrow 2015} Inst_i = \beta_{Inst} Inst_{i,1985} + \alpha + \epsilon_i$$

The country sample is time-varying (mostly increasing) as datasets add new countries into the sample.

Before presenting results for individual correlates, we test the convergence of all of our correlates jointly in table A.4, 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 2006-2016 in Panel B.[11] For both decades, we confidently reject (p-value $< 10^{-14}$) the hypothesis that convergence in correlates does not exist.

3.2 Enhanced Solow fundamentals

Human capital Human capital is a robust predictor of income growth, as emphasized in the seminal literature Lucas Jr (1988), Barro (1991), Mankiw et al. (1992), Sala-I-Martin (1997), Barro and Lee (1994).[12] Education augments labor productivity (Lucas Jr (1988)), facilitates technological progress (Romer (1990)), and industrializes economy (Squicciarini and Voigtländer

[9] 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 start in 1996. Table 3 Column (4) reports the 1996 average and the baseline year for the correlate convergence β_{Inst} in Column (7) is 1996 as well.

[10] In the Appendix, we also plot the standard deviations of the correlate metrics as the σ-convergence for correlates (Figures A.15 - A.19).

[11] The joint significance holds for any decade in 1996-2017.

[12] Government cannot directly manage human capital, but many policies can significantly influence educational attainment, such as budgetary decisions, school-building campaigns, curriculum, and minimum school leaving age.

(2015)).[13]

We measure time-varying human capital with the Barro-Lee average schooling years of population age 20-60. Figure A.12 Panel C reports the beta convergence. The convergence in human capital starts from 1975. Since 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 implies that 13 average years of education appears to be a soft cap for many countries.[14] We also observe a meaningful shrinkage in education attainment inequality across gender. The education advantage of male is expected to decline by 8.1% per decade.

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 A.12 Panel B suggests that convergence is initially concentrated and then witnesses a decrease, with the coefficient fluctuating around -6 and slowly moving towards -4 after 2000. Figure 4 Panel B exhibits a strong mean-reversion: with one percent higher investment in 1985 corresponds to a negative growth of 2.98% per decade. With most countries slowly decreasing their investment, certain developing countries like Mozambique, Ethiopia, and Angola, increased investment.

Population growth There has been a sizeable and statistically significant beta-convergence in population growth, with a prediction of -1.53 in growth each decade. Population growth is not development-favored and we observe a decrease in growth from 1.99% in 1985 to 1.42% in 2015, translating to -0.43 standard deviations in 1985. Figure A.12 Panel A reports the beta convergence which fluctuates between -4 and -2 before 2000, after which we witness a sharp decline towards -6. After 2000, population growth has fallen for poor, while population growth has stagnated for some of the rich countries. Figure 4 Panel A reports that most countries in our sample witnessed a negative growth in population.

3.3 Short-run correlates

Political Institutions Political institutions exhibit pervasive beta convergence and sigma convergence, with particularly strong convergence in the 1990s. We use the polity 2 score form the Polity IV project as our primary democracy measure, which ranges from -10 to 10. -10 represents dictatorship and 10 represents perfect democracy. Figure A.14 shows that the average polity 2 score hits its low point in 1978, at below -2, then the score gradually climbed back to zero in 1990. Then, the average democracy score jumped up to 2 after the dissolution of the Soviet Union, and persistently improved to above 4 in the next 25 years.

[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, United States — have population with more than 13 years of education. South Korea and Singapore are the only two nations pushed the number above 14.

Figure A.15 shows the plot of coefficients for beta-convergence in political institutions. Polity 2 score, political rights, and civil liberty yield similar results, including in the coefficient magnitude. 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 -0.2. The beta institutional convergence is statistically significant in any single year's cross-sectional regression. Beta-convergence in media freedom and political stability also holds since 1995 and the convergence pattern is very stable in the recent two decades.

Panel B reports the standard derivation of the five political institutions. The sigma convergence of democracy started 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 Polity 2 score below 5 radically shift their political institutions towards democracy.

Meanwhile, movements away from democracy are also common. Table A.2 summarizes the proportion of countries with increases and downgrades in democracy scores. After 1980, still, roughly 10% of countries experienced falls in democracy in each decade. If we focus, somewhat arbitrarily, on countries with a Polity 2 score reduction of at least three 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, 4 out of 5 in 2010-2015.

Developing countries are much more likely to experience political reforms, both towards democracy and against democracy, while rich countries successfully maintain their democratic politics. Table A.3 shows logit regressions of increases or decreases in Polity 2 score on income level for the six 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 has stayed close to 16% of GDP throughout 1985 to 2015. Moreover, there has been sizeable and statistically significant beta convergence in government spending: one percent higher spending in 1990 predicts a subsequent relative -1.61% decline. Figure 4 Panel E exhibits strong mean-reversion: one percent higher in government spending in 1996 predicts 1.61 percent reduction in the next two decades, where a high t-stat of 9.6 and the R-squared is as high as 41%.

This pattern is not unique to government spending, but common for 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 tariff drops from 9.46% to 4.36%; similarly value-weighted tariff drops from 8.11% to 3.09% — more than 50% tariff cut on average. Beta-convergence coefficient fluctuates around -6 but gradually moves to -4 in the recent decades. The magnitude is notably large compared with other correlates. The convergence is large in both equal-weighted and value-weighted tariff data. Figure A.17 Panels B4 indicates 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: modest convergence happens when countries are equal-weighted, while there is also substantial credit growth in a few large highly-leveraged developed economies.[15] 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 corresponding to a -0.98% decrease per decade. However, the convergence pattern is less persistent over time — Figure A.12 Panel F shows the convergence is particularly concentrated in the 1980s and 1990s.

Figure 4 Panel F implies that convergence happens in both directions. Under-leveraged economies, such as Denmark, Australia, and South Korea, expanded their financial sector. At the same time, many countries de-leveraged: 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, twelve countries hold credit-to-GDP ratio above 100% in 1990, reduced credit by 23% on average after two decades.[16] At the other extreme, seventeen countries with credit below 15% of GDP expand the credit by 21% till 2010.

Financial stability also increased significantly. For example, episodes of high inflation became much less frequent. Figure A.18 Panels A1 and B1 report the convergence pattern for inflation. We don't find robust convergence until 1980, when episodes of very high inflation were still widespread. The beta-convergence coefficients stay negative with a narrow confidence interval since 1980. Sigma convergence happens 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 hyper-inflation and contributed to the convergence in inflation. Figure A.13 plots the proportion of countries which experience a) inflation above 200%, b) inflation above 100%, c) inflation above 50%, d) inflation above 15% in a specific year. All the four lines start to decline since 1995. From 1972 to 1995,

[15] 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.

[16] Three developed economies - US, UK, and Japan - are notable exceptions: highly leveraged economies continue to expand bank credit even more. Japanese credit was over 200% of GDP in 1990, and the interest rate dropped below 1% in 1996. The US and UK were both highly leveraged, over 100% relative to GDP, and continued to increase another approximate 100%. Similarly, both countries lowered interest rates near zero after the 2008 financial crisis and the 2020 Covid-19 induced recession. The unprecedented low-interest rates further fueled outstanding credit.

about 35% of countries had annual inflation above 15%. and 10% countries experienced inflation over 100%. After 2000, almost no country has inflation above 50% while less than 10% countries bears inflation above 15%.

3.4 Culture

Culture and values can also evolve. We use the World Value Survey to measure trust, perceptions on inequality, views on political matters (respect for authority, interest in politics, joining in boycotts), and the importance of family, work, politics, religion, and traditions. To best match the time horizon considered for other correlates, we pick countries which are surveyed in both Wave 6 (2010-2014) and at least one of Waves 3-5 (1995-2009). 49 countries remain in our sample.[17]

Each cultural variable is the population-weighted average based on the whole sample.[18]. To adjust for the different survey frequency, we take the annualized cultural change (between the first survey year in Waves 3-5 and the survey year in Wave 6) and regress it on the baseline year's culture.

Beta-convergence holds for eight out of ten cultural variables in Table A.1. People in different countries reach a broader consensus on politics, inequality, work ethics, and the importance of family and traditions. We find no convergence in the trust level and the importance of religion.

4 Linking converging income with convergence of its correlates

In this section, we revisit the cross-sectional relationships between income and growth and their correlates, detailing how the relationships have changed and linking these changes to the emergence of absolute convergence in the past two decades. First, we consider the relationship between income levels and the potential correlates of income and growth. Then, we turn to the relationship between income growth and the correlates - growth regressions. Finally, combining the two, we turn to the question of conditional convergence - the prediction of neoclassical growth models - and a simple decomposition of the gap between unconditional and conditional convergence.

4.1 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 institutions:

$$Inst_{i,t} = \nu_t + \delta_t log(GDP_{i,t}) + \epsilon_{i,t} \tag{1}$$

where δ_t is the slope of the relationship and ν_t is the institutional level in year t.

[17] 33 countries are available both in Waves 3 and 6.

[18] Appendix XXX provides the survey question list for each cultural variable

Second, the relationship between institutions and growth, controlling for income - the classic growth regression:

$$\Delta_t log(GDP_{i,t}) = \alpha_t + \beta_t^* log(GDP_{i,t}) + \lambda_t Inst_{i,t} + \epsilon_{i,t} \quad (2)$$

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

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

$$\beta_t - \beta_t^* = \delta_t \times \lambda_t$$

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, equation 2, 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, since that is the period over which the majority of our correlate variables are available for a large number of countries. We also present certain results for the period 1960-1985 for those correlates for which we have the data to do so.

4.2 Correlate-Income relationship across countries

Prosperity is correlated with the rule of law, democracy, fiscal capacity, 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, or did the lines themselves change?

Figure A.20 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 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. 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, central bank independence, credit expansion as a crucial part of the economic stimulus package, lower tariffs to embrace globalization. Political institutions

improved almost as much as predicted. Meanwhile, measures of governance stagnated or even declined: property rights protection, investment freedom, business freedom, and political stability experienced sizable decline from 1985 to 2015.

We have seen that on average correlates have changed as predicted by their cross-country relationship with income, but what has happened to these cross-country relationships themselves? Figure 5, which normalizes correlates by their in 1985[19], shows the slopes of these correlate-income regressions, the δ_ts in Equation (1) , changed remarkably little. The slopes in 1985 is sufficient to explain the 69% of variation in slopes three decades later. The explanatory power (R-squared) 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.

4.3 Correlate-Growth relationship in growth regressions

Growth regression coefficients, the λ_ts in Equation (2), reduced 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 1985-1995 and 2005-2015. A one s.d. increase in educational attainment predicts 1.02% annualized GDP growth in 1985-1995, and the number falls to 0.58% for 2005-2015. Countries in which female have more equal access to education resources have grown faster: a one s.d. reduction in gender gap (in schooling years) predicts 0.56% higher GDP growth in 1985-1995, and 0.15% in 2005-2015.

In contrast, coefficients on short-run correlates reduced more substantially from 1985-2005, with essentially zero correlation between the two periods. Table 4 Columns (4) and (5) report λ_{1985} and λ_{2005}.[20] Figure 6 plots λ_{2005} re-estimated with the same country sample[21] two decades later 2005-2015. The slope of the correlate-growth relationships have shrunk towards zero and the slope of fitted line in Figure 6 is only 0.270.

Long-run correlates 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 towards zero with 0.228 as the slope of the fitted line. However, the correlate-growth relationship is more stable for culture with 0.635 as the slope of the fitted line.

[19] In Figure **??**, we normalize standard deviations of correlates in 1985 and 2015, respectively. The fitted line coincides with the 45-degree line, and the R-squared is as high as 92%.

[20] Our time horizon shrinks to 1985-2005 to accommodate the growth regression. Table 4 Columns (2) and (3) report δ_{1985} and δ_{2005}, instead of δ_{2015} discussed in Section 4.2.

[21] 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 since some countries vanish in the two decades.

4.4 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). Conditional convergence has been widely supported in the data (Durlauf et al. 2005).

This leads to the natural question of whether the shift towards unconditional convergence represents a reduction of the importance of conditioning – a shrinking of the gap between conditional and unconditional convergence. Or has conditional convergence itself become faster?

Univariate 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 1985-2005. Correlate-by-correlate, qualitatively the trend in the effect of conditioning 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 A.23, is that the effect on conditioning has on average shrunk to around zero for short-run and long-run correlates since 1980, while for Solow fundamentals 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, while 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, it is not that conditional convergence has gotten faster, but instead, that unconditional convergence has become closer to conditional convergence.

Table 5 reports the coefficients for growth in three decades from 1985 to 2015. From 1985 to 1995, correlates explain substantial variation in economic growth and convert absolute divergence to conditional convergence. The ten correlates jointly take down the coefficient from 0.33 (t=1.37)

to -0.627 (t=-1.15). In 2005-2015, the unconditional economic growth rate is -0.75% (t=-4.79). Correlates still effectively cut the convergence rate to -1.15% (t=-3.77), however, no sign indicates conditional convergence is faster than two decades ago.

5 Conclusion

There has been a trend toward absolute convergence since the late-1980s, resulting in absolute convergence since 2000. This trend towards convergence is consistent with neoclassical growth models and 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 divergence was the norm over a long period of recent history (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 broad increase in the rate of catch-up growth, the breadth of which does not support a model in which countries catch up only above a certain income threshold, and a growth slowdown at the frontier. What could have driven this change: faster catch-up *conditional* on correlates, due to globalization for example, or the convergence of correlates themselves, with the end of the Cold War and the adoption of the Washington Consensus?

Most correlates of growth and income - policies, institutions, and culture - have converged during the same period, towards those of rich countries. Some of these changes have been gradual, such as changes 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 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 0.6. Long-run correlates and culture were somewhat stable, while 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 to conditional convergence, the prediction of neoclassical growth, while the latter has held throughout the period. In the parlance of club convergence, policies and institutions have 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 towards convergence in the preceding two decades, when correlates were already converging; and why have growth regression coefficients since shrunk? While faster catch-up conditional on correlates is likely part of the explanation for the trend in convergence, and the shrink in growth regression coefficients may in part be explained by earlier overfitting, we have focused on the convergence of correlates. Our preferred narrative, in terms of parsimony, which is admittedly speculative, is as follows. Measures of policies and institutions are noisy measures of what really matters. Since the fall of the Soviet Union in 1991 and the adoption of the Washington consensus, there has been rapid convergence in policies and institutions. This has happened both for our measures of policies and institutions and for what really matters, and as such any remaining measurable differences in the former may no longer be indicative of the latter.

Do these results give cause for optimism or pessimism regarding whether changes in policies and institutions can lead to catch-up up growth? The persistence literature gives cause for pessimism, if what really matters for steady-state income is deep, persistent determinants, which may be hard to change. However, first we have shown evidence of convergence in culture, suggesting that even persistent determinants may change relatively rapidly. Second, more substantially, 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 matter less, while long-run correlates (and especially Solow fundamentals) have remained important.

References

Acemoglu, D., S. Johnson, and J. A. Robinson (2001). The colonial origins of comparative development: An empirical investigation. *American economic review 91*(5), 1369–1401.

Acemoglu, D., S. Johnson, and J. A. Robinson (2005). Institutions as a fundamental cause of long-run growth. *Handbook of economic growth 1*, 385–472.

Acemoglu, D., S. Johnson, J. A. Robinson, and P. Yared (2008). Income and democracy. *American Economic Review 98*(3), 808–42.

Acemoglu, D., S. Naidu, P. Restrepo, and J. A. Robinson (2019). Democracy does cause growth. *Journal of Political Economy 127*(1), 47–100.

Alesina, A. (1988). Macroeconomics and politics. *NBER macroeconomics annual 3*, 13–52.

Alesina, A. and R. Gatti (1995). Independent central banks: low inflation at no cost? *The American Economic Review 85*(2), 196–200.

Alesina, A., P. Giuliano, and N. Nunn (2013). On the Origins of Gender Roles: Women and the Plough *. *The Quarterly Journal of Economics 128*(2), 469–530.

Alesina, A. and L. H. Summers (1993). Central bank independence and macroeconomic performance: some comparative evidence. *Journal of Money, credit and Banking 25*(2), 151–162.

Algan, Y. and P. Cahuc (2010). Inherited trust and growth. *American Economic Review 100*(5), 2060–92.

Barro, R. J. (1991). Economic growth in a cross section of countries. *The quarterly journal of economics 106*(2), 407–443.

Barro, R. J. (1996). Democracy and growth. *Journal of economic growth 1*(1), 1–27.

Barro, R. J. and J.-W. Lee (1994). Sources of economic growth. In *Carnegie-Rochester conference series on public policy*, Volume 40, pp. 1–46. Elsevier.

Barro, R. J. and J. W. Lee (2013). A new data set of educational attainment in the world, 1950–2010. *Journal of development economics 104*, 184–198.

Barro, R. J. and X. Sala-i Martin (1992). Convergence. *Journal of political Economy 100*(2), 223–251.

Clemens, M. A. and M. Kremer (2016). The new role for the world bank. *Journal of Economic Perspectives 30*(1), 53–76.

Dell, M. (2010). The persistent effects of peru's mining mita. *Econometrica 78*(6), 1863–1903.

Dobbin, F., B. Simmons, and G. Garrett (2007). The global diffusion of public policies: Social construction, coercion, competition, or learning? *Annual Review of Sociology 33*(1), 449–472.

Durlauf, S. N., P. A. Johnson, and J. R. Temple (2005). Growth econometrics. *Handbook of economic growth 1*, 555–677.

Easterly, W. (2019). In search of reforms for growth: New stylized facts on policy and growth outcomes. Working Paper 26318, National Bureau of Economic Research.

Fischer, S. (1995). Central-bank independence revisited. *The American Economic Review 85*(2), 201–206.

Frankel, J. A. and D. H. Romer (1999). Does trade cause growth? *American economic review 89*(3), 379–399.

Garriga, A. C. (2016). Central bank independence in the world: A new data set. *International Interactions 42*(5), 849–868.

Glaeser, E. L., R. La Porta, F. Lopez-de Silanes, and A. Shleifer (2004). Do institutions cause growth? *Journal of economic Growth 9*(3), 271–303.

Grier, K. and R. Grier (2007). Only income diverges: A neoclassical anomaly. *Journal of Development Economics 84*(1), 25–45.

Grilli, V., D. Masciandaro, and G. Tabellini (1991). Political and monetary institutions and public financial policies in the industrial countries. *Economic policy 6*(13), 341–392.

Inglehart, R. and W. E. Baker (2000). Modernization, cultural change, and the persistence of traditional values. *American Sociological Review 65*(1), 19–51.

Johnson, P. and C. Papageorgiou (2020). What remains of cross-country convergence? *Journal of Economic Literature 58*(1), 129–75.

Krueger, A. B. and M. Lindahl (2001). Education for growth: Why and for whom? *Journal of economic literature 39*(4), 1101–1136.

Lucas Jr, R. E. (1988). On the mechanics of economic development. *Journal of monetary economics 22*(1), 3–42.

Mankiw, N. G., D. Romer, and D. N. Weil (1992). A contribution to the empirics of economic growth. *The quarterly journal of economics 107*(2), 407–437.

Michalopoulos, S. and E. Papaioannou (2013). Pre-colonial ethnic institutions and contemporary african development. *Econometrica 81*(1), 113–152.

Patel, D., J. Sandefur, and A. Subramanian (2021). The new era of unconditional convergence. *CGD Working Paper*.

Pritchett, L. (1997). Divergence, big time. *Journal of Economic Perspectives 11*(3), 3–17.

Rodrik, D. (2012). Unconditional convergence in manufacturing. *The Quarterly Journal of Economics 128*(1), 165–204.

Rogoff, K. (1985). The optimal degree of commitment to an intermediate monetary target. *The quarterly journal of economics 100*(4), 1169–1189.

Romer, P. M. (1990). Endogenous technological change. *Journal of political Economy 98*(5, Part 2), S71–S102.

Roy, S., M. Kessler, and A. Subramanian (2016). Glimpsing the end of economic history? unconditional convergence and the missing middle income trap. *Center for Global Development Working Paper* (438).

Sala-i Martin, X. X. (1997). I just ran four million regressions. Technical report, National Bureau of Economic Research.

Sala-I-Martin, X. X. (1997). I just ran two million regressions. *The American Economic Review*, 178–183.

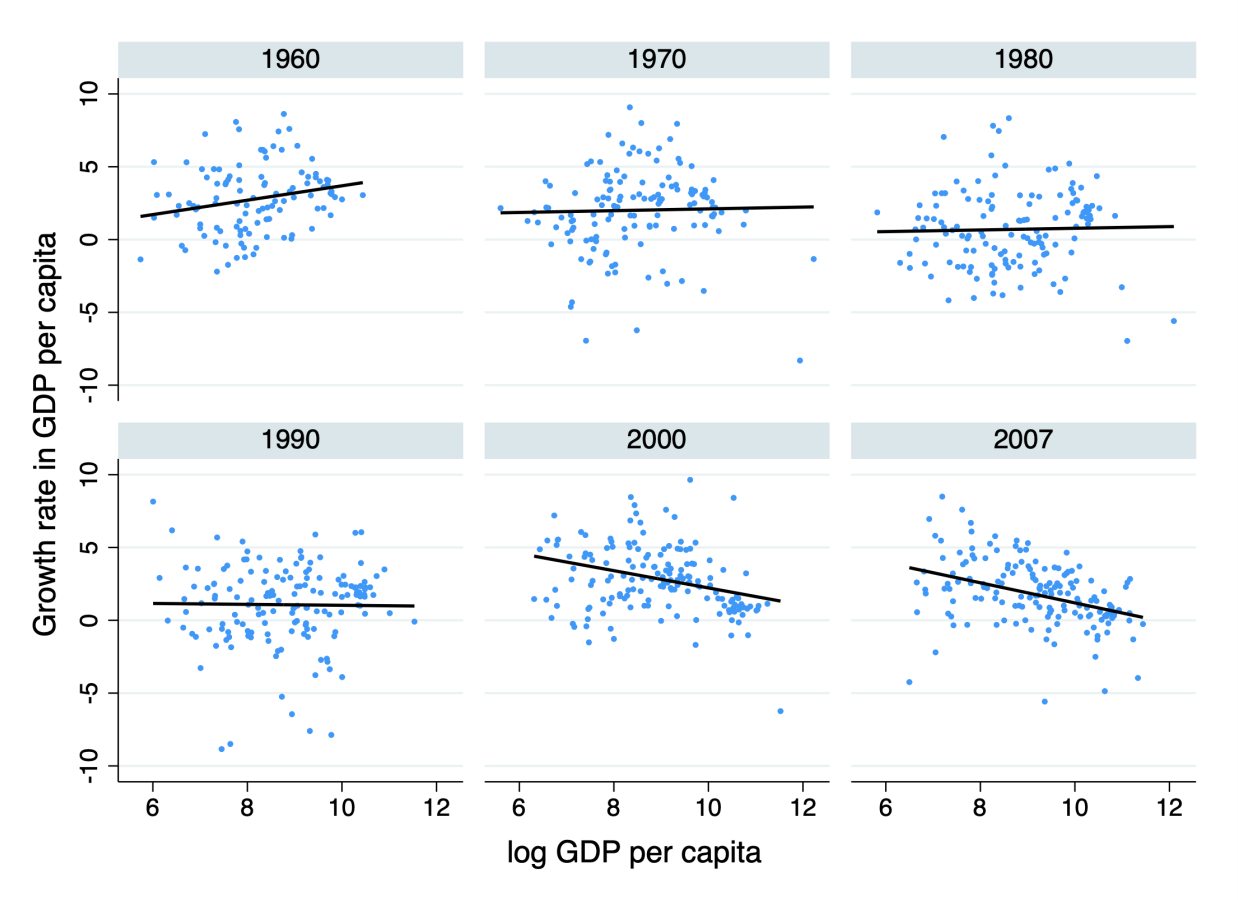
Santos, H. C., M. E. W. Varnum, and I. Grossmann (2017). Global increases in individualism. *Psychological Science 28*(9), 1228–1239.

Squicciarini, M. P. and N. Voigtländer (2015). Human capital and industrialization: evidence from the age of enlightenment. *The Quarterly Journal of Economics 130*(4), 1825–1883.

Young, A. T., M. J. Higgins, and D. Levy (2008). Sigma convergence versus beta convergence: Evidence from us county-level data. *Journal of Money, Credit and Banking 40*(5), 1083–1093.

Figures

Figure 1: Income convergence by decade

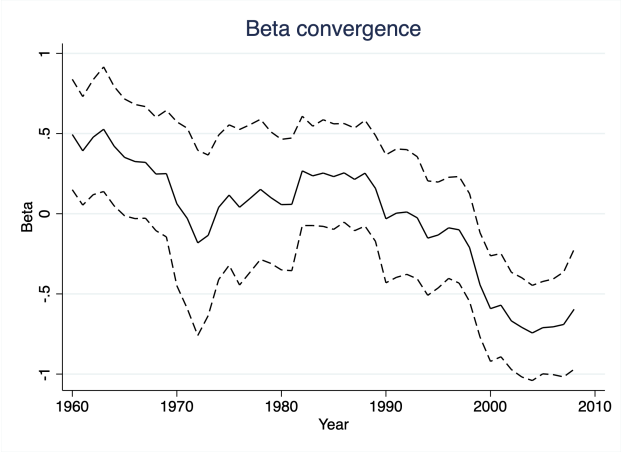


Notes: This figure plots, by decade, the raw scatter plots for the decade's β-convergence regression, as well as the regression line itself.

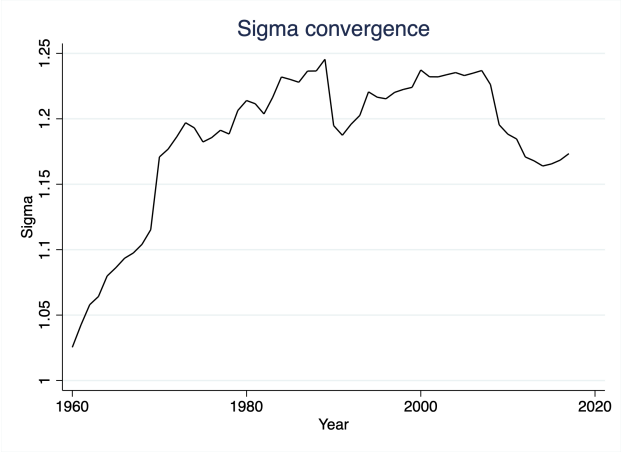
$$100\frac{log(GDPpc)_{i,t+10} - log(GDPpc)_{i,t}}{10} = \alpha_t + \beta_t log(GDPpc)_{i,t} + \epsilon_{i,t}$$

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 is available, excluding those with a population less than 200,000 or for whom natural resource rents for $> 75\%$ of their GDP. Data availability means that the number of countries is growing over time. For 2007, the period considered in 2007-2017.

Figure 2: Trend in income convergence, 1960-2007



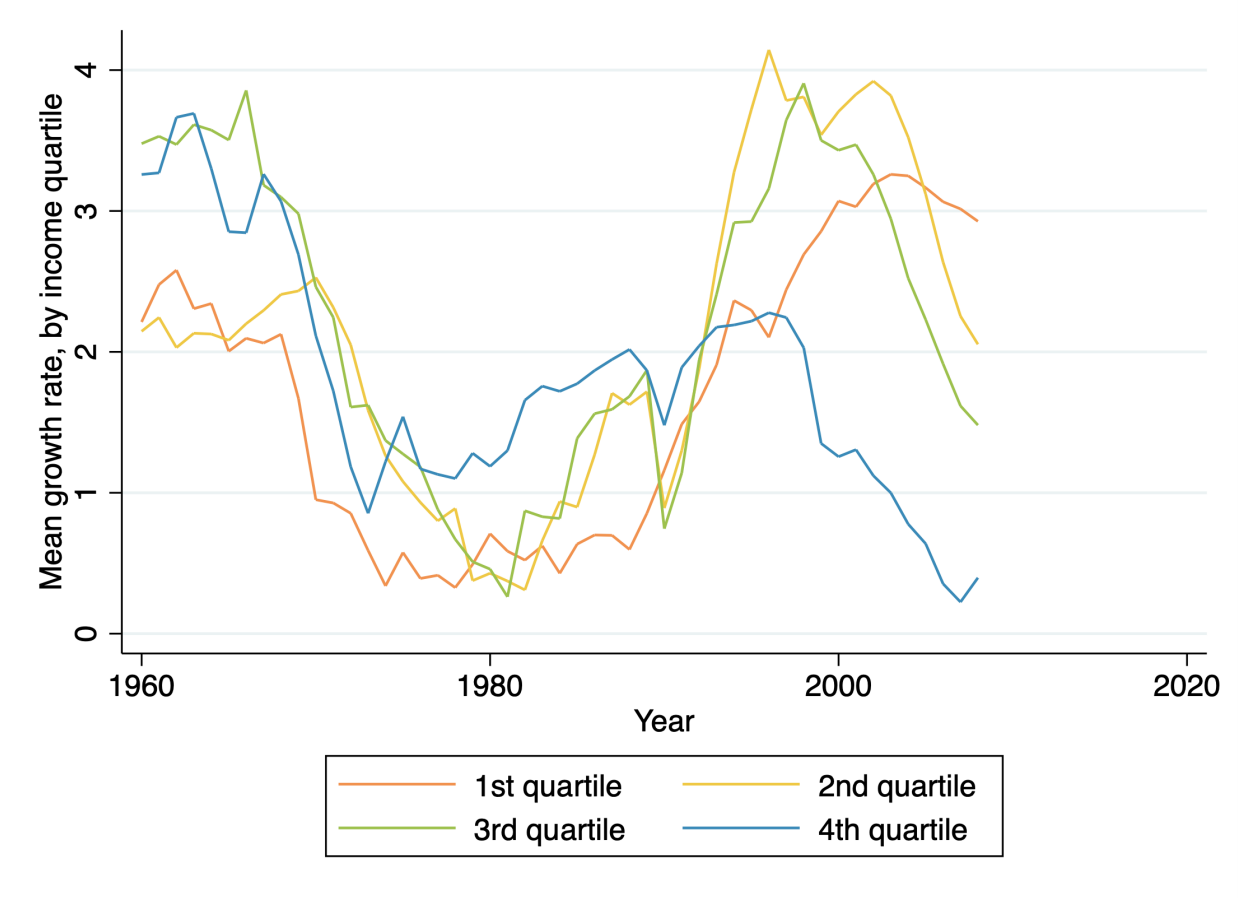
(a) $\beta-$convergence.



(b) $\sigma-$convergence.

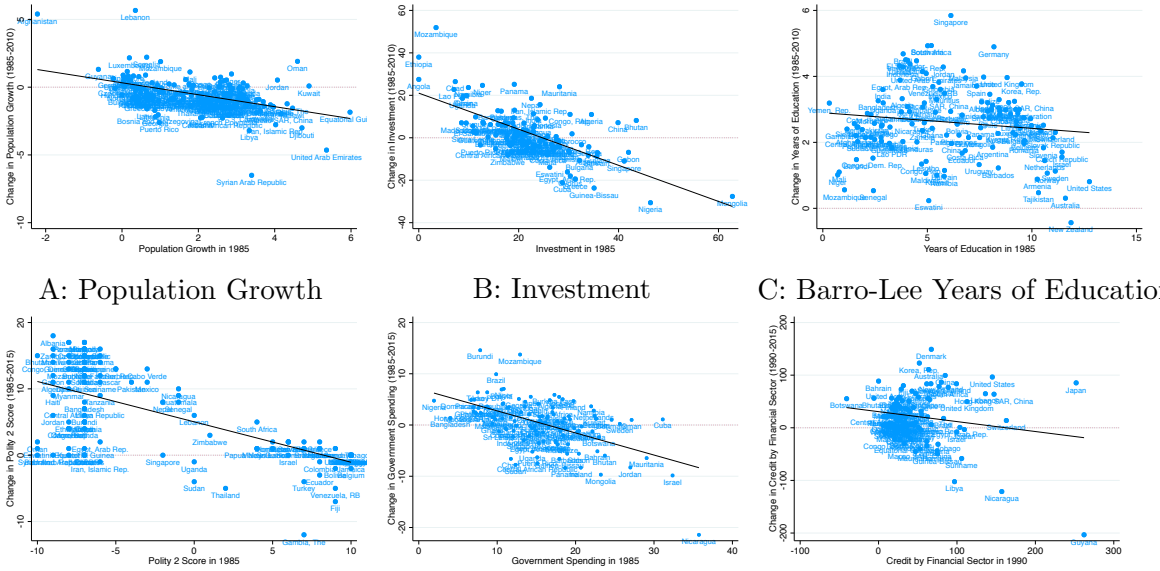
Notes: These figures show the trend in convergence from 1960 to 2007. Figure a) plots the β-convergence coefficient, for growth in the subsequent decade, over time. It is the coefficient from regressing, across countries, the average growth in GDP per capita in the next decade (in %) on the log of GDP 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, as detailed in Figure 1. Figure b) plots the evolution over time of the cross-country standard deviation in GDP per capita. *sigma*-convergence corresponds to a negative slope of the plot. The plot shows concavity, resulting in a negative slope recently, corresponding to converging to convergence. Equivalent panels using balanced panels are in Figure A.3.

Figure 3: Trend in income growth by income quartile, 1960-2007



Notes: The plots show the average annual growth in GDP per capita, PPP, for the subsequent decade, averaged by income quartile. Income quartile is classified based on GDP per capita in that year, with the 1st quartile being the lowest income and the fourth the highest.

Figure 4: Convergence in correlates: level in 1985 versus change 1985-2015

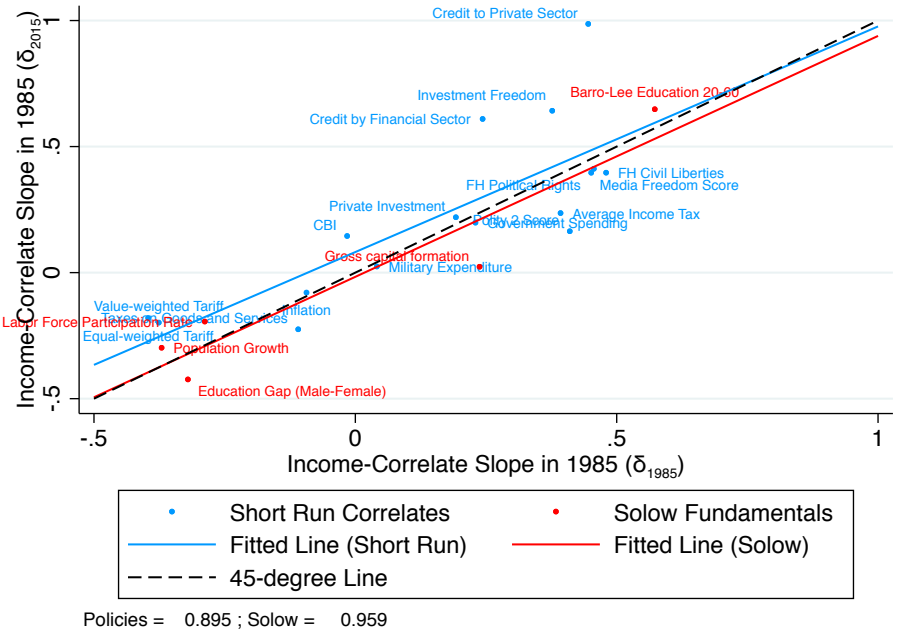


A: Population Growth B: Investment C: Barro-Lee Years of Education

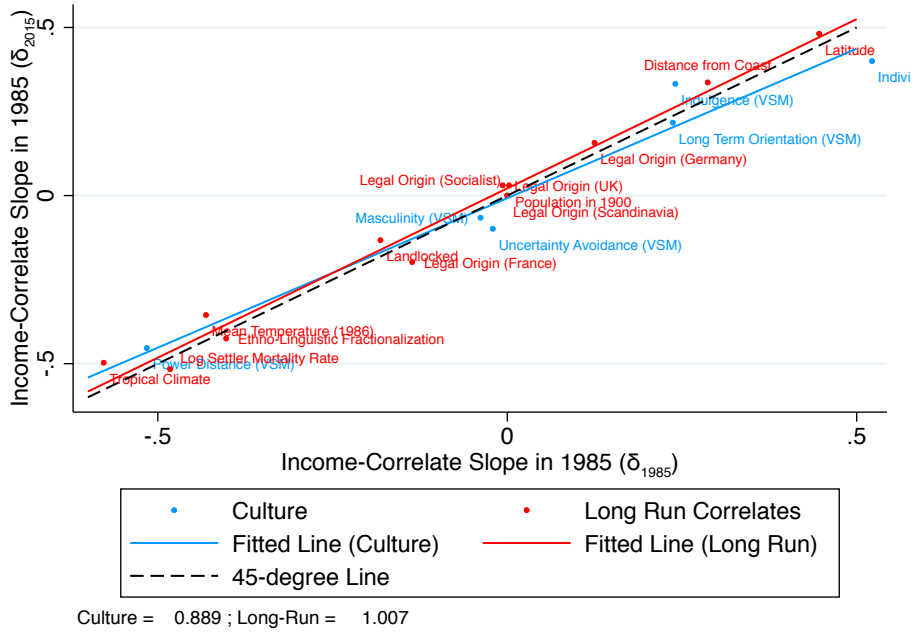
D: Polity 2 E: Government Spending F: Credit

Notes: This figure plots the correlate change from 1985 (or the earliest available year) to 2015 against the baseline correlate level. We include eight correlates: Population growth rate (%), Investment rate (% of GDP), Barro-Lee average years of education among 20-60 year olds, Polity 2 score, rule of law score, property rights score, government spending (% of GDP), credit by financial sector. The sample for each figure is the full set of countries for which the relevant data is available in both 1985 and 2015.

Figure 5: Correlate-income slopes, 1985 vs. 2005



Panel A: Enhanced Solow fundamentals and short-run correlates

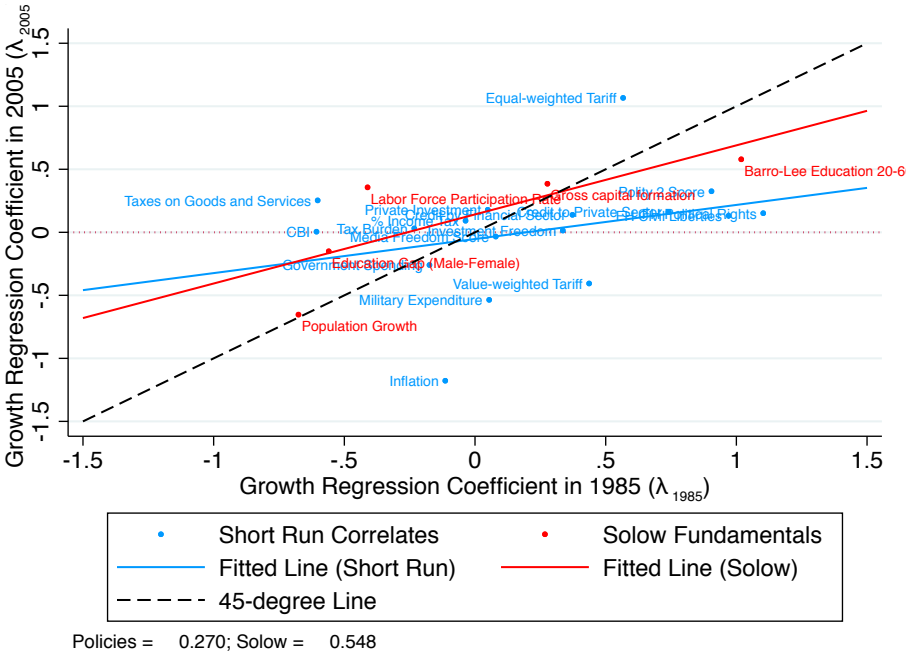


Panel B: Long-run correlates and culture

Notes: This figure plots the coefficients from regressing the normalized correlates on the log(GDP) in 1985 and 2015. The solid line is the fitted line of the scatter plot. The dashed line refers to the 45-degree line as a benchmark.

$$\frac{Inst_{i,t}}{SD(Inst_{1985})} = \delta_t log(GDPpc)_{i,t} + \nu_t + \epsilon_{t,i}$$

Figure 6: Growth-correlate slopes, 1985 vs. 2005



Policies = 0.270; Solow = 0.548

Panel A: Enhanced Solow fundamentals and short-run correlates

Culture = 0.635; Long-Run = 0.228

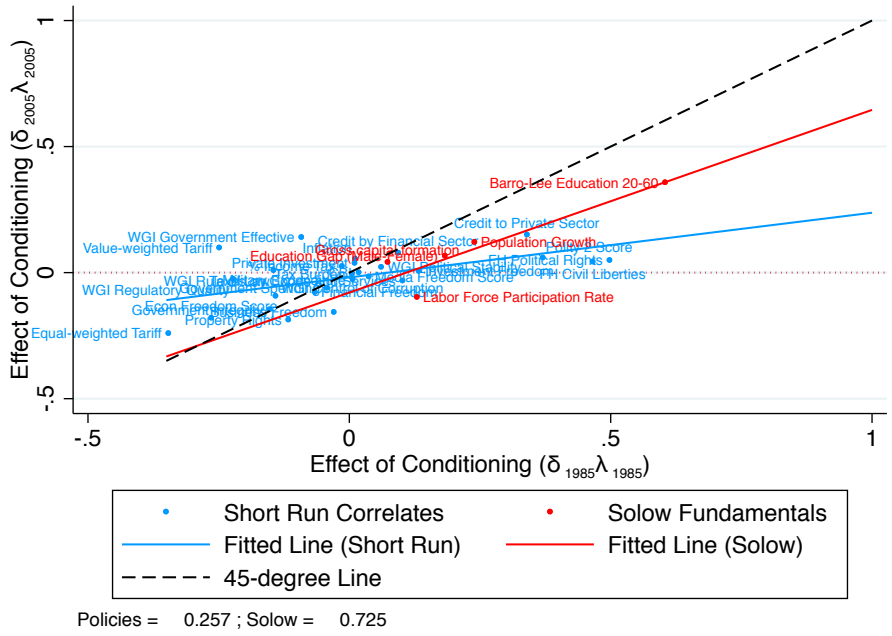
Panel B: Long-run correlates and culture

Notes: This figure plots the λ_{1985} and λ_{2005}, the 10-year growth regression coefficients in 1985 and 2005, corresponding to Table 4.

$$100\frac{log(GDPpc)_{i,t+10} - log(GDPpc)_{i,t}}{10} = \beta_t log(GDPpc)_{i,t} + \lambda_t \frac{Inst_{i,t}}{SD(Inst_{1985})} + \alpha_t + \epsilon_{i,t}$$

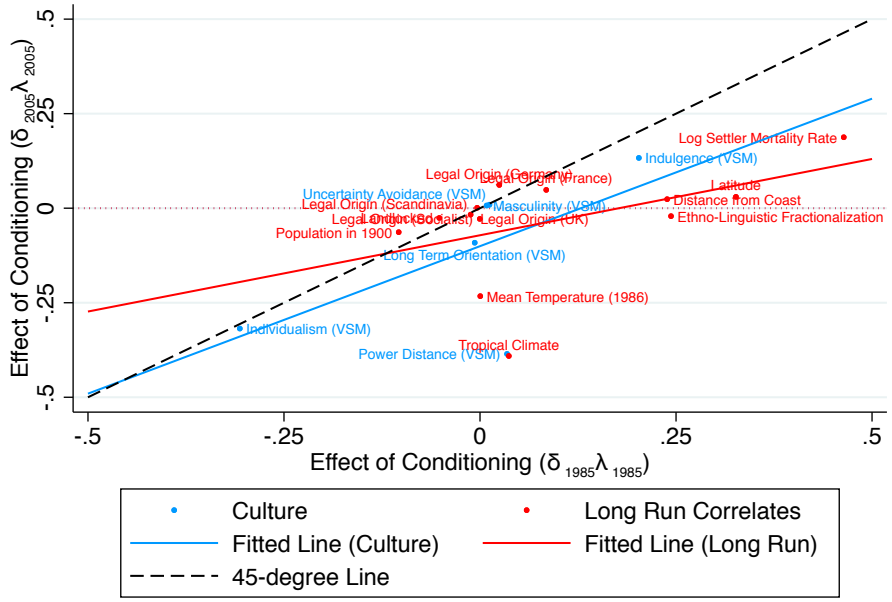
λ_{1985} and λ_{1985} is estimated using a balanced panel, for each correlate. The fitted lines are regressions of λ_{2005} on λ_{1985} for the different sets of correlates.

Figure 7: Gap between unconditional and conditional convergence (univariate), 1985 vs. 2005



Policies = 0.257 ; Solow = 0.725

Panel A: Enhanced Solow fundamentals and short-run correlates



Culture = 0.780 ; Long-Run = 0.403

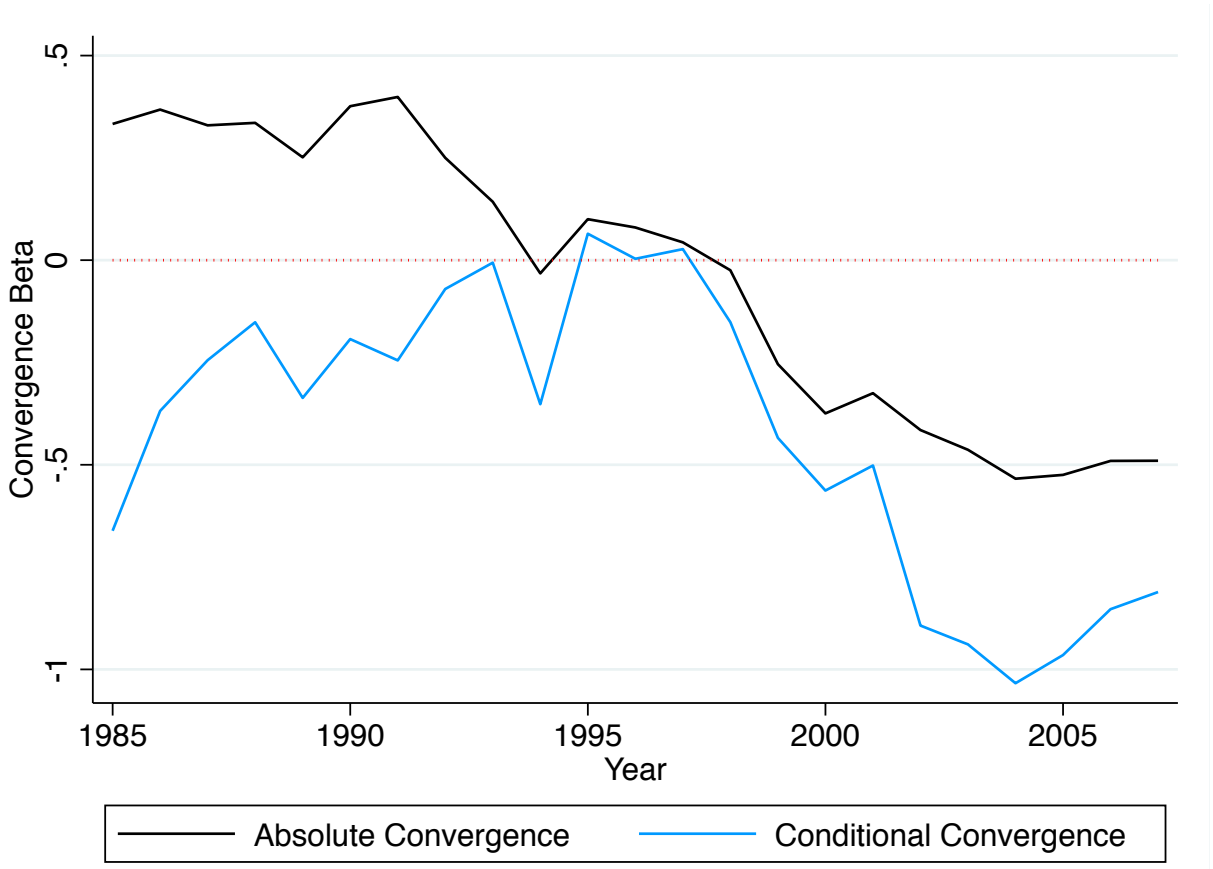
Panel B: Long-run correlates and culture

Notes: This figure plots the $\delta_{1985}\lambda_{1985}$ and $\delta_{2005}\lambda_{2005}$, with Panel A plotting policies and proximate institutions and Solow fundamentals, and Panel B plotting culture and long-run institutions. $\delta_{1985}\lambda_{1985}$ and $\delta_{2005}\lambda_{2005}$ are estimated from the following regressions with the GDP growth in sample periods 1985*-1995* and 2005*-2015*, linking conditional and unconditional convergence using a univariate approach.

$$\beta_t = \tilde{\beta}_t + \delta_t \lambda_t$$

The fitted line is a regression of λ_{2005} on λ_{1985} just for the set of policies and proximate institutions.

Figure 8: Absolute convergence converging to conditional convergence (multivariate)



Notes: The country sample contains 72 countries with sufficient institutional variables in 1985. The solid line represents the absolute convergence β-coefficient and the dashed line represents the conditional convergence β-coefficient. The institutional co-variates include polity2 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 red dotted line is the benchmark of no convergence.

Tables

Table 1: Converging to convergence. Absolute convergence 1960-2017

	Average annual growth in next decade		
	(1)	(2)	(3)
log(GDPpc)	-0.198*	0.468**	
	[0.109]	[0.192]	
log(GDPpc) * (Year-1960)		-0.024***	
		[0.005]	
log(GDPpc) * 1960s			0.494***
			[0.176]
log(GDPpc) * 1970s			0.062
			[0.261]
log(GDPpc) * 1980s			0.057
			[0.208]
log(GDPpc) * 1990s			-0.032
			[0.203]
log(GDPpc) * 2000s			-0.592***
			[0.168]
log(GDPpc) * 2007s			-0.690***
			[0.167]
Year FE	Y	Y	Y
Observations	863	863	863

Notes: This table reports absolute convergence regressions. The independent variable is the average annualized GDP 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 whom rents from natural resources account for $>$ 75% of GDP. Specification (1) pools the data since 1960. Specification (2) includes a time trend for the absolute convergence β. Specification (3) estimates the absolute convergence β by decade. Year fixed effects are included in all three specifications. Standard errors, clustered at the country-level, are reported in the parentheses. * $p < 0.05$, **$p < 0.01$, *** $p < 0.001$

Table 2: List of policies, institutions, and human capital 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
	Education Gap (Male-Female)	Barro-Lee Data	1950-2010
	Labor Force Participation Rate	WDI	1960-2017
Political Institution	**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
	Investment Freedom	Heritage Freedom	1995-2019
	Property Rights	Heritage Freedom	1995-2019
Fiscal Policy	Taxes on income & cap. gains (% of revenue)	WDI	1972-2017
	Taxes on goods and services (% of revenue)	WDI	1972-2017
	Tax Burden Score	Heritage Freedom	1995-2019
	Equal-weighted Tariff	WDI	1988-2017
	Value-weighted Tariff	WDI	1988-2017
	Private Investment (% Total Investment)	IMF	1960-2015
	Government Spending (% GDP)	WDI	1960-2017
	Military Expenditure (%GDP)	WDI	1960-2017
Financial Institution	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
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	-
	Population in 1900	Maddison Project	-
	Legal Origin (UK)	LaPorta et al. (2008)	-
	Legal Origin (France)	LaPorta et al. (2008)	-

Long-Run Variables	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)	-
	100km of the Coastline	Acemoglu et al. (2001)	-
	Ethno-Linguistic Fractionalization	Acemoglu et al. (2001)	-
	Landlocked	Acemoglu et al. (2001)	-
	Absolute Latitude	Acemoglu et al. (2001)	-
	Tropical Climate	Sachs and Warner (1997a)	-

This table summarizes all policy, institution, human capital, and cultural variables considered in the analysis, divided into seven categories: enhanced Solow fundamentals, 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 policies and institutions reported in Figure A.12 and Figure 4. Some of the variables 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.

Table 3: Change and convergence in policies, institutions, and human capital, from 1985* to 2015*

	Dev-Favored	1985 Mean	2015 Mean	Change (in σ_{1985})	t-stat	Convergence β
Gross capital formation (% of GDP)	High	22.07	24.18	0.23	1.88	-2.98***
Population growth (annual %)	Low	1.99	1.42	-0.43	-6.36	-1.53***
Barro-Lee Education Age 20-60	High	6.19	8.80	0.86	27.64	-0.16
Education Gap (Male-Female)	Low	0.97	0.33	-0.66	-9.57	-0.81***
Labor Force Participation Rate	Low	62.48	62.61	0.01	0.27	-0.66***
Polity 2 Score	High	-0.87	4.69	0.73	9.40	-2.03***
Freedom House Political Rights	High	5.86	6.53	0.30	4.16	-1.39***
Freedom House Civil Liberty	High	5.72	6.56	0.41	6.28	-1.36***
Media Freedom Score	High	52.63	49.93	-0.12	-2.32	-0.88***
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	-0.47	-3.79	-3.46***
Value-weighted Tariff	Low	8.11	3.09	-0.70	-5.71	-3.38***
Taxes on Income & Capital Gain	High	25.54	28.79	0.20	1.94	-1.61***
Taxes on Goods and Services	N/A	28.47	31.38	0.21	1.39	-2.51***
Government Spending (%GDP)	High	15.90	15.96	0.01	0.12	-1.61***
Tax Burden Score	N/A	-	-	-	-	-
Private Investment	High	0.63	0.63	0.00	-0.01	-1.60***
Military Expenditure (%GDP)	N/A	3.38	1.89	-0.47	-6.70	-2.10***
Inflation	N/A	16.19	2.25	-0.54	-6.33	-3.07***
Central Bank Independence	N/A	0.38	0.60	1.77	10.92	-2.56***
Credit to Private Sector	High	31.46	55.60	0.95	7.34	0.89**
Credit by Financial Sector	High	49.42	69.15	0.47	3.87	-0.98
Financial Freedom	High	-	-	-	-	-
Investment Freedom	High	-	-	-	-	-

Notes: 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 three 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 which are not significantly correlated with income in our base year 1985, i.e. 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 which are not directly comparable across time, for example if they are standardized each year.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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)	0.263***	0.111 *	0.277	0.385*	0.073	0.043	115
Population growth (annual %)	-0.354***	-0.187***	-0.676***	-0.653***	0.239	0.122	136
Barro-Lee Education Age 20-60	0.593***	0.619***	1.019***	0.579*	0.604	0.359	118
Education Gap (Male-Female)	-0.326***	-0.447***	-0.560 **	-0.151	0.183	0.067	118
Labor Force Participation Rate	-0.314***	-0.270***	-0.411	0.357*	0.129	-0.096	160
Polity 2 Score	0.409***	0.185***	0.905***	0.326	0.370	0.060	124
Freedom House Political Rights	0.451***	0.331***	1.103***	0.152	0.498	0.050	132
Freedom House Civil Liberty	0.480***	0.334***	0.970***	0.132	0.466	0.044	132
Media Freedom Score	0.466***	0.444***	0.079	-0.034	0.037	-0.015	152
WGI Political Stability	-	-	-	-	0.061	0.023	159
WGI Government Effective	-	-	-	-	-0.092	0.141	158
WGI Regulatory Quality	-	-	-	-	-0.222	-0.025	159
WGI Rule of Law	-	-	-	-	-0.145	0.010	159
WGI Control of Corruption	-	-	-	-	-0.141	-0.092	159
Overall Economic Freedom Index	-	-	-	-	-0.264	-0.179	97
Government Integrity	-	-	-	-	-0.153	-0.145	97
Property Rights	-	-	-	-	-0.117	-0.186	97
Business Freedom	-	-	-	-	-0.030	-0.156	97
Equal-weighted Tariff	-0.611***	-0.225***	0.567	1.066	-0.346	-0.240	45
Value-weighted Tariff	-0.571***	-0.246***	0.437	-0.406	-0.249	0.100	45
Taxes on Income & Capital Gain	0.394***	0.286 **	-0.036	0.092	-0.014	0.026	48
Taxes on Goods and Services	-0.169	-0.123	-0.602 *	0.253	0.102	-0.031	49
Government Spending (%GDP)	0.248***	0.230***	-0.174	-0.259	-0.043	-0.060	111
Tax Burden Score	-	-	-	-	0.005	-0.004	97
Private Investment	0.204***	0.218***	0.049	0.179	0.010	0.039	133
Military Expenditure (%GDP)	0.112	0.048	0.054	-0.536	0.006	-0.026	110
Inflation	-0.096	-0.048 **	-0.114	-1.177**	0.011	0.056	124
Central Bank Independence	-0.029	0.323***	-0.607 **	0.005	0.018	0.002	100
Credit to Private Sector	0.459***	0.937***	0.740 **	0.161	0.340	0.151	104
Credit by Financial Sector	0.251***	0.572***	0.373	0.139	0.093	0.079	104
Financial Freedom	-	-	-	-	-0.066	-0.077	97
Investment Freedom	-	-	-	-	0.133	0.007	97
Population in 1900	-0.218 *	-0.125	0.476	0.507**	-0.104	-0.063	58
Power Distance	-0.534***	-0.497***	-0.065	0.775***	0.034	-0.385	60
Individualism	0.545***	0.460***	-0.562 *	-0.691***	-0.306	-0.318	60
Masculinity	-0.034	-0.053	-0.250	-0.136	0.008	0.007	60
Uncertainty Avoidance	-0.024	-0.095	-0.493 *	-0.098	0.012	0.009	60
Indulgence	0.246***	0.294***	0.824***	0.452**	0.203	0.133	69
Long Term Orientation	0.230 **	0.210 **	-0.029	-0.434**	-0.007	-0.091	70
Legal Origin (UK)	-0.007	0.026	0.555***	0.041	-0.004	0.001	136
Legal Origin (France)	-0.136 **	-0.171***	-0.621***	-0.282	0.084	0.048	136

Legal Origin (Germany)	0.125 **	0.131 **	0.197	0.470**	0.025	0.061	136
Legal Origin (Scandinavia)	0.237***	0.219***	-0.051	-0.077	-0.012	-0.017	136
Legal Origin (Socialist)	-0.130 *	-0.080	0.002	0.352**	-0.000	-0.028	136
Log Settler Mortality Rate	-0.570***	-0.563***	-0.814 **	-0.333	0.464	0.188	84
Mean Temperature (1986)	-0.547***	-0.475***	-0.001	0.489**	0.000	-0.233	60
Distance from Coast	0.287 **	0.329***	0.832 **	0.072	0.239	0.024	61
Ethno-Linguistic Fractionalization	-0.405***	-0.417***	-0.601 **	0.050	0.244	-0.021	124
Landlocked	-0.182***	-0.136 **	0.286	0.189	-0.052	-0.026	129
Latitude	0.469***	0.477***	0.696 **	0.063	0.326	0.030	129
Tropical Climate	-0.578***	-0.509***	-0.064	0.768***	0.037	-0.391	89

This table reports the coefficients of the cross-sectional regressions of correlates on income and of (ten year average) growth on correlates, in 1985* to 2005*. In particular, the coefficients δ and λ are estimated from the following regressions:

$$\Delta log(GDPpc)_{i,t} = \beta_t log(GDPpc)_{i,t} + \lambda_t \frac{Inst_{i,t}}{SD(Inst_{1985})} + \alpha_t + \epsilon_{i,t}$$

$$\frac{Inst_{i,t}}{SD(Inst_{1985})} = \delta_t log(GDPpc)_{i,t} + \nu_t + \epsilon_{i,t}$$

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*-1995 and 2005*-2015. 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 non-missing correlate variables in 1985. Missing entries correspond to correlates which are standardized each year: the standardization makes comparisons over time of λ and δ difficult to interpret, but are cancelled out in for product $\lambda\delta$.

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

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	0.333	-0.485	-0.260	-0.627	-0.748***	-1.177***	-0.743***	-1.146***
	(0.240)	(0.537)	(0.435)	(0.547)	(0.156)	(0.289)	(0.243)	(0.305)
Investment		0.363		-0.00976		0.388		0.438
		(0.397)		(0.480)		(0.305)		(0.280)
Population growth		-1.035		-1.095*		-0.428***		-0.412***
		(0.627)		(0.657)		(0.131)		(0.147)
Barro-Lee Education 20-60		0.480		0.434		0.456		0.609**
		(0.443)		(0.593)		(0.349)		(0.306)
Polity 2 Score			-0.609	-1.070			0.705*	0.0151
			(0.694)	(0.704)			(0.393)	(0.395)
FH Political Rights			1.284	1.573*			-0.288	0.269
			(0.970)	(0.922)			(0.458)	(0.412)
Private Investment			-0.199	-0.276			0.304	0.267
			(0.326)	(0.329)			(0.406)	(0.356)
Government Spending			-0.0593	0.0595			-0.569**	-0.798***
			(0.384)	(0.417)			(0.276)	(0.252)
Inflation			-0.0925	-0.00337			-1.705**	-1.671**
			(0.232)	(0.240)			(0.836)	(0.830)
FH Civil Liberties			0.0825	-0.427			-0.0493	-0.274
			(0.683)	(0.759)			(0.782)	(0.710)
Credit to Private Sector			0.800*	0.730			0.403	0.386
			(0.471)	(0.546)			(0.294)	(0.270)
Credit by Financial Sector			-0.323	-0.439			-0.651*	-0.679**
			(0.510)	(0.592)			(0.348)	(0.334)
Constant	-1.462	5.677	0.0559	5.180	9.007***	11.19***	10.56***	12.15***
	(2.168)	(4.645)	(3.269)	(4.266)	(1.489)	(2.050)	(2.220)	(2.379)
Observations	73	73	73	73	113	113	113	113
R-Squared	0.0227	0.160	0.148	0.226	0.201	0.326	0.302	0.422

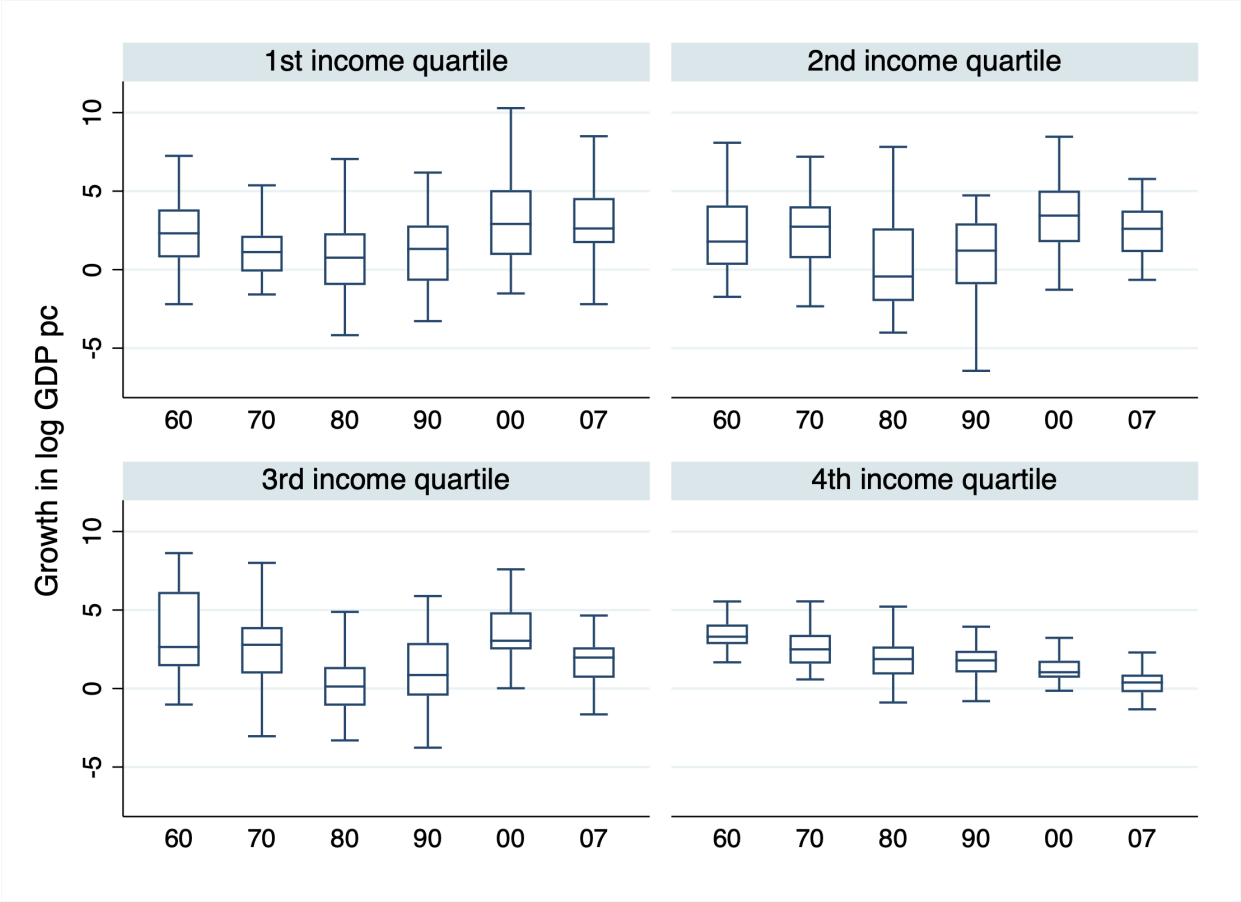
Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table reports absolute and conditional convergence regressions, for 1985*-1995 and 2005*-2015, for the fullest list of Solow and short-run correlates which allow a reasonable sample size of 72 in 1985. The covariates include Investment, Population growth, Barro-lee education attainment, polity2 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 1985-1995, and columns (5-8) for 2005-2015. 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. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

A APPENDIX figures and tables

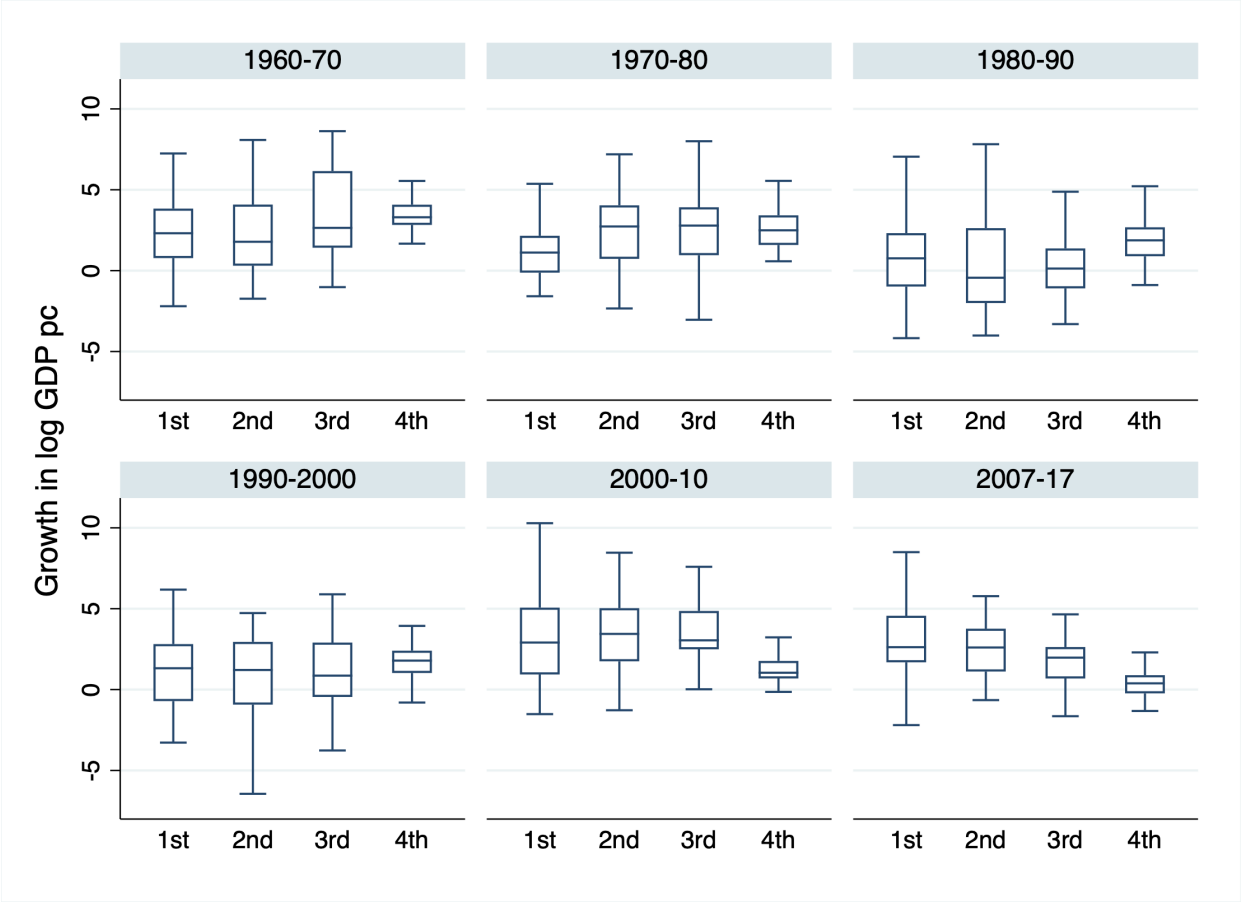
A.1 Income

Figure A.1: Trend in growth by income quartile, 1960-2007



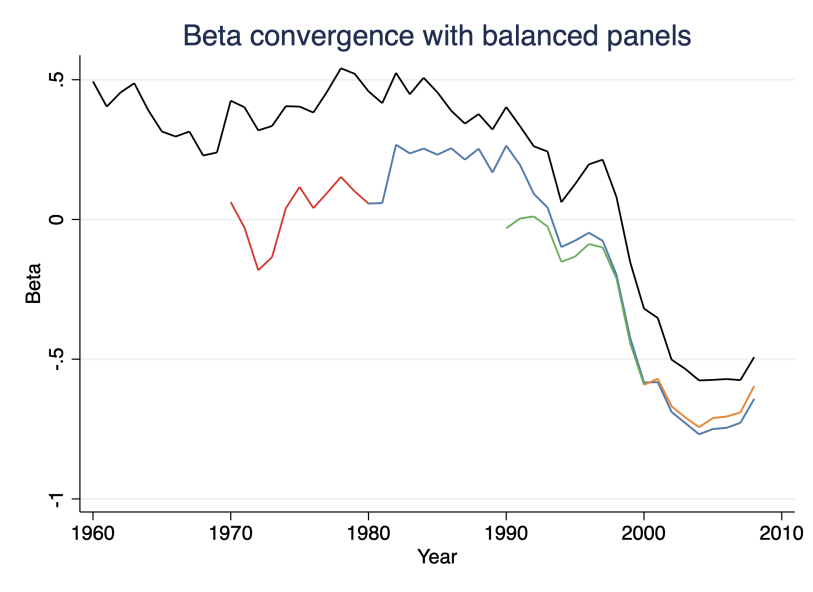
Notes: These are boxplots of country's average annual growth in GDP per capita, PPP, for a given decade. Each facet shows one quartile of countries, based on baseline GDP per capita that decade, with the 1st quartile being the lowest income and the fourth the highest. Within a facet, the plot shows how decade average growth for that quartile varied over time. 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.

Figure A.2: Boxplot of growth vs. country quintile, split by decade.

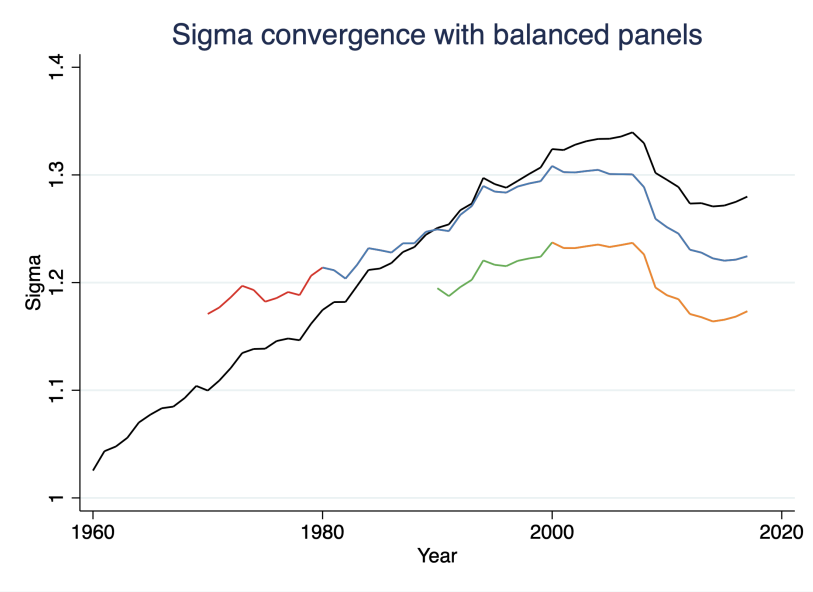


Notes: These are boxplots of country's average growth in GDP per capita for a decade. Each facet shows one decade. Within a facet, the plot shows how decade average growth varied by quartile of baseline GDP per capita. The top of the box is the 75th percentile of average growth in that quartile, the center is the median (teh 50th percentile), and the bottom is the 25th percentile. The whiskers represent the corresponding maximum and minimum. The last decade starts in 2007, since our data runs to 2017.

Figure A.3: Robustness of convergence to balanced panel.



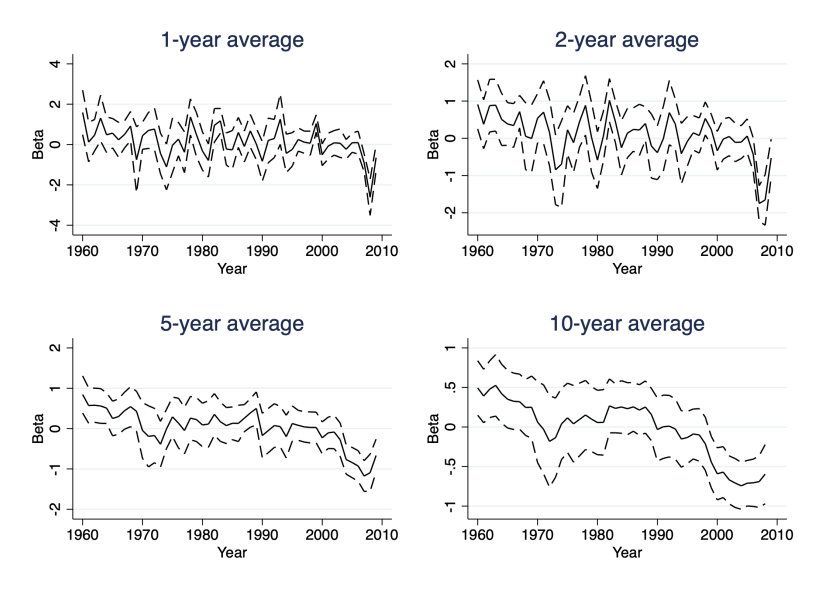
(a) Robustness of $\beta-$convergence.



(b) Robustness of $\sigma-$convergence.

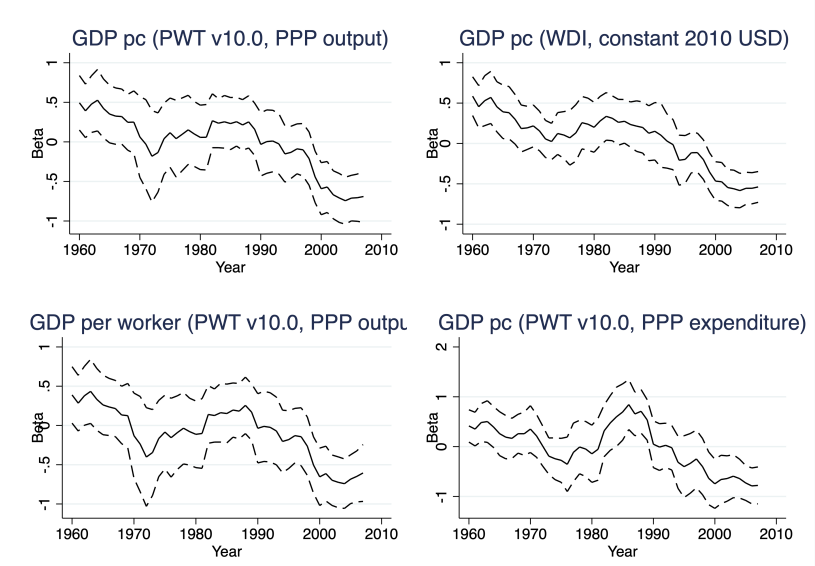
Notes: This figure shows robustness of the convergence coefficients to using balanced panels. Since countries are joining our dataset over time, we plot 5 different curves, one starting at the beginning of each decade. A given decades curve shows the evolution of the convergence coefficients going forward from the start of that decade, based upon the constant set of countries who were in the dataset at the start of that decade.

Figure A.4: Robustness of $\beta-$convergence to averaging period.



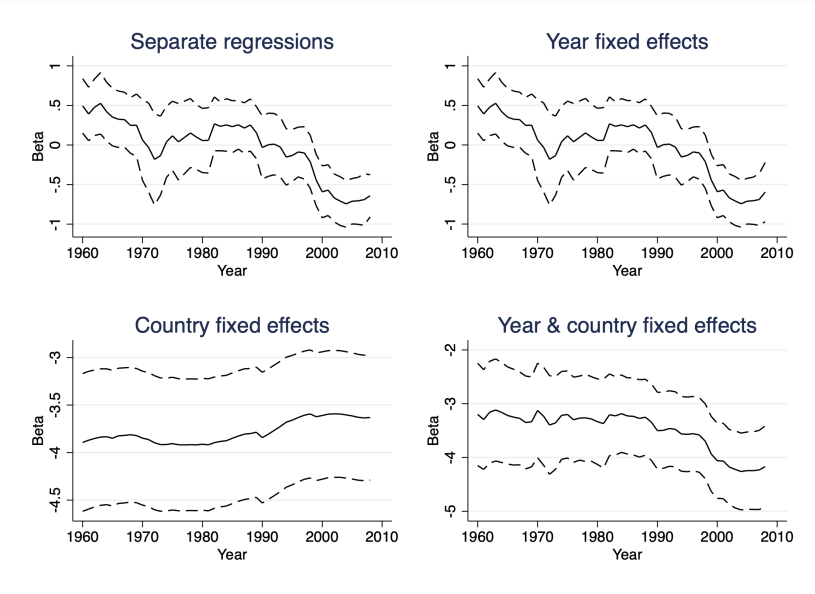
Notes: This figure shows robustness to the averaging period used for β-convergence. In particular, the plots show the β-convergence coefficients using subsequent 1, 2, 5, and 10 year average growth rates.

Figure A.5: Robustness of $\beta-$convergence to measure of output.



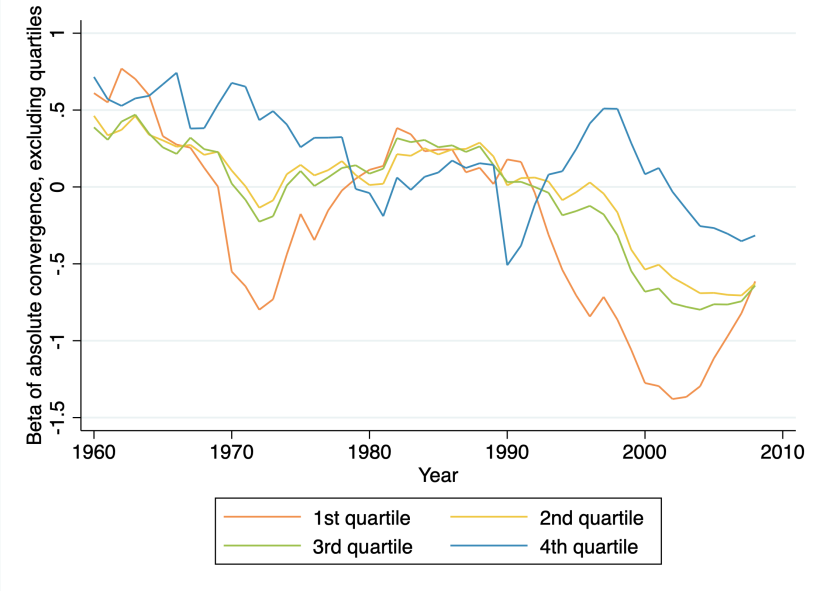
Notes: This figure shows robustness to the outcome used for β-convergence. Our baseline specification uses GPD pc in constant PPP output, from the PWT v10.0.

Figure A.6: $\beta-$convergence under alternative regression specifications.



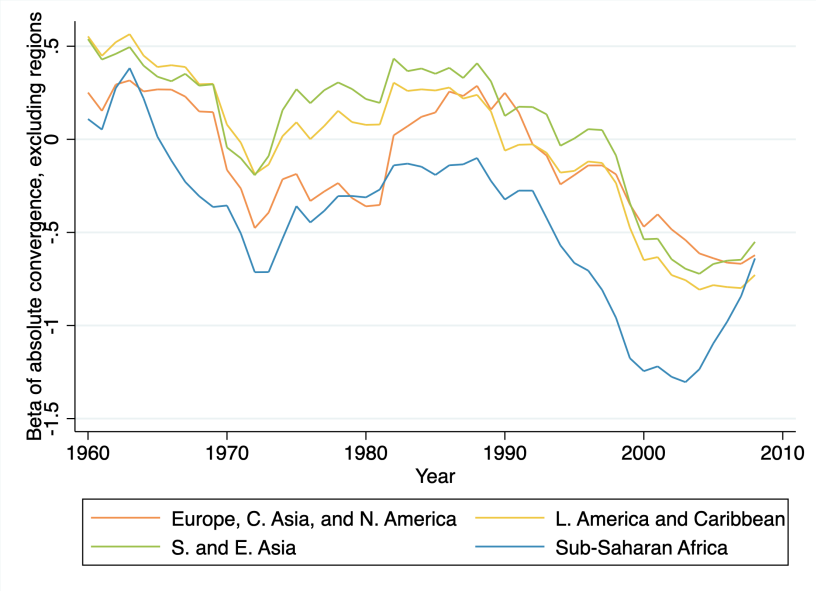
Notes: This figure shows robustness to the specification used for β-convergence. The first specification uses separate regressions for each year, while others pool across years and cluster by country. The second specification includes year fixed effects(our baseline specification). The third specification includes country fixed effects. The fourth specification includes both country and year fixed effects.

Figure A.7: Catch-up of the poor or slow-down of the rich? $\beta-$convergence when excluding countries from different quartiles of per capita income.



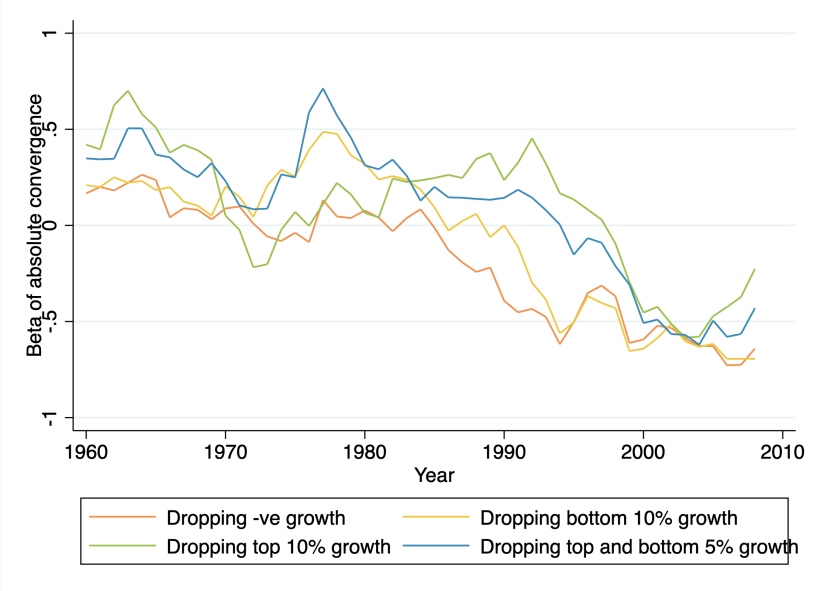
Notes: This figure reports the sensitivity of the absolute convergence coefficient β to excluding different quartiles of wealth from the sample. The legend refers to which wealth quartile is being dropped, where the 1st is the poorest.

Figure A.8: Which regions are converging? $\beta-$convergence when excluding countries from different regions.



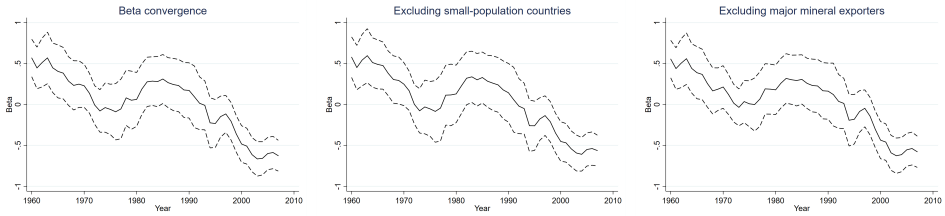
Notes: This figure reports the sensitivity of the absolute convergence coefficient β to excluding different regions. The legend refers to which region is being dropped.

Figure A.9: Disasters, growth miracles, and stagnation. $\beta-$convergence when excluding outlying growth rates.



Notes: 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 useful for diagnostic purposes). The legend refers to which countries are being dropped.

Figure A.10: Robustness of $\beta-$convergence to excluding small countries and major mineral exporters.



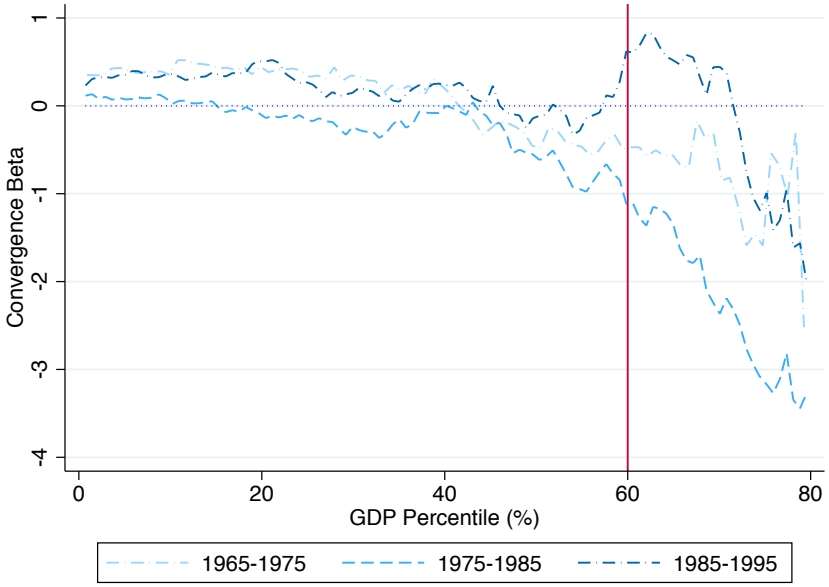
(a) Main specification.

(b) Excluding small population countries.

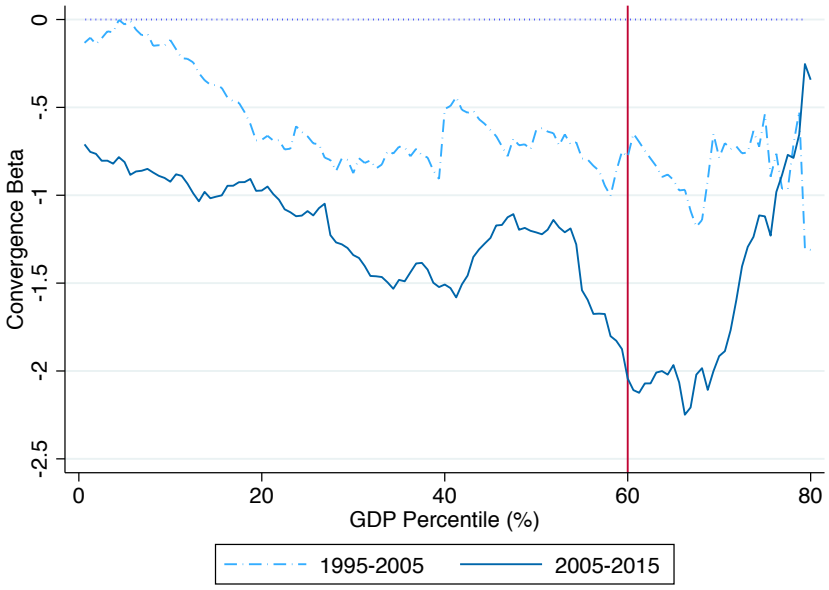
(c) Excluding major mineral exporters.

Notes: These graphs show robustness of the β-convergence plot to natural changes in the set of countries. a) is the original, main specification. b) Excludes countries for whom exports of minerals accounted for $> 20\%$ of their GDP in 2010. c) Excludes countries whose population was less than 500,000 in 2010.

Figure A.11: Club convergence by income



Panel A: Conditional convergence in decades from 1965 to 1995



Panel B: Conditional convergence in decades 1995 to 2005

Notes: 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 three decades in the pre-convergence era: 1965-1975, 1975-1985, and 1985-1995. Panel B reports the β for the two decades in the post-convergence era: 1995-2005 and 2005-2015. The red vertical lines imply the cutoff for country sub-sample in the top 40% income percentile. The blue dotted lines are the benchmark of no convergence.

A.2 Correlates

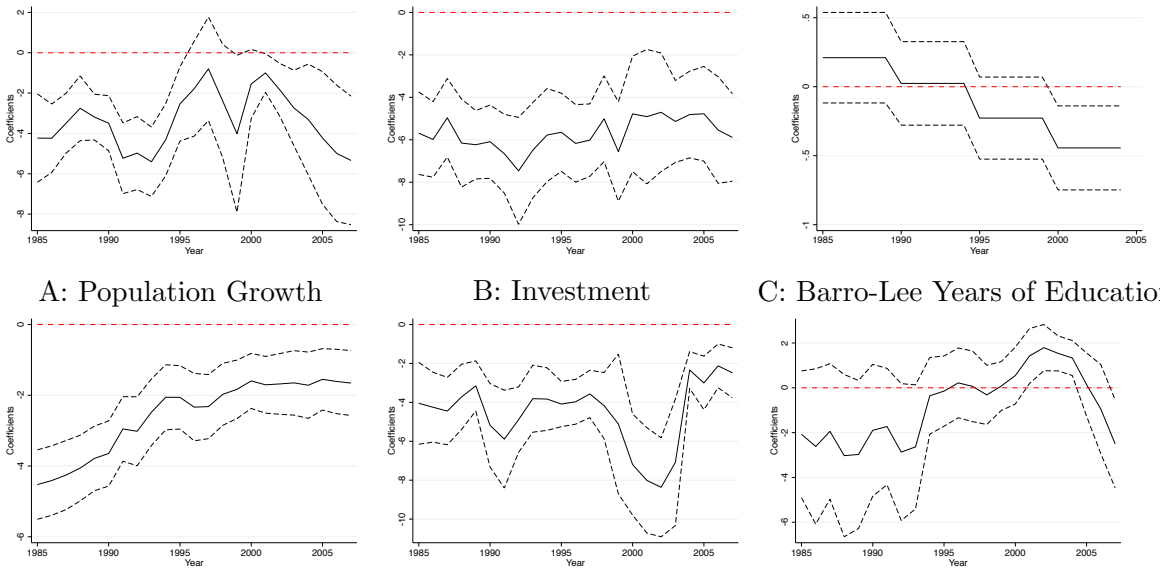
Table A.1: Convergence in culture using the World Value Surveys

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Trust	-0.00645									
	(0.00802)									
Perception on Inequality		-0.0265**								
		(0.0123)								
Politics - Respect for Authority			-0.0177**							
			(0.00828)							
Interest in Politics				-0.0269**						
				(0.0104)						
Political Actions					-0.0635***					
					(0.00900)					
Importance of Politics						-0.0184**				
						(0.00777)				
Importance of Family							-0.0435***			
							(0.00853)			
Work Ethics								-0.0329***		
								(0.0111)		
Religion									0.00376	
									(0.00475)	
Tradition										-0.0708***
										(0.0131)
Constant	0.0116	0.110	0.0287**	0.0804***	0.139***	0.0539**	0.0470***	0.0495***	-0.00431	0.0237***
	(0.0140)	(0.0733)	(0.0135)	(0.0281)	(0.0215)	(0.0214)	(0.00980)	(0.0161)	(0.0109)	(0.00851)
N	33	32	32	31	33	33	33	33	33	33

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table reports $\beta-$ convergence regressions, for country-level changes in cultural traits in the World Value Surveys (WVS). Country level traits are calculated as the population-weighted average of the traits reported in the WVS. The sample is countries which are surveyed both in wave 6 of the WVS (2010-2014) as well as in at least one of the waves 3-5 (1995-2009). To adjust for the different survey frequency, we take the annualized change. Robust standard errors are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.12: Convergence in correlates of income and growth



A: Population Growth | B: Investment | C: Barro-Lee Years of Education

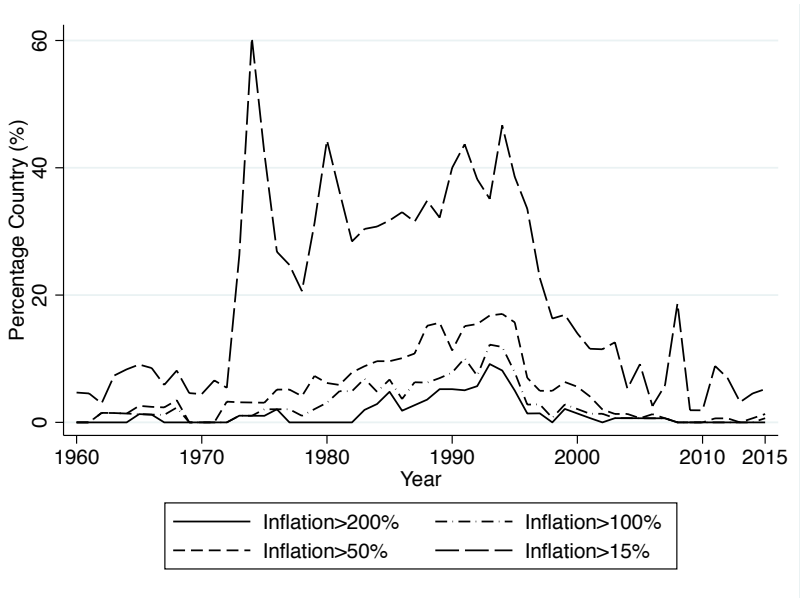
D: Polity 2 | E: Government spending | F: Credit by Financial Sector

Notes: 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):

$$100\frac{Inst_{i,t+10} - Inst_{i,t}}{10} = \beta_t Inst_{t,i} + \mu_t + \epsilon_{t,i}$$

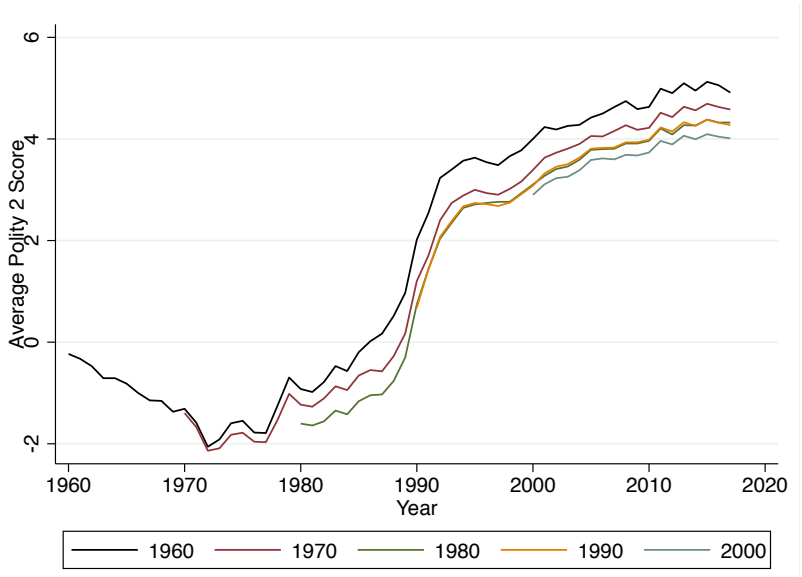
Five institutions are included: polity 2 score, rule of law (WGI), government spending (% GDP), credit provided by the financial sector, and Barro-Lee education attainment of age cohorts from 25 to 60. The dashed horizontal red lines are benchmark $\beta_t = 0$

Figure A.13: Hyper-inflation over time



Notes: This figure plots four series of the percentage of countries experience inflation above 200%, 100%, 50%, and 15%.

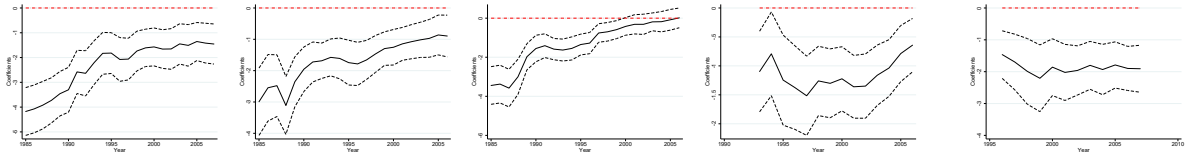
Figure A.14: Polity 2 score with fixed country samples



Notes: Average Polity 2 score with the country samples available in 1960, 1970, 1980, 1990, and 2000.

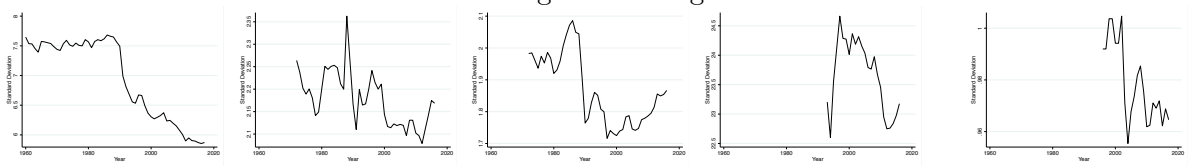
Figure A.15: Convergence in Political Institutions

Panel A: Beta-Convergence



Panel A1: Polity 2 | Panel B1: Political Rights | Panel C1: Civil Liberty | Panel D1: Media Freedom | Panel E1: WGI Political Stability

Panel B: Sigma-Convergence

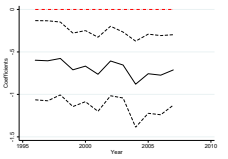


Panel B1: Polity 2 | Panel B2: Political Rights | Panel B3: Civil Liberty | Panel B4: Media Freedom | Panel B5: WGI Political Stability

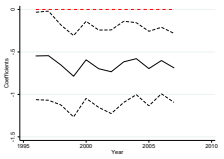
Notes: Political institution measures include Polity 2 score from Center of Systematic Peace (1960-2015), Freedom House political rights score (1973- 2015), Freedom House civil liberty score (1973-2015), Press Freedom score (1995-2015), and WGI political stability. The top panels (A1-A5) report results of Beta convergence. The bottom panels (B1-B5) report results of Sigma convergence.

Figure A.16: Convergence of Governance

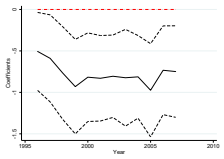
Panel A: Beta-Convergence



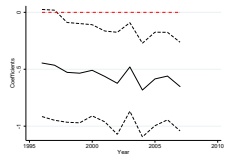
A1: Rule of Law



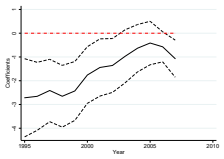
A2: Gov Effectiveness



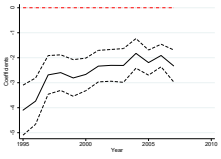
A3: Regulatory Quality



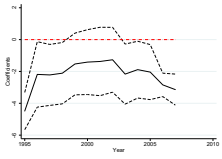
A4: Control of Corruption



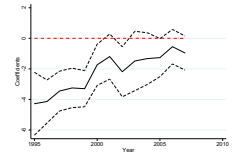
A5:Economic Freedom Score



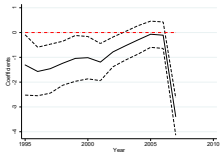
A6: Government Integrity



A7: Business Freedom

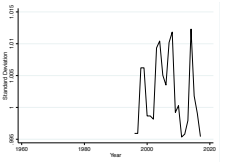


A8: Investment Freedom

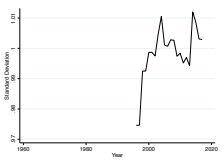


A9: Property Rights

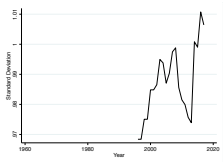
Panel B: Sigma-Convergence



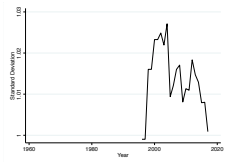
B1: Rule of Law



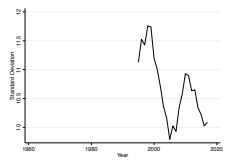
B2: Gov Effectiveness



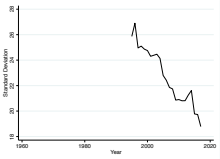
B3: Regulatory Quality



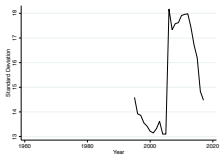
B4: Control of Corruption



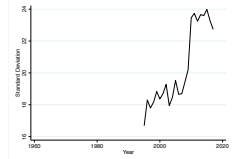
B5: Economic Freedom Score



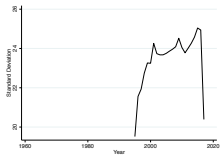
B6: Government Integrity



B7: Business Freedom



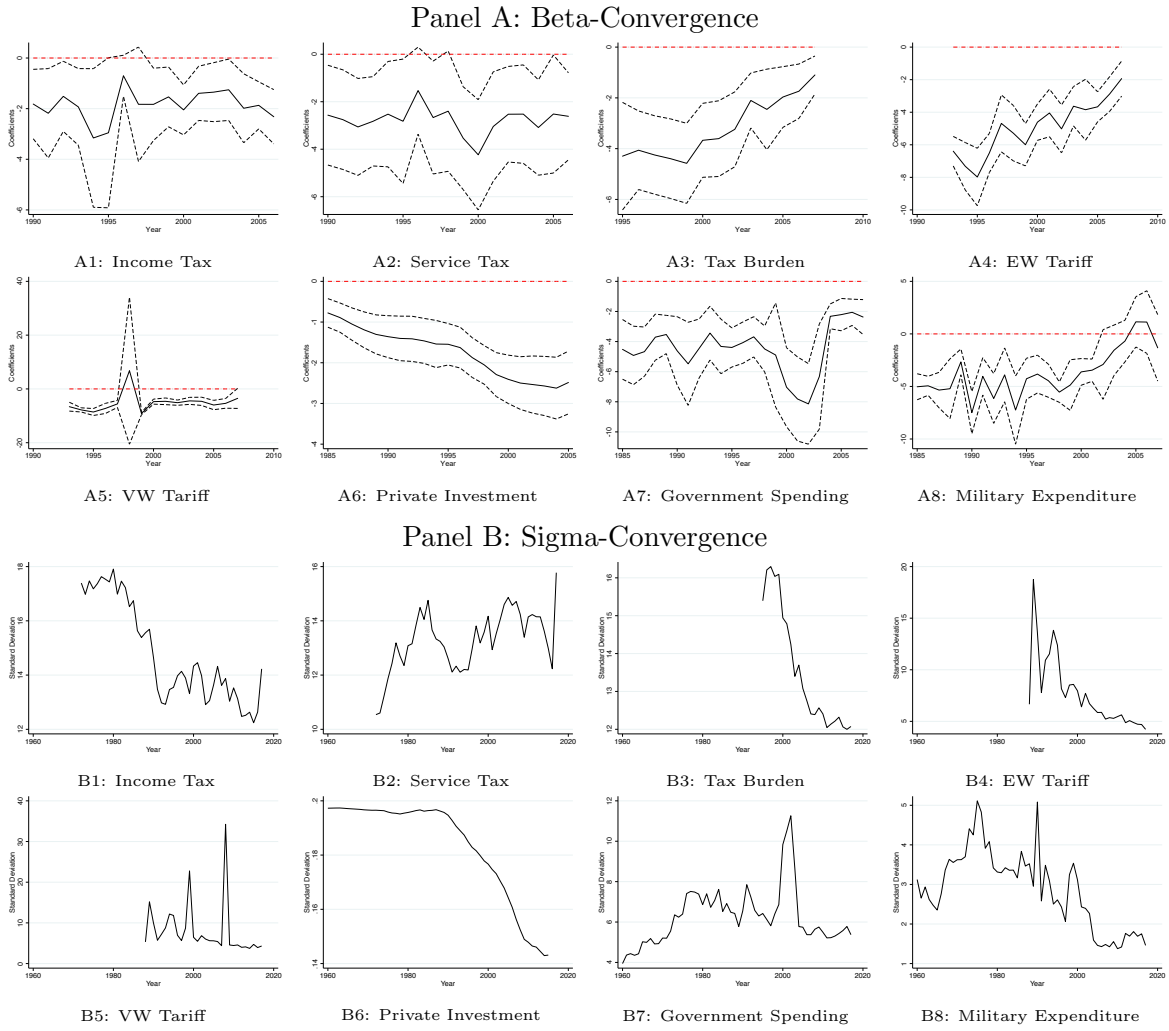
B8: Investment Freedom



B9: Property Rights

Notes: Governance quality measures include rule of law, government effectiveness, regulatory quality, control of corruption, overall economic freedom score, government integrity, business freedom, investment freedom, and property rights. The top panels (A1-A9) report results of Beta convergence. The bottom panels (B1-B9) report results of Sigma convergence.

Figure A.17: Convergence in Fiscal Policy



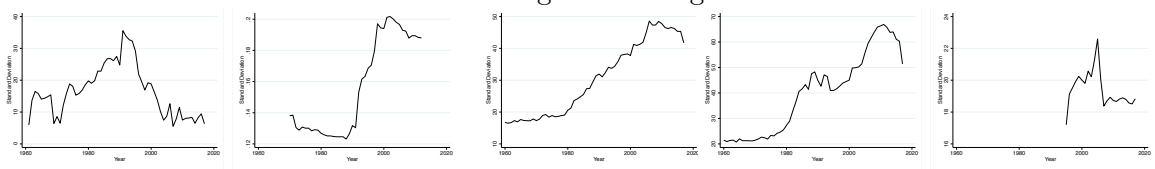
Notes: Fiscal policy measures include tax on income and capital gain (% tax revenue),tax on goods and service (% tax revenue), tax burden score, equal-weighted tariff rate, value-weighted tariff rate, private investment (% total investment), government spending (% GDP), and military expenditure (% GDP). The tax burden is a quadratic decreasing function with of tax as a portion of GDP. See https://www.heritage.org/index/fiscal-freedom for more explanation. The top panels (A1-A8) report results of Beta convergence. The bottom panels (B1-B8) report results of Sigma convergence.

Figure A.18: Convergence in Financial Institutions

Panel A: Beta-Convergence

A1: Winsorized Inflation A2: CBI A3: Credit to Private Sector A4: Bank Credit A5: Financial Freedom

Panel B: Sigma-Convergence

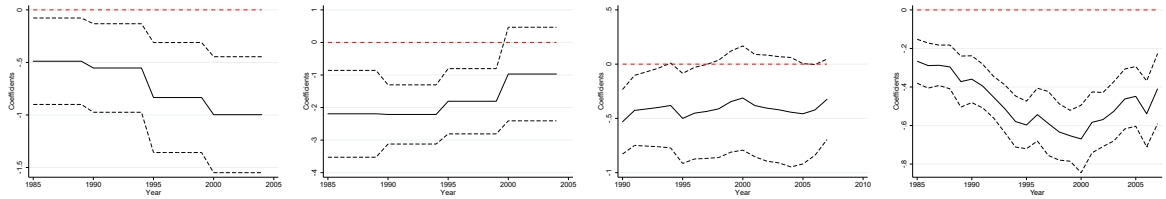


B1: Winsorized Inflation B2: CBI B3: Credit to Private Sector B4: Bank Credit B5: Financial Freedom

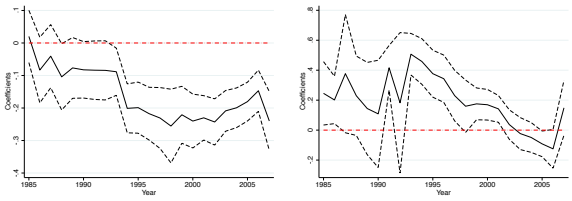
Notes: Financial institution measures include winsorized inflation, central bank independence, credit to private sector, credit by financial sector (bank credit), and financial freedom score. The annual inflation data is winsorized by 100% to reduce the impact of outliers. The top panels (A1-A5) report results of Beta convergence. The bottom panels (B1-B5) report results of Sigma convergence.

Figure A.19: Convergence in Labor

Panel A: Beta-Convergence

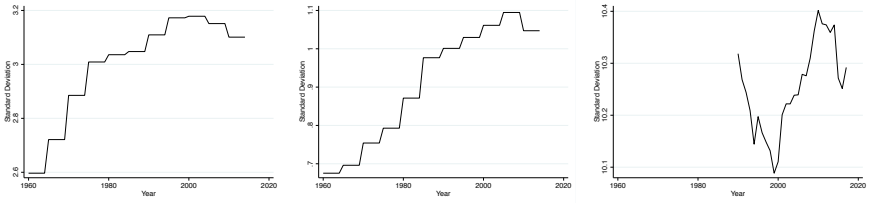


A1: Barro-Lee Age 25-29 A2: Education Gap by Gender A3: Labor Participation A4: Primary Enrollment



A5: Secondary Enrollment A6: Tertiary Enrollment

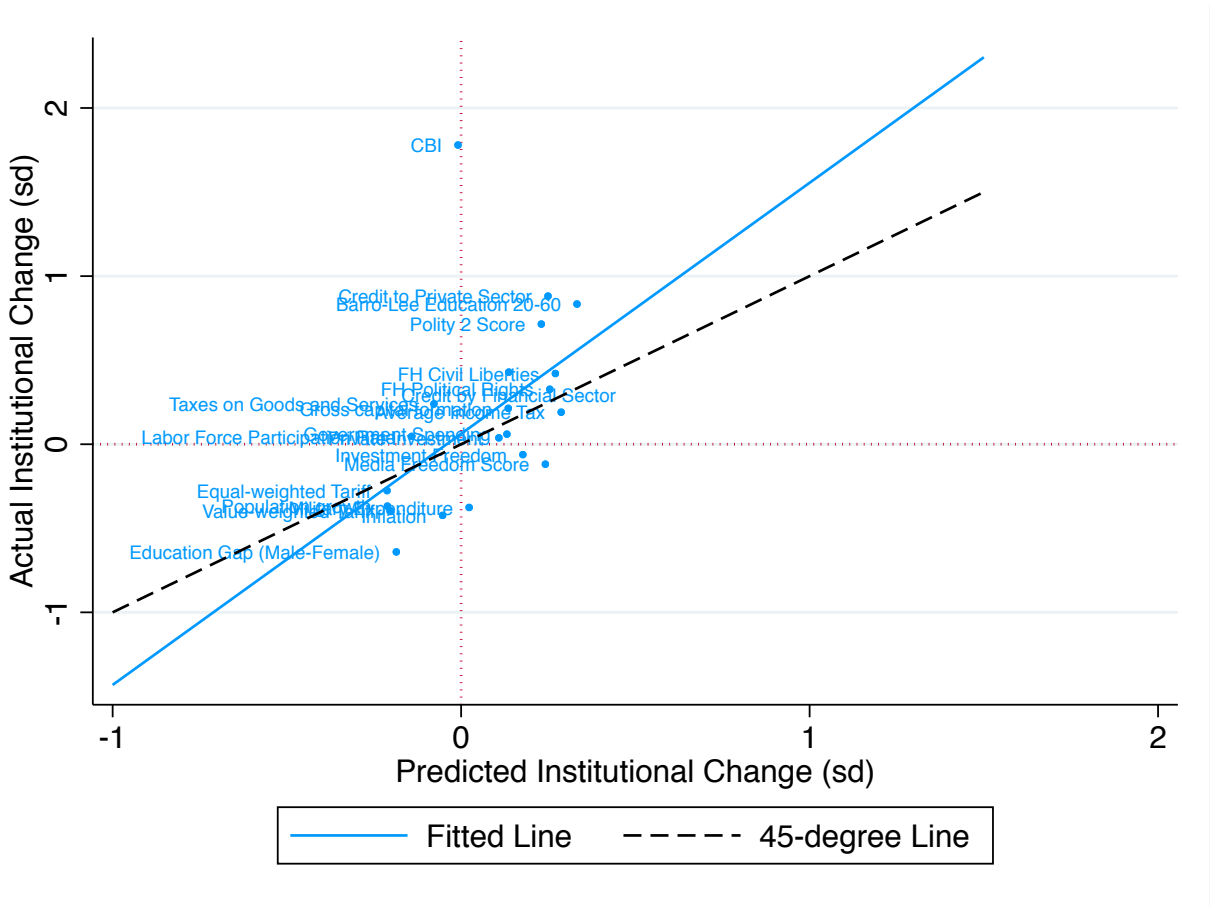
Panel B: Sigma-Convergence



B1: Barro-Lee Age 25-29 B2: Education Gap by Gender B3: Labor Participation

Notes: Labor measures include the quinquennial Barro-Lee educational attainment of Age group 25-29 (1970-2015), gender gap in educational attainment (male minus female), labor force participation rate, primary school enrollment rate, secondary school enrollment rate, tertiary school enrollment rate. The top panels (A1-A6) report results of Beta convergence. The bottom panels (B1-B6) report results of Sigma convergence.

Figure A.20: Actual and predicted change in correlates of income and growth from 1985 to 2015

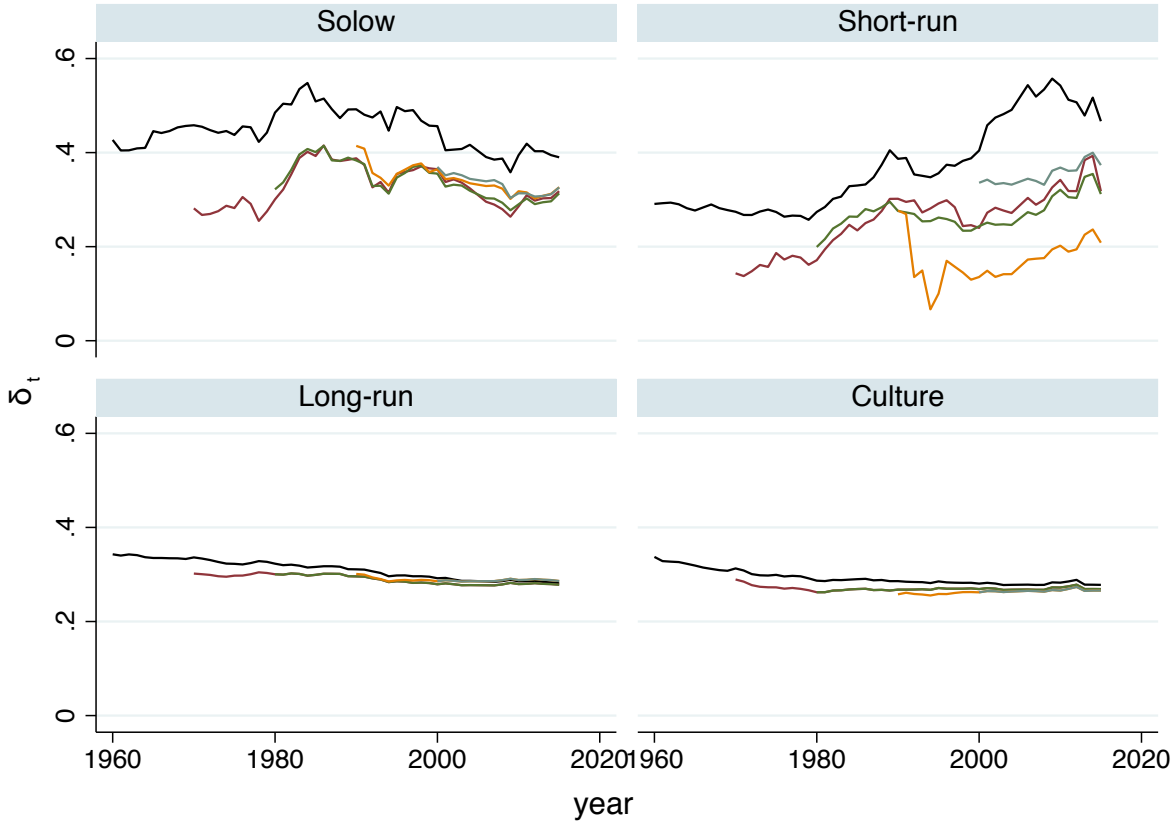


Notes: This figure plots the actual average correlate change from 1985 to 2015 versus the predicted average correlate change due to GDP growth, predicted using the GDP-correlate relationship in 1985 which is estimated by the following regression:

$$\frac{Inst_{i,1985}}{SD(Inst_{1985})} = \delta_{1985} log(GDPpc)_{i,1985} + \nu_{1985} + \epsilon_{i,1985}$$

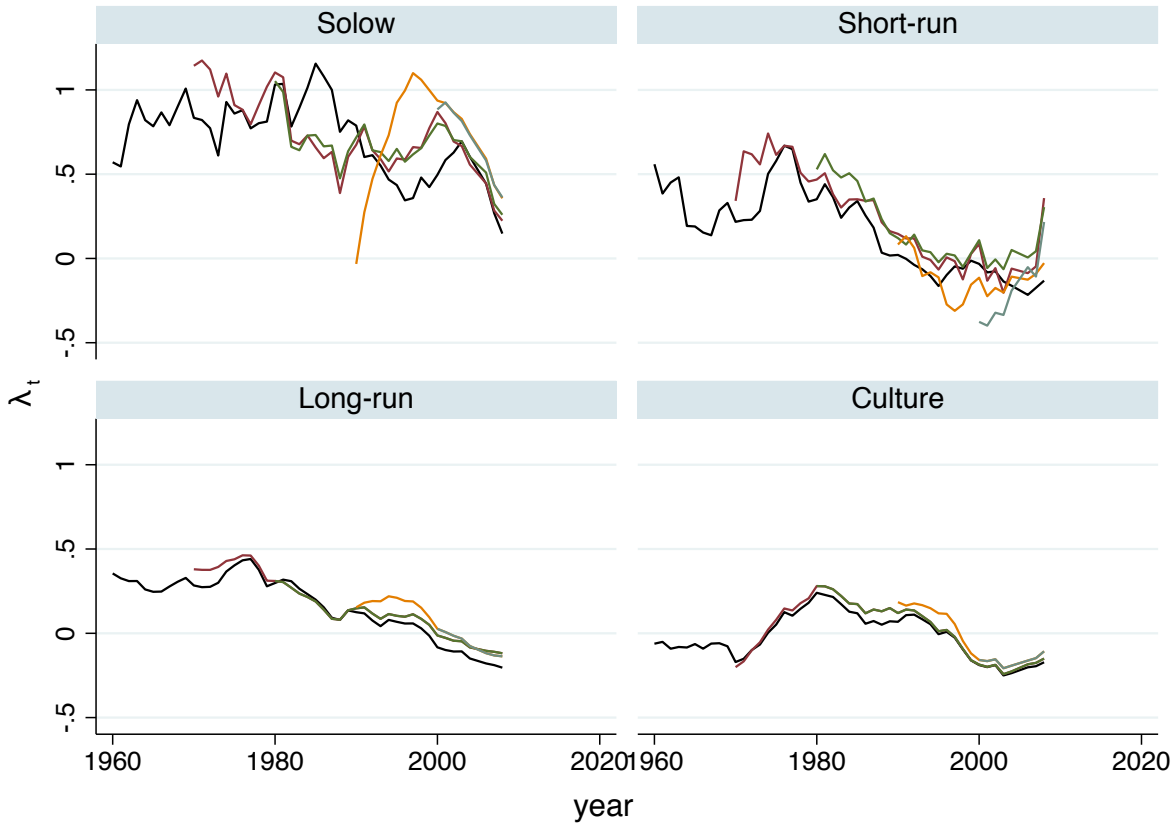
The predicted correlate change (on X-axis) is defined as $\delta_{1985}\text{mean}_i(log(GDPpc)_{i,2015} - log(GDPpc)_{i,1985})$. The actual correlate change (on Y-axis) is defined as $\text{mean}_i\left(\frac{Inst_{i,2015} - Inst_{i,1985}}{SD(Inst_{1985})}\right)$. The solid line is the fitted line of all correlates. The dashed line is the 45-degree degree line as a benchmark.

Figure A.21: Trend in correlate-income relationship (δ)



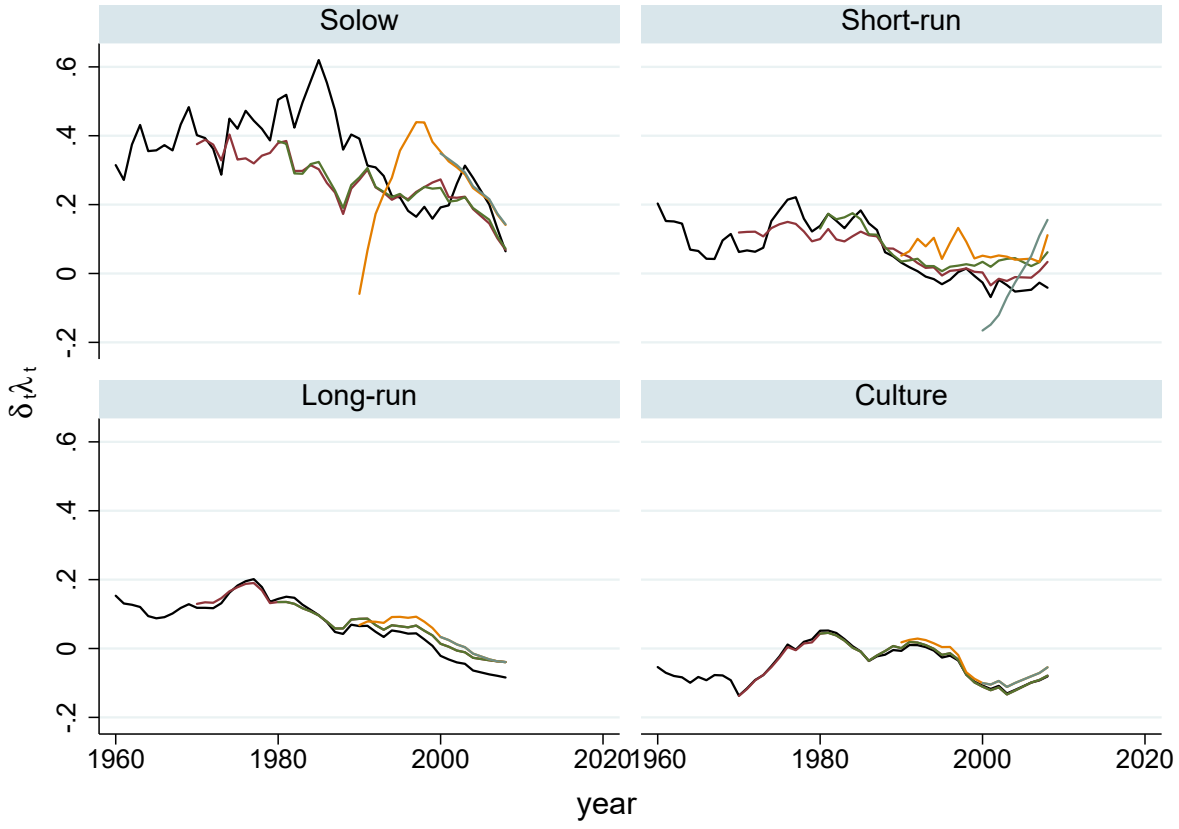
Notes: These figures plot δ_t - the slope of the correlate-income relationship - averaged across the different correlates. Each line represents a balanced panel, so that, for example, the line starting in 1960 is estimated from those country-correlate pairs for which data was available in 1960.

Figure A.22: Trend in growth-correlate relationship (λ)



Notes: 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 was available in 1960.

Figure A.23: Trend in difference between unconditional and conditional convergence, univariate ($\delta\lambda$)



Notes: 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 was 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.

Table A.2: Polity 2 Score Change by Decade

Decade	Increase in Polity 2	Decrease in Polity 2	Unchanged Polity 2	Obs
1960-1970	19.4%	30.1%	50.5%	103
1970-1980	23.8%	25.4%	50.8%	122
1980-1990	37.3%	9.7%	53.0%	134
1990-2000	52.9%	10.1%	37.0%	134
2000-2010	31.6%	13.3%	55.1%	158
2010-2015	19.3%	6.8%	73.9%	161

Notes: This table reports the portion of countries with an increase, decrease, and unchanged Polity 2 score for each decade: 1960-1970, 1970-1980, 1980-1990, 1990-2000, 2000-2010, and 2010-2015.

Table A.3: Democratization and Income by Decade

	(1)	(2)	(3)	(4)	(5)	(6)
	1960-1970	1970-1980	1980-1990	1990-2000	2000-2010	2010-2015
	Panel A: Dummy {Increase in Polity 2 Score}					
Log(GDP)	-0.403**	0.0575	0.0707	-0.468***	-0.137	-0.0173
	(-2.36)	(0.44)	(0.63)	(-3.99)	(-1.46)	(-0.18)
Obs	91	114	137	169	193	203
	Panel B: Dummy {Decrease in Polity 2 Score}					
Log(GDP)	-0.328*	-0.690***	-0.438*	-0.0895	-0.292*	-0.280
	(-1.68)	(-3.32)	(-1.81)	(-0.47)	(-1.79)	(-1.22)
Obs	68	96	114	127	154	158

Notes: 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 in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.4: Correlate convergence: joint tests

	Chi-squared	P-value	Number of Institutions
		Panel A: 1996-2006	
Political Institution	155.10	1.09×10^{-31}	5
Governance Quality	317.97	0.00	9
Fiscal Policy	460.23	0.00	8
Financial Institution	122.43	9.61×10^{-25}	5
Labor	124.23	2.11×10^{-24}	6
		Panel B: 2006-2016	
Political Institution	98.29	1.21×10^{-19}	5
Governance Quality	207.81	0.00	9
Fiscal Policy	170.41.75	1.06×10^{-32}	8
Financial Institution	698.09	0.00	5
Labor	74.53	4.80×10^{-14}	6

Notes: This table reports the joint significance test for two decades 1996-2006 and 2006-2016. The null hypothesis is that correlate convergence does not exist in all Solow fundamentals and short-run correlates (all βs are zeros). 1996 is the first year, 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).