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Abstract

I conduct a cross-country analysis of the human development index (HDI) components, income, life expectancy, literacy and gross enrolment ratios, using Gray and Purser's 1970-2005 quinquennial database for 111 countries. 1) A descriptive analysis uncovers a complex pattern of divergence and convergence for these components' evolution. Development is not a smooth process but consists of a series of superposed transitions each taking off with increasing divergence and then converging. 2) Absolute divergence/convergence for the HDI components is decomposed using simultaneous growth regressions including a full set of quadratic interactions between the HDI components, and indicators of urbanization, trade, institutions, foreign direct investment and physical geography. These are implemented, first, using three stage least squares, all of the non-exogenous independent variables fully instrumented, and second, as independent regressions with errors clustered by countries, again all non-exogenous variables instrumented. 3) A set of quantile regressions is run for the HDI component levels on the same variables (just the linear terms), again fully instrumented. Urbanization is a leading significant variable for human development indicators in both sets of estimates, stronger than trade, FDI and institutional indicators. These indicators act with ambiguous signs that may result from their distributive impacts, reducing their effectiveness. The results indicate that improving markets will have smaller returns than complementing them with institutions that can coordinate urbanization as well as investment in human capital. Urbanization itself can provide a concrete agenda for development involving all aspects of economic, political and social life as well as human development.

Keywords: human development, growth, convergence, divergence, urbanization.

JEL classification: O11, O20, O47.

1. Introduction

What are the main determinants of divergence and convergence in human development? How is this process interlinked with economic growth? What makes some countries catch-up in the different dimensions of human development, and others not?

These questions cut deep into the formulation of the theories and policies of economic growth. The initial theories of growth that emerged with the Neoclassical revolution and the demise of Keynesianism defined the concept of convergence. As Development Economics was thrown out, together with its appreciation of vicious and virtuous circles, nascent theories of economic growth based simply on extending the concepts of market equilibrium to the intertemporal, dynamic context predicted absolute convergence. It followed that economic convergence across countries would result from the implementation of free markets. Findings of convergence were thus considered to support free market policies. However, the initial empirical studies on income convergence (Barro, 1991) found absolute divergence instead, as was confirmed for the long-term by Pritchett (1997). Only the finding of conditional convergence has been robust[1], with absolute convergence confined to specific groups of countries. Essentially, what this means is that some variables move slower than income (or the variable of interest) and define its equilibrium levels. Variables that converge do not require much policy intervention while variables that move slowly, generating stratification or divergence, are reflecting the deeper inertias that define development and underdevelopment.

Two decades of empirical investigations left behind long-held views that economic growth consisted fundamentally of a process of capital accumulation, finding that human capital,

[1] A robust negative conditional convergence coefficient means *only* that economic growth follows a process of dynamic equilibrium. This is a non-trivial finding, but only implies a local form of convergence that is consistent with global convergence, divergence or stratified growth. The control variables are supposed to be exogenous and to define the steady state trajectories.

technology, institutions and economic geography to be essential components of the process. The main debate, nevertheless, is to what extent the growth process generated by markets is sufficient to bring about economic development, and where not, what the most effective complementary policies can be.

The 1990 Human Development Report explicitly addresses these questions, and defines economic development as *human development*. Twenty years of change have followed, marked by globalization and events that have moved faster than our understanding of them. Gray and Purser's (2009) new database on human development indicators for 111 countries ranging quinquenially across the period 1970-2005 provides an opportunity to take stock of these issues. What has been the physiognomy of convergence and divergence? What variables have most intervened in improving income, life expectancy, literacy and gross enrolment ratio, the four components of the human development index? How has globalization impacted human development? Can a comparative evaluation be made of the relative importance of the main determinants of economic growth that current research proposes?

Now, the fact of the matter is that this area of study, centered mainly on conditional convergence regressions, has produced a vast literature but nebulous results. A well-known investigation found that *"the cross-country statistical relationship between long-run average growth rates and almost every particular macroeconomic indicator is fragile to small changes in the conditioning information set"* (Levine & Renelt, 1992). This research also found *"qualified support for the conditional-convergence hypothesis: a robust, negative correlation between the initial level income and growth over the 1960-1989 period when the equation includes a measure of the initial level of investment in human capital,"* implying, as mentioned above, that human capital is a slow moving variable reflecting the deeper inertias that define development and

underdevelopment. Another well-known investigation used two million regressions to find that regional dummies, political variables such as rule of law or political rights, religion, market distortions and performance, types of investment, fraction of primary products in total exports or of GDP in mining, openness, type of economic organization, and colonial history were *on the whole* significant determinants of economic growth (Sala-i-Martin, 1997).

What these studies show is that economic and human development are complex processes with historical, political, economic, institutional and geographical determinants that do not conform to some simple linear model.

To throw light on the evolution of human development over the period 1970-2005, I first conduct a descriptive study of the indicators of human development and of some of the main explanatory variables. The main conclusion is that *economic development consists of a series of nonlinear transitions*, characterized by an initial period of divergence followed by a subsequent period of convergence.

Next I conduct two sets of estimates on cross country differences that evaluate two different aspects of growth. One is an estimate on the divergence/convergence of the human development index (HDI) components. This estimate *decomposes* the (absolute) convergence coefficient for each of these four indicators, to find what explanatory variables contribute to their convergence or divergence. To take into account the complex interaction which exists between the different economic variables, these regressions are fully instrumented. There are variables contributing to both convergence and divergence. Variables contributing to divergence are more critical to the growth process because they exhibit impact thresholds and increasing returns.

The other set of estimates concentrates on differences in HDI component *levels* across countries. It consists of quantile regressions for the determinants of these levels across deciles of

these same variables, in terms of the main explanatory variables. These regressions are also fully instrumented. The impact of the various determinants varies considerably across deciles.

We compare the overall significance of the different explanatory variables for human development. Urbanization is a more significant and quantitatively important protagonist of development than trade, institutions or geography. Per capita income, life expectancy, literacy and enrolment ratios also affect each other considerably.

In what follows we first discuss the data and results. Discussion and conclusions follow.

2. Data

The main data set is Gray and Purser's (2009) extended quinquenial database on human the development index components, per capita income, life expectancy, literacy and gross enrolment ratios. This panel ranges over 111 countries over the period 1970-2005. This database is complemented with data from the World Development Indicators (2008)[2] and Polity IV (2009)[3]. The explanatory variables cover the following categories: institutions, trade, physical geography and economic geography. The first three categories are regarded by researchers seeking exogenous determinants of economic growth as the ultimate causes of economic growth. Researchers studying path dependence mainly study dynamics in human development (including the demographic transition), economic geography and technology. Human development indices are already included in the study. The only quinquennial indicator in economic geography found in the World Development Indicators is urbanization. There is unfortunately no suitable indicator for technology adoption.

[2] See http://data.worldbank.org/indicator.

[3] The Polity IV Project was originated by Will H. Moore and is currently available at the Center for International Development and Conflict Management at the University of Maryland. Special values -66, -77, -88 used to represent various exceptions are replaced here with 0. We use the 2009 update.

The set of explanatory variables that was included was therefore: trade[4], FDI inflows, FDI outflows (these variables are thought to be indicators of globalization and technological change), executive constraints, democracy (these two from Polity IV), inflation and risk premium, landlocked, tropical, latitude, urban proportion of the population, population density (with agricultural land as denominator) and its rate of change. Including these population density variables accounts for the impact of endogenous fertility on human capital (e.g. Galor & Weil, 2000) and for such phenomena as the demographic dividend (Bloom, Canning & Sevilla, 2003a). Because of the devastating impact of AIDS in some very specific regions, a control for HIV was included, a dummy indicating countries for which more than 10% of the adult population was HIV positive in 2001 according to UNAIDS (2008). These countries are Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe.

Our instrument set includes correlates of long-term historical, political, economic, institutional and geographical determinants. These are legal origin (British, French, German or Scandinavian, from Levine, Loayza and Beck, 2000), geographic region (East Asia Pacific, East Europe and Central Asia, Middle East and North Africa, South Asia, Western Europe, North America, Sub Saharan Africa and Latin America and Caribbean), landlocked, tropical, latitude, area, the well known malaria ecology instrument (together with a dummy indicating its availability, Sachs, 2003), ethnic fractionalization in 1960 (from the Easterly and Levine (1997) dataset) and a time period dummy. To these instruments are added their quadratic interactions. For instance this allows the impacts of institutional, health and period variables to vary substantially across geographic regions, which themselves have very different histories. Note that landlocked, tropical and latitude are used as exogenous controls.

[4] Trade is the sum of exports and imports as proportions of income. Although these are quite different variables from the technological point of view, they are collinear. For this reason I keep to the variable used more commonly, trade.

Descriptive statistics for all of the variables are presented in Table 1.

3. Descriptive analysis of the evolution of the HDI components, 1970-2005

The first descriptive analysis is an inspection of the evolution of the mean and dispersion (specifically, the standard deviation) of the component indicators of human development as well as urbanization, exports, imports, executive constraints and democracy by groups of countries. These groups are defined to represent human development or income levels. The evolution of the mean reflects on improvement across time, while the evolution of dispersion reflects on the presence of σ-convergence or divergence. This is the technique used by Grier and Grier's (2007) evaluation of the neoclassical model, which excels for its simplicity.

The second descriptive analysis is an examination of decade phase diagrams of the HDI components showing all countries together with trend lines for their groups. This is a way of visually inspecting the Gray and Purser (2009) data for specific periods of time.

3.1 Mean and dispersion of HDI components across country groups

The groups of countries are defined according to initial data as follows. I took the 111 countries for which the HDI index is defined in the Gray and Purser (2009) data over the years 1970-2005, divided these into groups of 28 countries, except for the top group which is 27 countries, according to either log GDP per capita in 1970 or the HDI index in 1970. I therefore defined higher, upper middle, lower middle and lower income or HDI countries. On occasion the regional classification of countries used by the World Bank is used instead.

As it happens, literacy is the variable that most closely follows the paradigm of absolute convergence. This is because the proportion of the population that can be literate has a natural upper bound (the whole population, actually 0.99 in our database), and because one of the factors of production of this good–teachers–consists of literate people themselves, independently of their level of income. The good itself–literacy–is not subject to much technological change, and fairly high levels of literacy have been obtained by many less developed countries. Between 1970 and 2005 mean literacy for the 111 countries increased from 0.62 to 0.83 and the standard deviation decreased almost linearly from 0.30 to 0.18. Even so, there is one difference with the usual paradigm, and this is that the initial phase of literacy growth is divergent.

Figures 1.1 and 1.2 show the trajectories of mean and standard deviation for four groups of countries, defined according to income or human development levels. Each trajectory consists of eight points corresponding to the quinquennial series 1970-2005, that shift towards the right unless otherwise indicated. It can be observed that once mean literacy reaches a level of approximately 0.5, the dispersion of literacy across both income and human development groups diminishes as group mean literacy increases. Also, the value mean literacy tends to converge to is common across groups: the maximum possible value, when all of the population is literate. These trajectories are most clearly distinct across human development groups, showing this grouping defines the dynamic of the variable itself better than the income grouping.

So far, this describes absolute convergence. However, the initial segments of the trajectories traversed by the lowest income or human development groups, when literacy is less than approximately 0.5, follow divergent trajectories, since as literacy increases so does its dispersion. This shows that literacy growth takes off in different countries at different times.

The two qualitatively different segments of the trajectories, first divergence and then convergence, together constitute a transition, in this case from illiteracy to literacy.

Let us now turn to log per capita GDP. In this case both the mean and standard deviation across the 111 countries increased, from 8.2 to 8.7, and from 1.27 to 1.41 respectively. However, a closer look shows Figures 2.1 is consistent with a long-term transition in income for the three highest groups, while the bottom group is trapped. The mean is not marked by improvement. Figure 2.2 also shows the bottom group trapped, but this time the top groups form a convergence club pattern, the top group apparently converging to a higher equilibrium, as the linear trend lines show. These conclusions are consistent with other well-known research. Quah (1996) finds evidence for a twin-peaked distribution. Bloom, Canning & Sevilla (2003b), find evidence for an income poverty trap. Castellacci (2006, 2008) finds evidence for three technology convergence clubs consistent with the theory in Howitt and Mayer-Foulkes (2005). Mayer-Foulkes (2006) finds evidence for three convergence clubs with divergence as well as transitions between them.

Life expectancy shows a somewhat different evolution to per capita income or literacy. Mean life expectancy across the 111 countries increased from 58 to 68 years, while the standard deviation went from 10.1 to 11.1, partly because of the increasing life expectancy at the top end of the spectrum. Figures 3.1 and 3.2 shows a transition in which countries are eventually tending to similar life expectancy levels. If only the first five points of each trajectory are considered, from 1970 to 1990, the diagrams a transition ending with a convergence almost as sharp as for literacy. The transition is clearest by human development groups. However, around 1990 dispersion begins increasing in the three lower groups. Also, human development groups 1 and 2 have experienced a consistent increase in life expectancy since 1995, without an increase in dispersion. This changing pattern from convergence to divergence is documented in a series of

works. Moser, Shkolnikov & Leon (2005) show that life expectancy divergence replaced convergence in the late 1980's because of adult mortality differences. These results are supported by McMichael et al (2004). A trend from convergence to divergence in the late 20th century is also noted by Taylor (2009). Ram (2006) shows that, instead of the sharp convergence before the 1980's, after 1980 there is lack of convergence and an indication of "divergence," that is particularly marked during the 1990s. Also noted is substantial heterogeneity across the top and the bottom quartiles within each period. Increases in world life span inequality are also noted by Edwards (2010).

Gross enrolment ratios represent the proportion of the schooling age population enrolled in primary, secondary, and tertiary education. Figures 4.1 and 4.2 show the evolution of these rates across time and across country groups. Because schooling follows discrete stages, enrolment ratios increase by waves across time. This is most clearly seen by income groups. Apparently higher education levels are undertaken when income resources permit, and when this occurs, a rise in dispersion follows. 19 out of 31 human development group 1 countries had reached enrolment ratios above 0.9 by 2005. The mean gross enrolment rate across the 111 countries is somewhat meaningless. It increased from 0.49 to 0.72, while the standard deviation fluctuated from 0.20 down 0.18 and then back to 0.19.

3.2 Decade phase diagrams for the evolution of HDI components across country groups

A closer examination of the evolution of HDI components across country groups is provided by decade phase diagrams that show levels of some indicator on the x axis and its change across a decade on the y axis.

We begin again with literacy, because it illustrates a transition that begins with a period of divergence and ends with absolute convergence. Figure 5.1 shows decade phase diagrams across regional country groups beginning in 1970, Figure 5.2 beginning in 1995. The 1970 diagram shows Sub Saharan Africa and South Asia in the initial divergent stage of the literacy transition, with the rest of the regions already converging towards a literacy rate of 1. By 1995 all of the regions had reached the convergent phase of the transition.

Log per capita income follows quite a complex process. Figure 6.1 illustrates income growth from 1980 to 1990 across income groups. Here the higher income group is divided into OECD and non-OECD countries. All of the groups except for the OECD countries are following a pattern of club convergence, while higher OECD countries appear to be experiencing a new phase of growth. This coincides with the initial phase of the wave of globalization that begun in the 1990's. Ten years later, in 1990 (Figure 6.2), all groups of countries are growing towards higher equilibriums, especially the non-OECD higher income group, which exhibits some divergence, but also the lowest income group. The full pattern is one of a sequence of transitions that begin with a divergent phase and then follow a convergent pattern that might exhibit club convergence or delayed entrance into later transitions.

Figure 7.1, a life expectancy phase diagram for the 1970 to 1980 decade across geographical regions, shows a typical transition pattern. However, the most advanced regions are converging towards higher levels of life expectancy. By 1995, though (Figure 7.2) Sub Saharan Africa had experienced a life expectancy disaster (due to HIV and war). It was now converging towards a life expectancy level of only 55 years. Meanwhile South Asia was experiencing a new spurt of transition in life expectancy.

A similar pattern occurred for the gross enrolment ratio. Figure 8.1 shows for the decade beginning in 1970 a convergent pattern for gross enrolment to levels of 0.8, except for divergence in Eastern Europe and Central Asia, and convergence to very low levels in South Asia. By the decade beginning 1995 (Figure 8.2) Western Europe and North America, East Europe and Central Asia, and Latin America and Caribbean have completed transition phases and are now converging to higher equilibriums. Meanwhile East Asia Pacific, Middle East and North Africa, and South Asia are entering transitional phases with lower initial levels.

Figure 8 shows Sub Saharan Africa's life expectancy evolution over the full period 1970-1995 in more detail. The decades beginning 1970, 1975 and 1980 show divergent transitional phases. 1985, 1990 and 1995 instead show convergent phases, towards lower levels of dispersion, but also to lower steady state levels falling to 53 years in 1990 and then rising to 55 in 1995. Some countries display 15 years loses in life expectancy in the decade beginning 1995.

3.3 Mean and dispersion of the main explanatory variables

We now conduct a descriptive analysis of our main explanatory variables. One of the motivations is to see whether these variables offer particularly striking instances of divergence or convergence. We consider the evolution of the mean and dispersion of urbanization, exports, imports, executive constraints and democracy in the same way as we did for the human development indicators.

Figure 9.1 shows a surprisingly intimate relation between urbanization and income levels. The trajectories of urbanization across lower and middle income groups form an almost perfectly integrated common trajectory of increasing means and standard deviations. Meanwhile, the higher income group also increased its urbanization rate, but at a lower level of dispersion

between countries, perhaps because urbanization started much longer ago in this group. The same pattern is shown when this data is examined across human development groups (Figure 9.2) except that the lower middle human development group had relatively higher levels of urbanization, and the higher human development group decreased its dispersion in urbanization. Mean urbanization across the 111 countries increased from 0.42 to 0.56, dispersion increasing slightly from 0.24 to 0.56.

Figures 10.1 and 10.2 shows a relation between income or human development levels and exports (as a proportion of income). Essentially, the dynamics correspond to the divergent phase of a long-term transition to higher levels of integration. However, looking at the trend lines, groups 1 and 3 are diverging faster, perhaps undergoing faster transitions. These groups of countries may be more intensely involved in globalization, representing the typical FDI partnership. Mean export rates across the 111 countries increased from 0.25 to 0.42, dispersion also increasing from 0.18 to 0.28.

Imports (Figures 11.1 and 11.2) show a similar pattern to exports. Mean import rates across all countries increased from 0.27 to 0.45, while dispersion increased from 0.16 to 0.25.

The main institutional variables we use are executive constraints and democracy from the Politi IV database. Figures 12.1 and 12.2 show the evolution of executive constraints. This follows a typical transitional pattern, with low mean and dispersion levels for low development, followed by increasing levels of both means and dispersions and then finally by a convergence trend toward high levels of executive constraints. The trajectories are not smooth and show quite a bit of variation. Mean executive constraints rises across the 111 countries from 3.33 to 5.25, the standard deviation increasing from 2.04 to 2.55.

A similar pattern of transition is found for democracy in Figures 13.1 and 13.2. From 1975 to 2005 the mean across the 111 countries rises from 1.89 to 3.58 and the standard deviation from 3.97 to 4.17.

In contrast to Acemoglu, Johnson and Robinson (2002, 2005), who propose that the critical feature of success in development had been the quality of the institutional framework inherited since colonial times, which they consider to be for all intents and purposes fixed across time, both executive constraints and democracy are clearly following a transition. Approximately three fourths of all countries are still in the divergent phase, with only the top fourth beginning to converge. It is illustrative to note that the case of literacy is the reverse: the bottom fourth is still in the divergent phase of the transition, while the top three fourths are in the convergent phase.

Summarizing, the main feature revealed by the descriptive analysis is that human development, as well as its determinants, follow a series of superposed transitions that first take off with increasing divergence and then converge to a higher equilibrium. This very fundamental feature of development is almost completely missing in most theoretical models on economic growth. It could be said that vicious cycles keep transitions from beginning. Once they begin, they are characterized by virtuous cycles that reach a higher equilibrium.

4. Decomposition of the convergence coefficient

The descriptive exploration has shown that the evolution of the HDI components is characterized by a complex pattern of convergence and divergence. It consists of a series of superposed transitions that first take off with increasing divergence and then converge, smoothly in some exceptional cases and exhibiting more complexity and turbulence in others. Also, a series of

events such as HIV, war, globalization, or regime changes in Eastern Europe and Central Asia, India, China, and so on, strongly affect the course of this evolution.

In what follows we carry out an econometric analysis to investigate whether some causal variables are particularly related to convergence or divergence.

4.1 Estimation

One way of investigating convergence and divergence is to introduce interaction terms in the convergence term in regressions on the rate of growth, of income for example. Here we extend this method, used for example in Aghion, Howitt and Mayer-Foulkes (2005), as follows.

I consider that utility is approximately linear in life expectancy, literacy and enrolment ratios, only per capita income needing to be considered as a logarithm. Thus in his section when we talk about HDI components log per capita income stands in place of per capita income.

The convergence decomposition estimates are the following. For each HDI component consider the convergence decomposition regression

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where index t over periods 1970, 1975, … , 2000 and index i ranges over 85 countries constituting a balanced panel (the explanatory variables do not cover the 111 countries). Here are the explanatory variables to be instrumented, including the HDI components. The convergence coefficient is decomposed as . It is necessary to include the independent terms so as not to introduce omitted variable bias. We include a very limited number of controls that are not interacted with the convergence term, specifically the AIDS dummy, and the physical geography variables landlocked, tropical and latitude. These are therefore

considered to have level but not growth effects[5]. are time period dummies[6]. u_{jt} are the stochastic terms. Finally are the coefficients.

These regressions are evaluated simultaneously using 3SLS, and individually using clustered errors. Explanatory variables are instrumented using the instruments listed in the data section. Exogenous variables of course intervene in the first stage regressions[7]. Inclusion of the quadratic interactions of the instruments is justified not only on the grounds mentioned above that the impacts of the various instruments can vary across geographic regions (these are also historical correlates), but also because the presence of the quadratic interaction terms of the independent variables calls for them. At the same time these interactions serve to augment the instrument set's dimension, allowing the simultaneous instrumentation of variables , each of which can be considered endogenous.

The only instruments providing variation across time are the period dummies. In a sense the panel estimates therefore provide an enriched cross section. For this reason it is to be expected that the error structure is clustered, showing correlation across time for each country. Clustered errors turn out to be the best estimates because the instrument set satisfies the Hausman and Sargan tests in this case. It also turns out that the 3SLS estimate results are not very different when the regressions for the HDI components are evaluated individually or simultaneously.

4.2 Results

[5] When the physical geography variables were interacted the 3SLS estimation did not converge.
[6] The quinquennial fixed effects can be thought to include the technological leading edge in the HDI component being evaluated (see Aghion, Howitt and Mayer-Foulkes, 2005).
[7] The AIDS dummy defines a contiguous region that approximately coincides with the region south of the 18th southern parallel in Africa. I consider that the social and geographic conditions that established this region as a contagion basin for AIDS already existed in 1970, and therefore consider the AIDS dummy to be exogenous.

For reference, Table 2 shows the results for the usual absolute convergence regressions using OLS, 3SLS and clustered error IV estimates. The instruments used are the full set of instruments. The results change considerably. While log GDP per capita is consistently divergent, the other HDI components appear to converge in the OLS case. However, only literacy is consistently convergent. Life expectancy becomes ambiguous when instrumented, while the IV clustered error estimates for gross enrolment ratio yields divergence.

Our results on absolute convergence/divergence are supported by diverse research. Results on income divergence and on life expectancy convergence turning to divergence were already mentioned above (Bloom, Canning & Sevilla, 2003b; Castellacci, 2006, 2008; Mayer-Foulkes, 2006; Moser, Shkolnikov & Leon, 2005; McMichael et al, 2004; Taylor, 2009; Ram, 2006; Edwards, 2010).

We turn now to the 3SLS and clustered error IV estimates. We examine whether the instrument set is weak in the sense that it is only indirectly related to the variables. Staiger & Stock (1997) develop an asymptotic distribution theory for instrumental variables regressions when the partial correlations between the instruments and the endogenous variables are close to zero. According to this study, F values above 10 obtained for the instrument sets in the first stage regressions imply acceptable modeling of the endogenous variables by the instruments. Table 3.1 shows that most of the independent variables achieve these levels of significance. Explanatory variables passing the weak instrument test are the HDI components themselves, urban, trade, executive constraints, democracy and population density. Only FDI inflows and outflows, rate of change of population density, inflation and risk premium have F values less than 10. These are not the main variables of interest and in any case their inclusion serves as controls for the other coefficients. Note however that confidence values obtained by these variables in the first stage

regressions are all better than 1.3% (Table 3.2), and that the correlation of these independent variables with the non-interacted, original instrument set is not that low. Table 4 shows risk premium has two and FDI inflows and inflation have three instruments with correlations above 0.10. FDI outflows and rate of change of population density have 10 such instruments.

Four sets of regressions were run for each of the 3SLS and clustered error IV methods. The first uses all of the variables. The next three in turn exclude democracy, executive constraints and urban. The reason is to examine the considerable interaction between these variables. Let us now examine the results of Hausman and Sargan tests[8] for each of these runs in Table 5. In the case of 3SLS, the Hausman test fails for log GDP per capita and life expectancy, while the Sargan test fails for literacy and gross enrolment ratios. In the case of clustered errors IV both tests are successful in every case, except the Sargan test when urban is excluded. This strengthens our result on the robustness of the overall significance of the urban variable.

Table 6 shows the coefficients of the 3SLS and IV clustered error convergence estimates with no independent variable excluded. As can be seen, there is a considerable variation in the pattern of significance and in the magnitude of the coefficients, implying that the biases introduced by error correlations are significant. The number of observations is 581 instead of 595 because trade data is missing for Cyprus, Jordan and Mauritius in 1970; Ethiopia, Mozambique and Panama in 1970 and 1975; Liberia in 1990 and Tanzania in 1970, 1975, 1980 and 1985.

Table 7 shows the signs and significance pattern of the interacted coefficients and the non-interacted control variables. (The significance of the linear terms for explanatory variables that also appear interacted is not too relevant on its own.) The fact that the regressions are fully

[8] The Hausman test first runs simultaneous OLS regressions instead of the simultaneous 3SLS regressions, and then an F test for the joint significance of the coefficients of the simultaneous OLS regression of these residuals on the full instrument set (including interacted terms). The Sargan test instead regresses the residuals of the simultaneous 3SLS regressions on the full instrument set and runs an F test on their joint significance. These tests are similarly applied to the individual clustered error IV regressions.

instrumented implies that the results are congruent with causal analysis. However, what really happening in the estimates is that a space of causes is being assigned according to correlation strengths. In so far as we believe that the set of independent variables do in fact proxy for causal factors, when a variable obtains significant coefficients this means it is significantly correlated with the causes, more significantly than other variables. While this may seem to be a weak causality statement, that is precisely what one means by statements such as “trade is an ultimate cause of economic growth”. This means that such processes as learning, technological change, competition, and so on are especially connected with trade, or “trade is significantly correlated with the causal factors of economic growth”. Similarly, urbanization is correlated with making living arrangements around modern production facilities and returns to scale or agglomeration externalities in education, health and production.

In this sense, log GDP per capita is a robust factor of convergence for all HDI components. This means that it has decreasing returns. Its highest growth impact is at low levels of the HDI components. Literacy, by contrast is a divergence factor for income (except when urban is excluded) and life expectancy. This means that below a certain threshold lack of literacy causes backwardness, and above that threshold it has increasing returns. Its results for literacy and gross enrolment ratios interact with democracy, executive constraints and urban. Gross enrolment ratio contributes to convergence in literacy. Urban is a robustly significant factor of divergence for all four HDI components. On the other hand, when it is omitted the significance pattern of the remaining variables is altered significantly, especially for income and enrolment rate but also for literacy and life expectancy. Trade only gives significant, divergent, results for the gross enrolment ratio. Executive constraints yield income convergence so long as democracy is included, and robust divergence in the case of literacy. Its omission alters results for

democracy and other variables. Democracy yields divergence in incomes so long as executive constraints are included, and divergence in enrolment ratios so long as urban is included. Its omission alters results for executive constraints and other variables. FDI inflows are a factor of convergence in literacy and enrolment ratios. FDI outflows are a factor of divergence in life expectancy and gross enrolment ratio and of convergence in literacy. Population density is a factor of divergence in life expectancy and convergence in enrolment rates. Population density growth is only significant when urban is excluded. Low risk premiums, (correcting for its negative quality by changing the signs) contribute to convergence in literacy and divergence in enrolment rates. Similarly, low inflation contributes to divergence in life expectancy, literacy and enrolment rates.

Turning to non-interacted controls, AIDS decreases life expectancy and increases GDP per capita (through mortality). Landlocked reduces income and life expectancy somewhat significantly, when no variables are omitted. Tropical reduces GDP and literacy. Latitude increases income, life expectancy and literacy but reduces the enrolment ratio.

The results depend considerably on the set of independent variables. Nevertheless, one noteworthy result is that the correlation of urbanization with causal factors of economic and human development is robustly significant, and has increasing returns.

5. Quantile regressions

As mentioned in the discussion on divergence and convergence, we are interested in knowing what impact different variables have on economic performance at different levels of income. A quantile regression is therefore attractive. However, to choose the quantiles according to the levels of the human development components, it is necessary for these variables also to be the

dependent variables. This is possible if we conduct a levels rather than growth estimate. Also, we need to instrument the independent variables so that we can estimate each of the components in terms of the others as well as all of the independent variables. The quantile levels we consider are 0.1 to 0.9. We include the time dummies only as instruments and not as controls because the quantile regressions do not converge when they are included, there probably are already too many constants in the estimates, one for each quantile level. Explanatory variables $\mathbf{X}_t$ are substituted with their predicted values from the first stage of instrumental equations before running the quantile estimates[9].

5.1 Results

The results are shown in Tables 8.1 to 8.4. There are many significant results and they vary considerably at different quantiles. We examine the results graphically in Figures 14.1 to 14.4. To do so we plot the coefficients with a higher t value than 1.96 (corresponding to a significance of approximately 5%) multiplied by one standard deviation. This measures the impact of a change of one standard deviation on the target HDI component.

This exercise does not include the physical geography variables, which are not subject to policy. However, these variables obtained significant results. Latitude was positive when significant for income and life expectancy, and negative for literacy. It was not significant for enrolment ratios. Latitude may be embodying omitted variables in technology, colonial history, and so on. Landlocked was positive when significant for income, mostly negative for life

[9] All of the estimates were carried out with Stata. Each quantile regression was carried out separately. Fifty weighted least-squares iterations were estimated before the linear programming iterations were started.

expectancy, positive for literacy and negative for enrolment ratios, in somewhat surprising results. Tropical was negative when significant for income, life expectancy, and enrolment ratios, and positive for literacy. Next come literacy and executive constraints, exhibiting decreasing impact with income level. Democracy, FDI inflows and inflation appear with negative signs.

Figure 14.1 shows the quantile results for income. The variables with most impact are life expectancy and urbanization. Interestingly, life expectancy is not only affecting lower but also higher income levels. Work on the impact of health on income has previously emphasized the impact of health at lower income levels (for a summary see Bloom & Canning, 2008). The impacts at higher income levels may be related to transitions in the last 20 years. In contrast, urbanization affects middle income levels more strongly, making it a development tool for a wide range of underdeveloped countries.

Figure 14.2 shows the results for life expectancy. Literacy, democracy, income, urbanization, trade, population and FDI inflows have a positive impact, while executive constraints, population growth, FDI outflows, and risk premium have a negative impact. The indicators exhibit a high degree of significance and all of the signs are the expected signs except perhaps for executive constraints. While some indicators show decreasing returns, others peak at medium high levels of life expectancy, such as urbanization, yet others at the top levels, such as enrolment ratios.

Figure 14.3 shows the results for literacy. Enrolment ratio, life expectancy, FDI outflows, and executive constraints are the variables with the most consistent positive impact. Democracy, urbanization, trade (for lower levels of literacy) and population growth are the variables with the most consistent negative impact.

Figure 14.4 shows the results for enrolment ratios. Literacy (for all levels of enrolment), urbanization and GDP (at lower levels of enrolment), democracy, population and trade (at intermediate levels), life expectancy, FDI outflows and population growth (for higher levels), are significant.

6. Discussion

6.1 The most significant results

What have we learned from our analysis? We can start by comparing the results of the two sets of estimates. Note that the convergence coefficients represent the marginal growth and the quantile estimates the marginal level that each independent variable can provide for each HDI component. Table 9 represents the signs and significance of the main coefficients in both sets of estimates. In the case of the convergence estimates the preferred run is the clustered error IV, with no variable omitted. Our significance measure is the sum of the number of significance stars obtained by each variable for each sign. This measure is closely correlated with just counting the number of times a variable is significant in each sign. In the case of quantile regression coefficients, we count the number of quantiles each variable was significant for, for each sign.

We comment on the explanatory variables in the order of their total significance scores. Urbanization is the most significant. While it has some negative level effects, it has consistently increasing returns to growth (of HDI components). Literacy is always positive for levels and also has consistently increasing returns to growth. Income is equally significant, always positive in levels but always has decreasing returns to growth. Next is democracy, with positive and negative impact levels, but increasing returns to growth. Executive constraints follows, equally

ambiguous in levels, but with some increasing and some decreasing returns to growth. Then comes life expectancy, always positive in levels, but with decreasing returns, like income. Trade is as significant as life expectancy, ambiguous in levels but with increasing returns. Low inflation has ambiguous level effects but increasing returns. FDI inflows also has ambiguous level effects but instead decreasing returns. Then come FDI outflows, population density and its growth, with ambiguous level and growth effects, although FDI outflows stands out for increasing returns.

In order of significance, urbanization, low inflation, FDI outflows, literacy and democracy stand out for their *increasing returns to HDI component growth*. This is an aspect of growth that the prevalent emphasis on convergence has missed studying. Similarly literacy, urbanization, life expectancy, income and trade, in that order, stand out for their positive contributions to *levels* of the HDI components.

There are several salient results. First is the consistent significance of urban proportion of the population. It affects income, literacy and gross enrolment ratio. All of its signs are positive and the magnitudes significant except for the literacy quantile estimate. This may be a reflection of migrant poverty. Given the consistent impact of cities, it is surprising that they do not impact life expectancy significantly. Perhaps they have significant positive and negative effects.

Once one thinks about it, it is quite reasonable that cities play an important role in development, given that modern technologies and life are mainly city based. The reason the result is a surprise is that cities do not figure very much in development analysis or policy.

Another surprise is that trade does not significantly impact income. It does significantly affect life expectancy levels. This may work through increasing the availability of myriad cheap technologies to improve health, as well as cheap food. It may also complement knowledge

channels significantly associated here with life expectancy, such as literacy and gross enrolment ratio. Trade is also significantly associated with the gross enrolment ratio and its growth.

Low inflation is positively associated with income levels and yields increasing returns in the other HDI components.

As far as the set of exogenous variables are concerned, which include the "ultimate causes of growth," economic geography yields far more significant impacts than trade, FDI or institutions. This kind of geographic variable is not the kind of physical geography, exogenous variable that is included in ultimate causes. Instead, it refers to an important economic feature that is not well coordinated by the market system.

While globalization has had large impacts, see for example Figure 14 showing how income divergence (or dispersion) peaks in 1990, its main features, trade and FDI, have not had the impact on the HDI components that might have been expected, according to the significance patterns found here.

Another salient result is the ambiguity of the signs obtained by several important explanatory variables across HDI components. This raises important questions. Why do executive constraints, democracy, trade and FDI inflows and outflows and low inflation have such mixed impacts? Are there issues of distribution that muddy the impacts of these institutional, openness and macro management variables? The answer to this question might yield very productive insights.

6.2 Towards objectivity

The modern theory of economic growth began with the neoclassical growth model, in some sense a paradigm for the belief that markets are sufficient, or at least almost sufficient to direct

economic growth. The model assumes that competitive markets will allocate resources in such a way as to produce optimal economic growth and economic convergence. Because much of international economic life does in fact occur through markets, in evaluating cross-country growth the model serves as a benchmark to see whether in fact the model explains growth, or if not, what is going wrong.

For example, Grier and Grier (2007) note that to be consistent with the absolute divergence in output levels – which they corroborate is occurring – it would be necessary to observe divergence in some of the determinants of income, such as physical and human capital, which they do not observe. However, they do observe divergence in technological levels. So this is the first point – markets might not distribute technology optimally.

The neoclassical growth model can fail in two ways. If markets are a sufficient in principle, then deficiencies might originate in the context that defines them – institutions, (physical) geography and trade, this last being a basic policy choice. A considerable literature on economic growth focuses on these types of causes as the fundamental causes of long-term growth. Recently institutions seem to be the favorite of these causes (Rodrik and Subramanian, 2003; Rodrik, Subramanian and Trebbi, 2004).

Alternatively, markets are insufficient for regulating and coordinating substantial classes of economic problems. For example, human capital investment is characterized by market failures. Technology is based on market power. Urbanization is based on externalities. In addition, public goods may be important. When such issues are strong enough, deficient market equilibriums may arise, corresponding to persistent poverty. The lower equilibriums constitute, by definition, traps that markets cannot dissolve.

Convergence and divergence are linked with these two possibilities. When markets drive growth, convergence forces drive towards a new equilibrium. When markets are insufficient, bottlenecks arise that slow growth and generate divergence between countries. When and if the bottlenecks are overcome a transition emerges to an at least somewhat higher equilibrium.

Our descriptive study shows that development consists of a series of such superposed transitions that first take off with increasing divergence and then converge to a higher equilibrium. The paradigm of smooth growth is inconsistent with the facts.

The point is that the paradigm is deceptive. The reason is that conceptualizing growth as a smooth process makes it appear that it is susceptible to uniform policies. When a transition is ripe, it has increasing returns. When it is not, it may be impossible.

Miracle growth, which ought to be the objective of development policy, is a transition from a low to a high steady state (see Wan's 2004 case histories of East Asia) involving transitions in production and in all aspects of economic life. It is not a simple, smooth process.

Markets will often bump into transitions on their own and carry them forward. However, some transitions need public inputs and institutions. Aid programs in particular must recognize which the relevant transitions are.

It is worth noting here that, at least conceptually, institutions fall into two kinds, those that simply establish the market system, and those that play an additional economic, political or social role. Providing public goods is not the least such role! *Objectively*, what types of institutions are needed when?

It is of course possible that the market structure itself is impeded, creating a bottleneck, but not all bottlenecks are solvable through markets. On the contrary, these barriers have traditionally been the direct concern of public policy. The point is to let markets do what they do

well and complement what they do not. Western society has done this throughout its capitalist history (with all the struggles this involves).

The discussion of convergence has tended to link with a radical defense of the neoclassical growth model. However, what is needed is *objectivity*. When do markets carry forward the growth process, and when do they not? What are the best ways to trigger the transitions that are essential to development process? It is clear that well functioning markets are a part of this, but claiming they are the whole throws the baby out with the bathwater.

Our convergence decomposition is a step towards objectivity. It shows that some variables contribute to convergence and others to divergence. In turn, the quantile estimates show that different variables are important at different levels of development. Moreover, several of the crucial variables are not particularly well driven by the market, such as urbanization, life expectancy, literacy and democracy.

6.3 Urbanization as an intermediate objective for development

Urbanization can be a particularly interesting intermediate objective for development for several reasons. First, it is necessary. It is part of the development path. Perhaps given modern technologies this includes making urban quality and externalities available to rural life. It certainly means bringing quality to urban life. Many things go into organizing cities well, such as transportation, provision of health and education, assigning areas for living and for industry and services, and so on. It requires political and social organization. Also, each city in each context will call for particular improvement objectives. These are all elements of a program of development. On the other hand they are concrete. A way must also be found for markets to determine some of the choices within some framework. Traditionally in underdeveloped

countries what has happened is that urbanization has proceeded in a disorganized way that turns out to be very costly, governments following behind the facts.

In so far as urbanization has been important, it is not mainly making markets work better that has achieved growth. Instead, it has been achieving the kind of social coordination that is successful at creating cities that has obtained additional growth, *together* with the coordination that markets can provide. The importance of this coordination and its institutional aspects is illustrated by the interaction we have shown exists between the variables urban, democracy and executive constraints.

7. Conclusions

Our descriptive analysis and estimates show that economic growth and development follow a complex pattern of divergence and convergence. This can be thought to consist of a series of superposed transitions that first take off with increasing divergence (and increasing returns) and then converge.

Each human development component follows its own set of transitions. These are also interlinked, in different ways at different stages. The estimates confirm the complex relations in divergence and convergence that exist in these indicators.

Our estimates include indicators of the "ultimate causes of economic growth," institutions, trade and physical geography. They also include an indicator in economic geography, proportion of the urban population. The descriptive analysis has found evidence of divergence in the evolution of urbanization, exports and imports (Figures 9, 10, 11). It also found strong evidence that executive constraints and democracy follow an endogenous –if more complex– transition analogous to other variables such as literacy (Figures 1, 12, 13).

The results show that economic geography is more significant to economic and human development than either trade or the market-institutional indicators (executive constraints, risk premium and inflation), and that, as any variable contributing to divergence, has increasing returns to growth.

There is also evidence that institutional and openness variables such as democracy and executive constraints, trade and FDI inflows, have both significantly positive and significantly negative impacts. Perhaps this is due to their distributive effects. It may be that policies for institutional improvement and openness could be more effective if their interactions with distribution were addressed.

Meanwhile, improving markets will have smaller returns than complementing them with adequate institutions capable of coordinating urbanization and investing in human capital and technology. Urbanization itself can provide a concrete agenda for development addressing critical local issues involving all aspects of economic, political and social life as well as human development.

The neoclassical growth paradigm is wrong in another way as well. Economic development is not a smooth process. Growth policies depend for their success in identifying a set of transitions that a country is ripe for.

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Figure 1 Evolution of mean and standard deviation of literacy across country groups

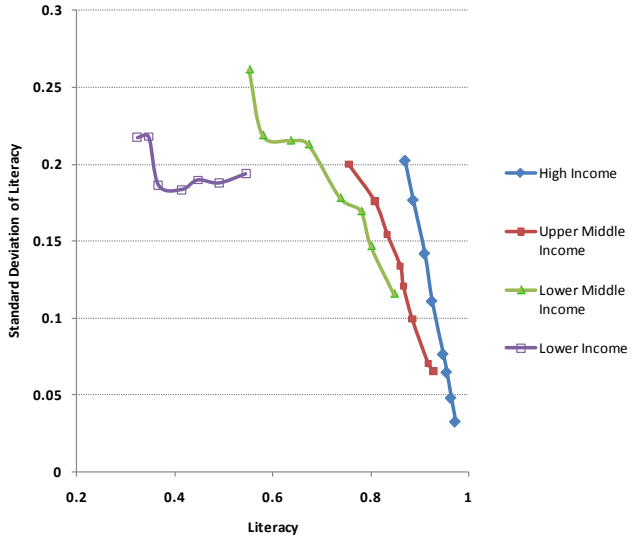


Figure 1.1 Across income groups

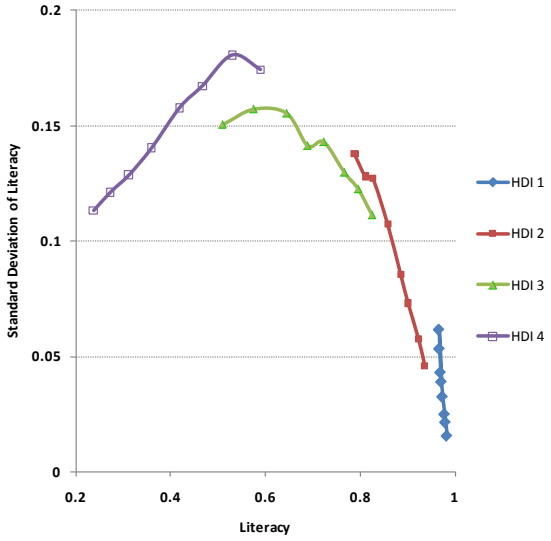


Figure 1.2 Across human development groups

Figure 2 Evolution of mean and standard deviation of log GDP per capita across country groups

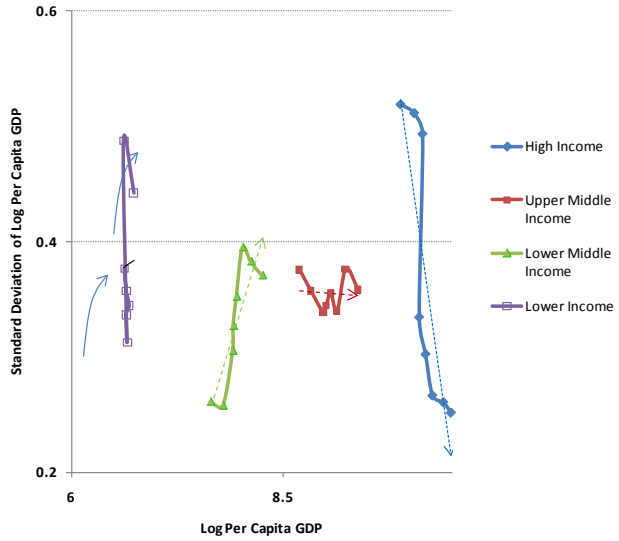


Figure 2.1 Across income groups

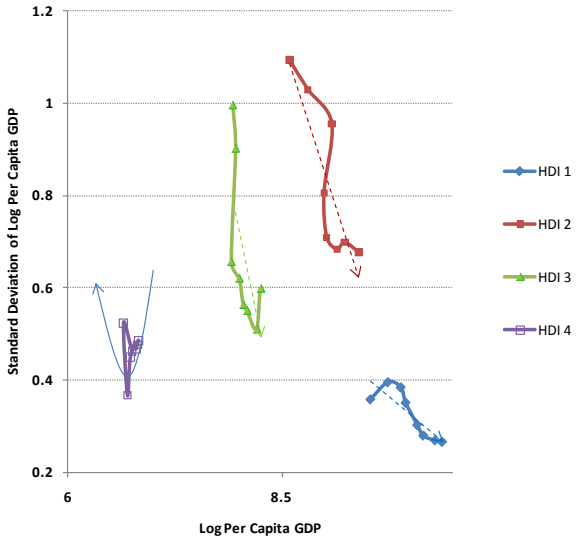


Figure 2.2 Across human development groups

Figure 3 Evolution of mean and standard deviation of life expectancy across country groups

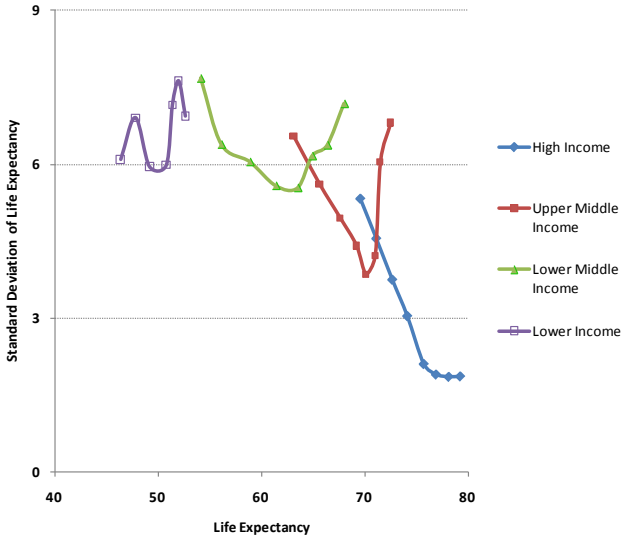


Figure 3.1 Across income groups

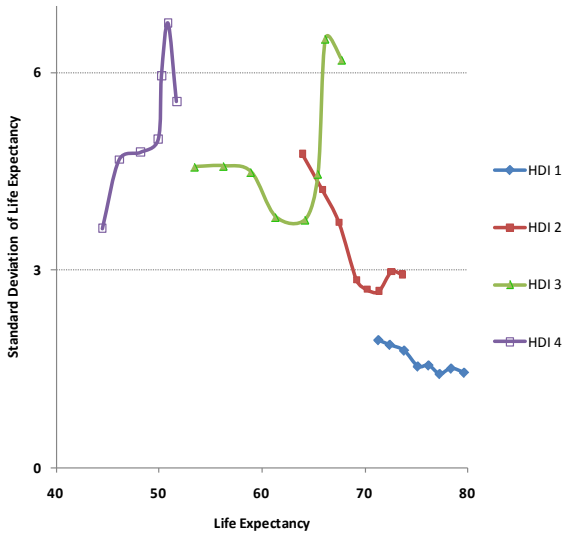


Figure 3.2 Across human development groups

Figure 4 Evolution of mean and standard deviation of gross enrolment rates across country groups

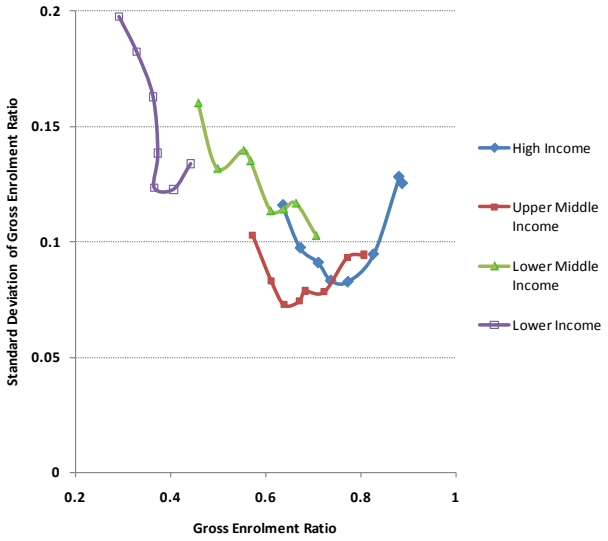


Figure 4.1 Across income groups

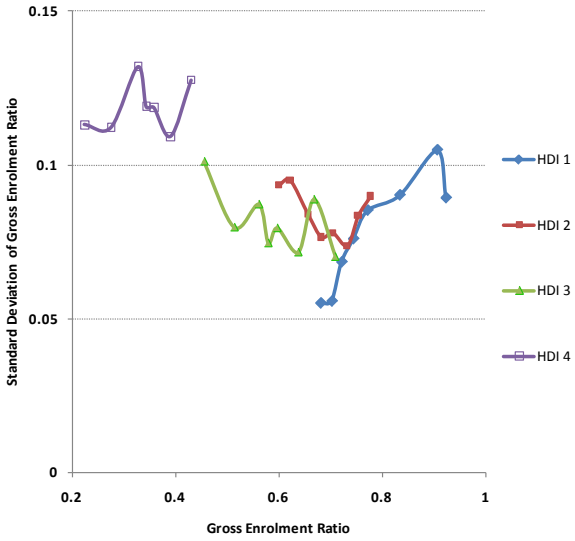
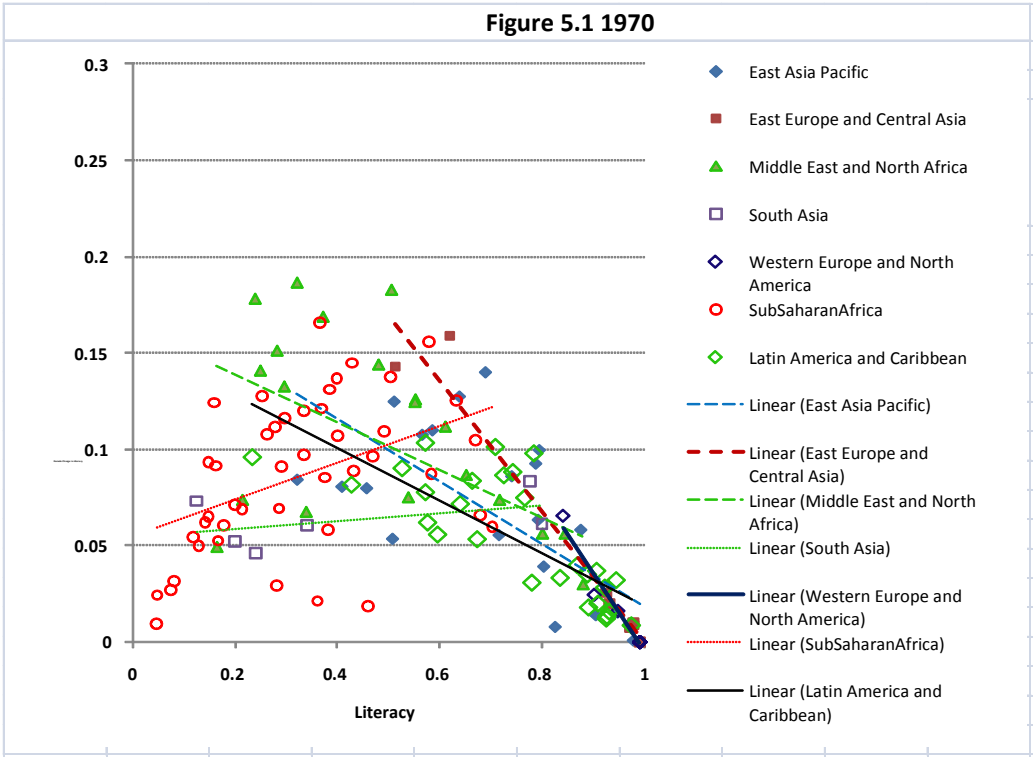


Figure 4.2 Across human development groups

Figure 5 Decade phase diagrams for the evolution of literacy across regions in 1970 and 1995



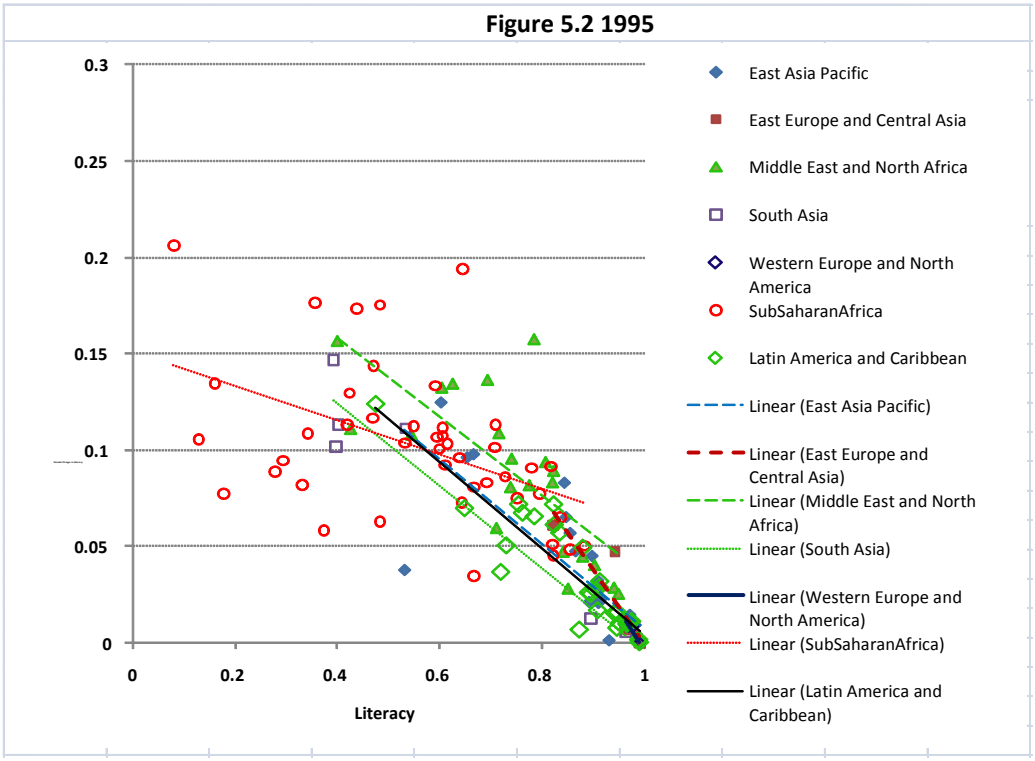
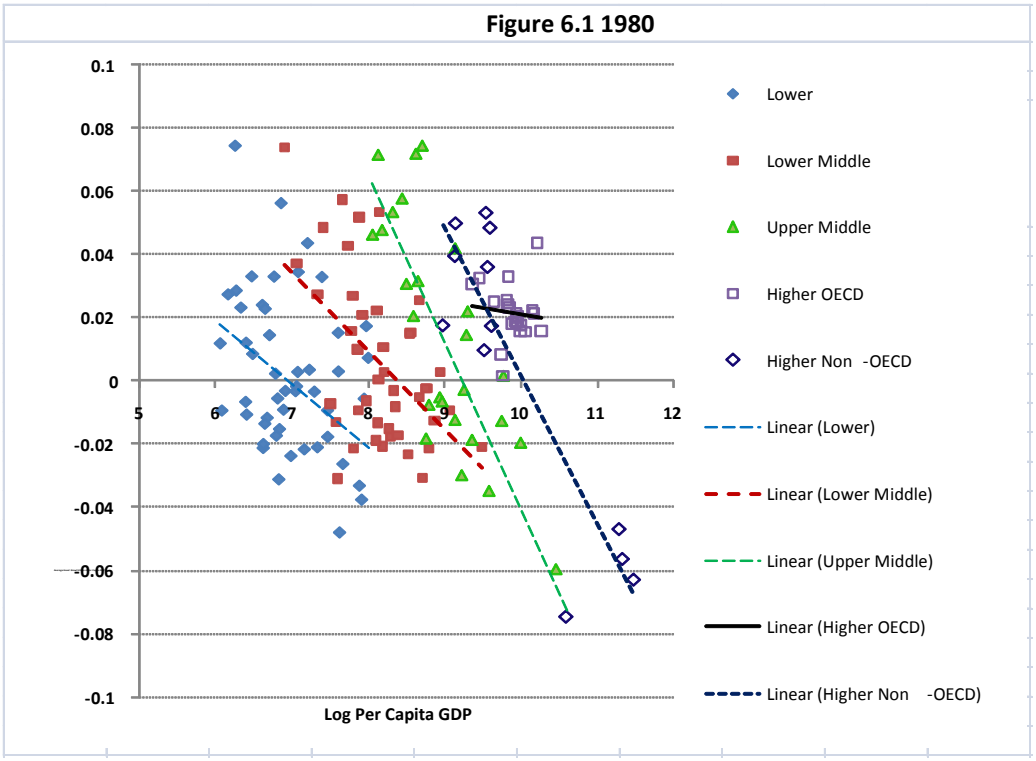


Figure 6. Decade phase diagram for the evolution of log per capita income across income groups in 1980 and 1990



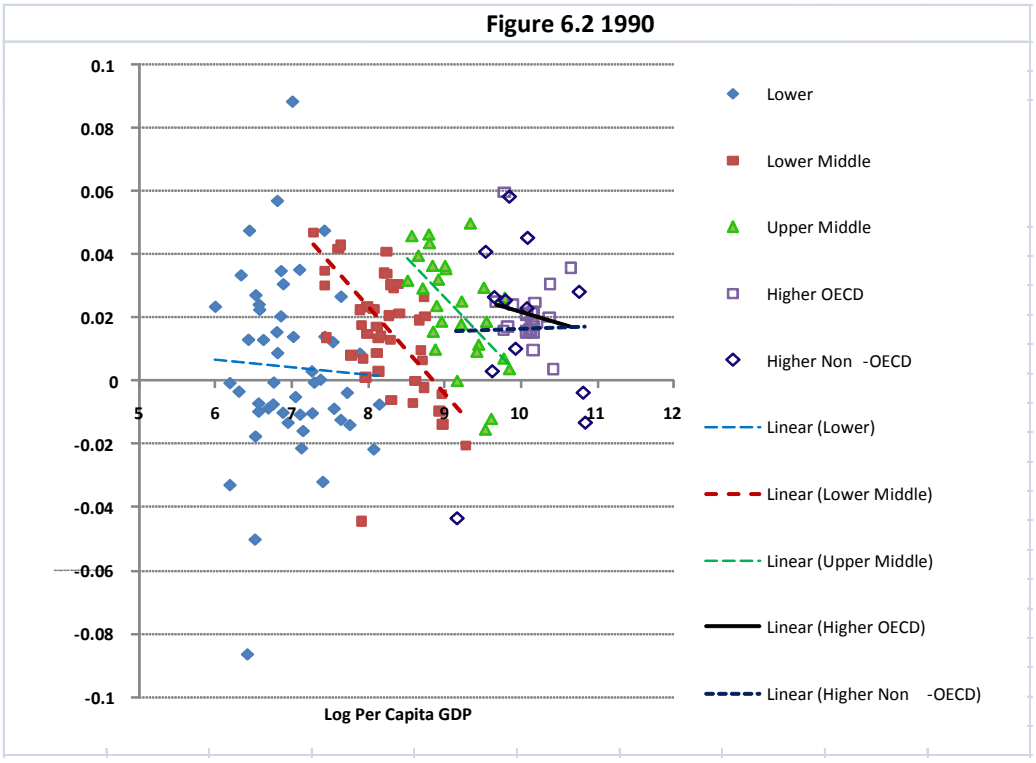
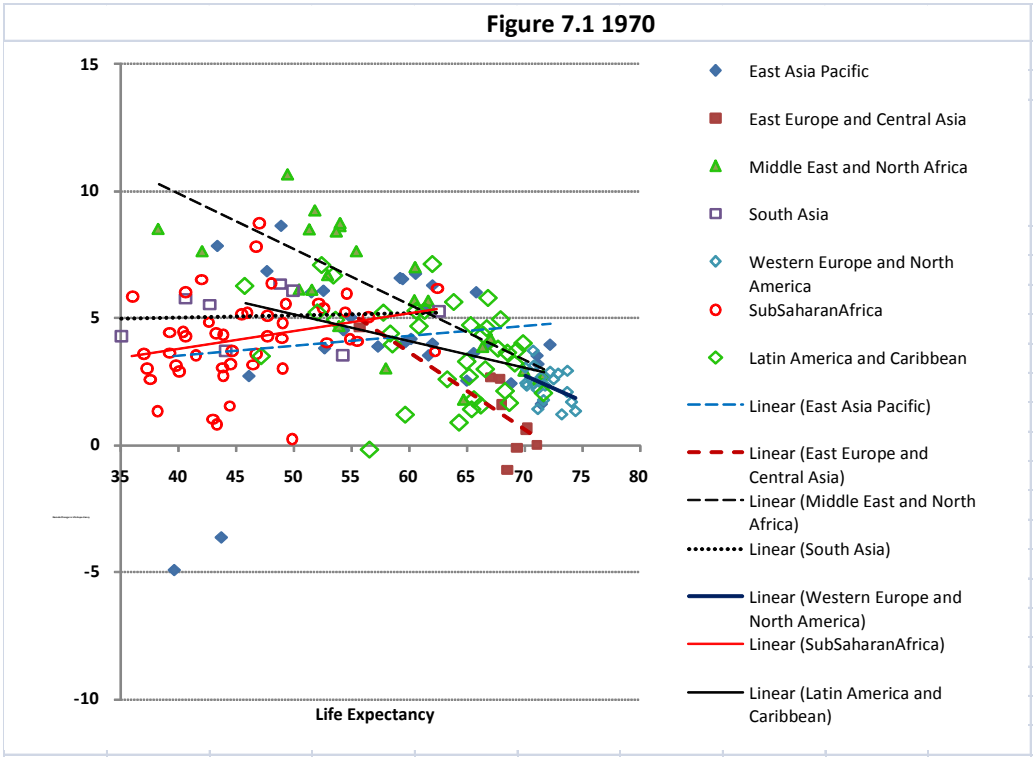


Figure 7 Decade phase diagrams for the evolution of life expectancy across regions in 1970 and 1995



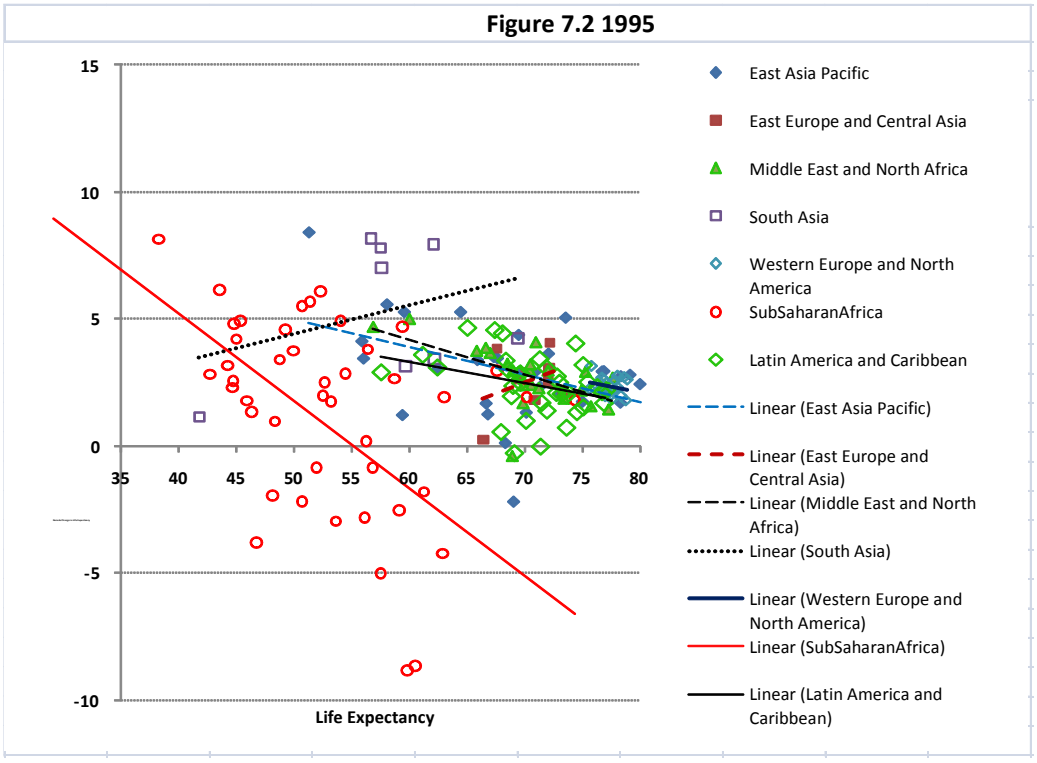
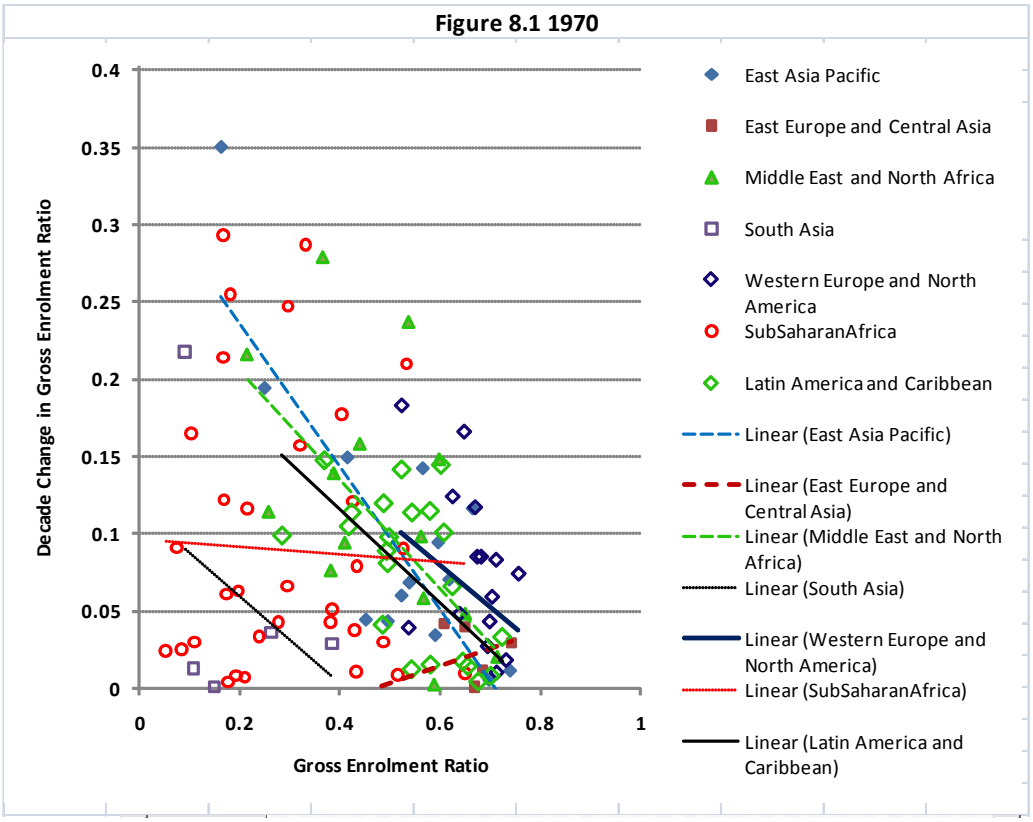


Figure 8. Decade phase diagram for the evolution of gross enrolment ratio across income regions in 1970 and 1995



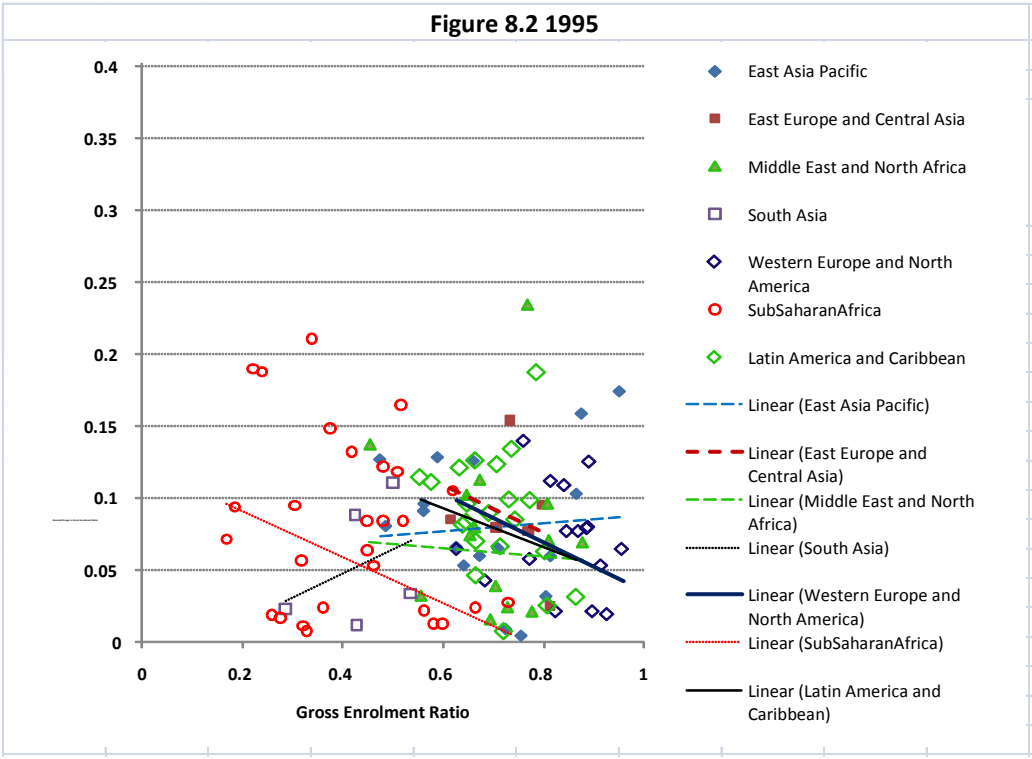


Figure 8 Decade phase diagram for the evolution of life expectancy in Sub Saharan Africa from 1970 to 1995

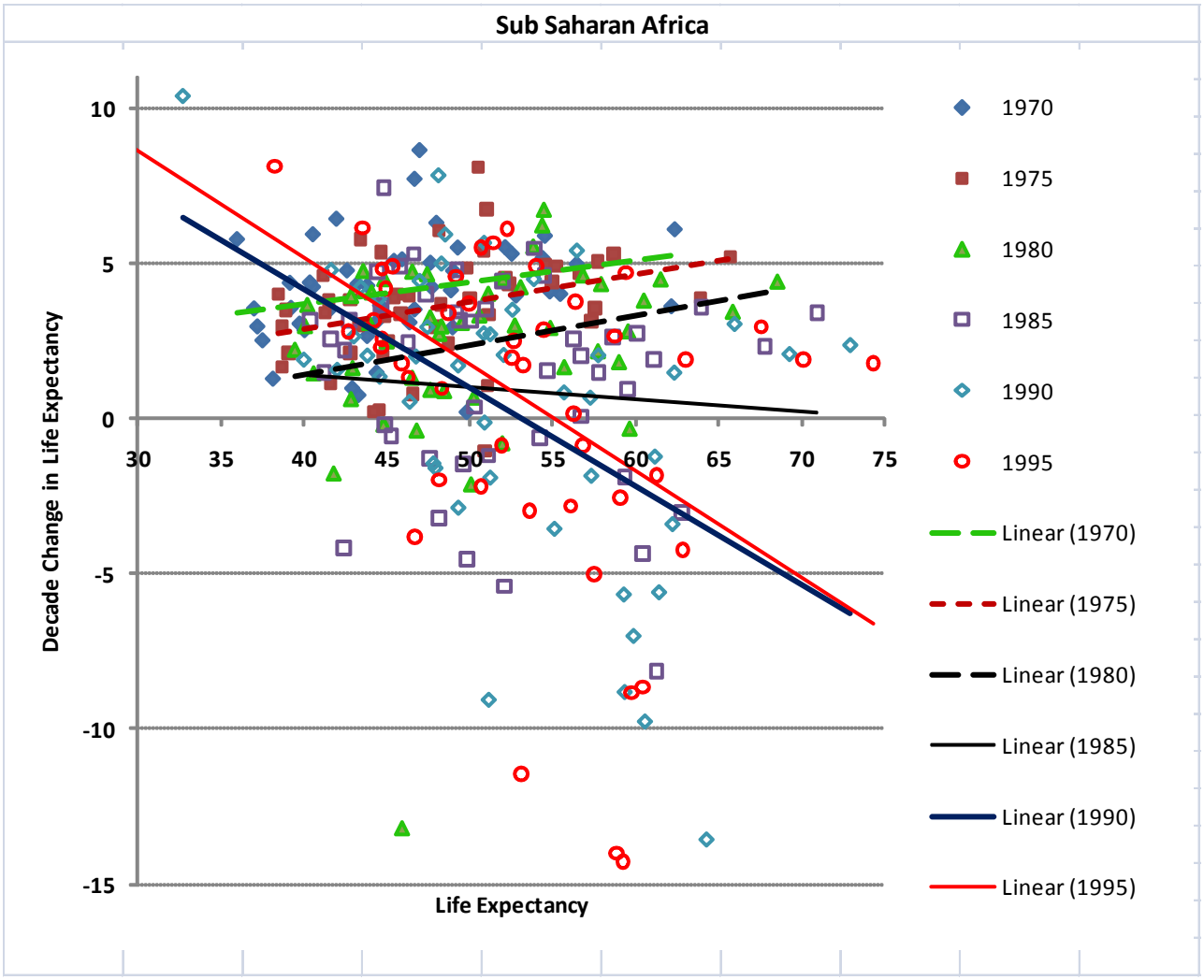


Figure 9 Evolution of mean and standard deviation of urbanization across country groups

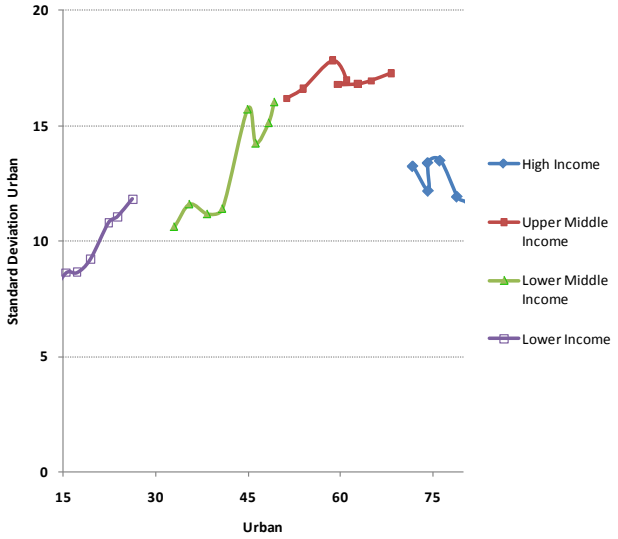


Figure 9.1 Across income groups

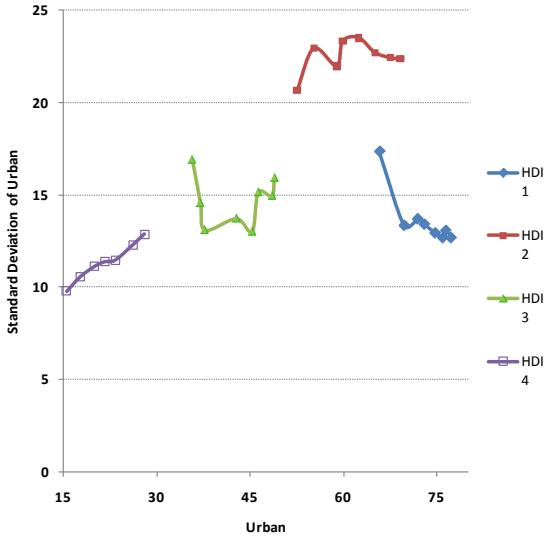


Figure 9.2 Across human development groups

Figure 10 Evolution of mean and standard deviation of exports across country groups

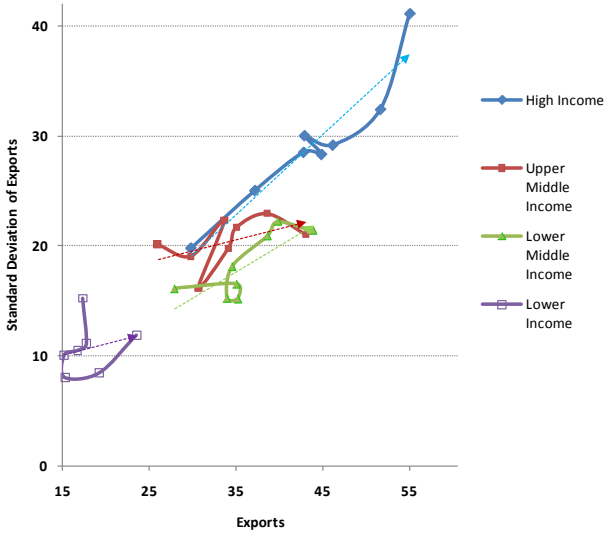


Figure 10.1 Across income groups

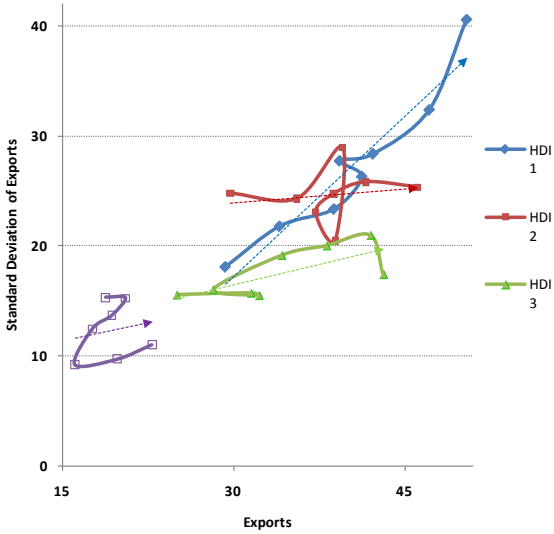


Figure 10.2 Across human development groups

Figure 11 Evolution of mean and standard deviation of imports across country groups

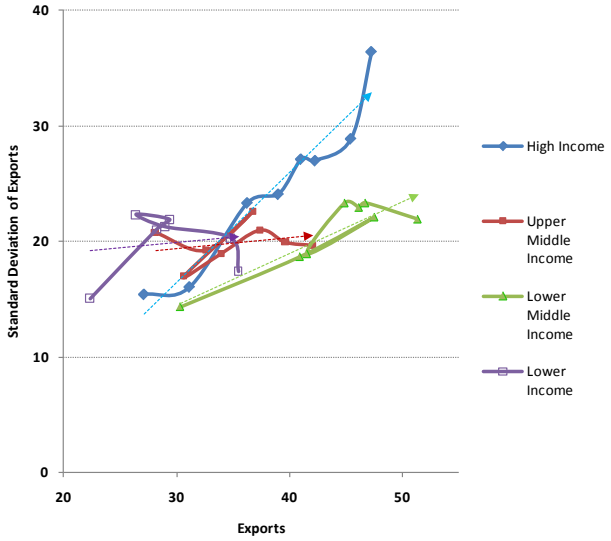


Figure 11.1 Across income groups

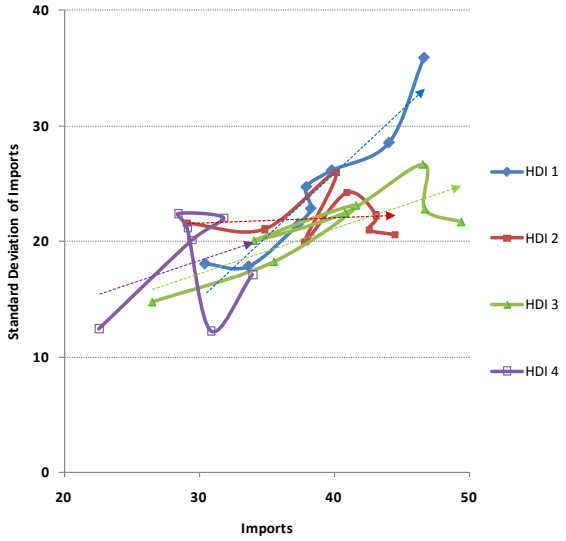


Figure 11.2 Across human development groups

Figure 12 Evolution of mean and standard deviation of executive constraints across country groups

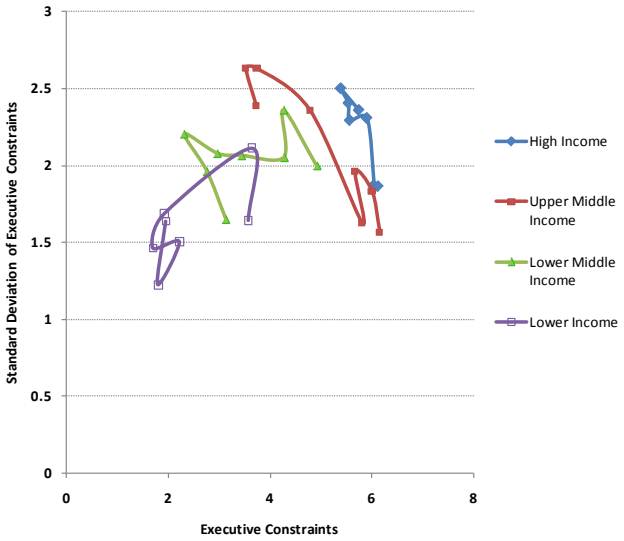


Figure 12.1 Across income groups

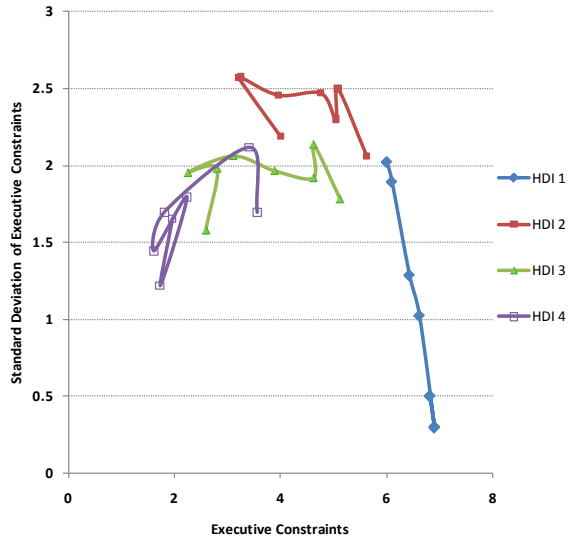


Figure 12.2 Across human development groups

Figure 13 Evolution of mean and standard deviation of democracy across country groups

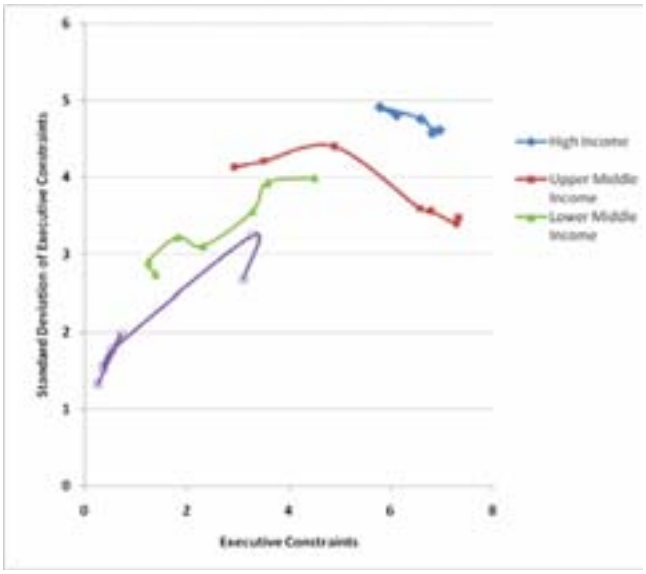


Figure 13.1 Across income groups

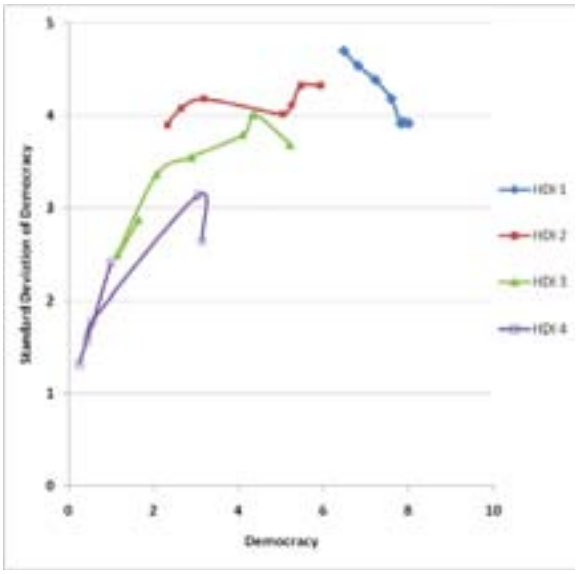


Figure 13.2 Across human development groups

Table 1. Descriptive Statistics for the Variables

Over the 595 Observation Sample

Variable	Mean	Std. Dev.	Minimum	Maximum
Log GDP capita	8.36	1.29	5.02	11.40
Life Expectancy	62.66	11.43	29.11	81.38
Literacy	0.69	0.28	0.05	0.99
Gross Enrolment Ratio	0.57	0.21	0.05	1.15
Urban	47.83	24.30	2.47	98.20
Trade	61.43	33.56	8.06	222.26
Executive Constraint	3.95	2.63	0	7
Democracy	3.86	4.31	0	10
FDI inflows	1.58	2.89	-5.50	33.51
FDI outflows	0.41	1.27	-2.72	12.47
Pop Density (Agr)	-2.09	1.29	-5.93	0.99
Δ Pop Density (Agr)	0.02	0.01	-0.08	0.15
Inflation	28.38	169.25	-3.46	2719.50
Risk Premium	2.08	10.95	-1.80	245.23
AIDS Dummy	0.04	0.20	0	1
Landlocked	0.19	0.39	0	1
Tropical	0.54	0.50	0	1
Latitude	14.09	25.92	-36.89	63.89
area (sq. km.)	898,753	1,832,343	430	9,160,736
Malaria Ecology Available	0.95	0.21	0	1
Malaria Ecology	4.29	7.58	0	31.55
Ethnic Fractionalization 1960	41.9	30.3	0	93.0
British Legal Origin	0.33	0.47	0	1
French Legal Origin	0.56	0.50	0	1
German Legal Origin	0.05	0.21	0	1
Scandinavian Legal Origin	0.06	0.24	0	1
East Asia Pacific	0.09	0.29	0	1
East Europe and Central Asia	0.01	0.11	0	1
Middle East and North Africa	0.12	0.32	0	1
South Asia	0.02	0.15	0	1
Western Europe	0.16	0.37	0	1
North America	0.02	0.15	0	1
Sub Saharan Africa	0.33	0.47	0	1
Latin America and Caribbean	0.24	0.42	0	1

Table 2. Absolute Convergence Regressions

1970-2005

	Log GDP per Capita	Life Expectancy	Literacy	Gross Enrolment Ratio
		OLS		
Initial Value	0.00320***	-0.00251**	-0.0119***	-0.00338**
	(0.00107)	(0.00120)	(0.000641)	(0.00166)
Constant	-0.0130	0.443***	0.0143***	0.00898***
	(0.00902)	(0.0764)	(0.000477)	(0.00101)
Observations	595	595	595	595
R-squared	0.015	0.007	0.369	0.007
		3SLS		
Initial Value	0.00526***	-0.000145	-0.0129***	0.000946
	(0.00113)	(0.00128)	(0.000676)	(0.00182)
Constant	-0.0302***	0.295***	0.0150***	0.00650***
	(0.00955)	(0.0812)	(0.000500)	(0.00110)
Observations	595	595	595	595
R-squared	0.009	0.001	0.366	-0.004
		IV Clustered		
Initial Value	0.00564***	-5.67e-05	-0.0139***	0.00134*
	(0.000242)	(0.000568)	(0.000292)	(0.000700)
Constant	-0.0336***	0.288***	0.0158***	0.00620***
	(0.00242)	(0.0413)	(0.000219)	(0.000479)
Observations	595	595	595	595
R-squared	0.006	0.000	0.358	

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3.1 F Statistic for Instrument Significance in First Stage Regressions

	Independent variable													
Interacted with	**Log GDP capita**	**Life Expectancy**	**Literacy**	**Gross Enrolment Ratio**	**Urban**	**Trade**	**Executive Constraint**	**Democracy**	**FDI inflows**	**FDI outflows**	**Pop Density (Agr)**	**D Pop Density (Agr)**	**Inflation**	**Risk Premium**
None	80.61	103.60	119.66	71.63	156.74	22.41	15.46	12.31	3.51	6.01	90.81	3.31	1.48	1.55
Log GDP per Capita	74.19	121.26	164.02	97.68	134.12	25.93	22.92	15.18	3.50	5.90	88.33	3.07	1.45	1.60
Life Expectancy	121.26	111.23	159.50	96.08	153.92	26.08	22.50	14.71	3.31	5.86	72.47	2.96	1.45	1.61
Literacy	164.02	159.50	133.11	135.26	166.99	31.20	28.85	15.63	3.25	6.23	66.18	3.12	1.45	1.62
Gross Enrolment Ratio	97.68	96.08	135.26	48.11	127.12	26.04	25.89	15.43	2.72	5.02	56.19	3.42	1.46	1.58

Table 3.2 P Values for Instrument Significance in First Stage Regressions

	Independent variable													
Interacted with	**Log GDP capita**	**Life Expectancy**	**Literacy**	**Gross Enrolment Ratio**	**Urban**	**Trade**	**Executive Constraint**	**Democracy**	**FDI inflows**	**FDI outflows**	**Pop Density (Agr)**	**Δ Pop Density (Agr)**	**Inflation**	**Risk Premium**
None	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.004
Log GDP per Capita	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.002
Life Expectancy	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.002
Literacy	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.002
Gross Enrolment Ratio	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003

Table 4. Correlation of Independent Variables with Instruments

Over the 595 Observation Sample

	Log GDP capita	Life Expectancy	Literacy	Gross Enrolment Ratio	Urban	Trade	Executive Constraint	Democracy	FDI inflows	FDI outflows	Pop Density (Agr)	Δ Pop Density (Agr)	Inflation	Risk Premium
AIDS Dummy	-0.16	-0.18	-0.07	-0.03	-0.15	0.10	0.01	0.01	0.13	-0.05	-0.19	0.05	-0.01	0.02
Landlocked	-0.39	-0.44	-0.36	-0.39	-0.44	-0.06	-0.15	-0.14	-0.05	-0.06	-0.23	0.09	0.02	0.00
Tropical	-0.63	-0.59	-0.45	-0.53	-0.60	0.07	-0.35	-0.33	0.07	-0.30	-0.20	0.19	0.05	-0.03
Latitude	0.47	0.41	0.24	0.27	0.29	0.05	0.16	0.18	-0.08	0.33	0.38	-0.16	-0.14	-0.02
Area (sq. km.)	0.18	0.11	0.12	0.17	0.23	-0.33	0.16	0.15	-0.05	0.03	-0.14	-0.03	0.12	0.04
Malaria Ecology Available	-0.11	-0.04	-0.05	-0.07	0.08	-0.18	0.09	0.09	-0.08	0.06	-0.09	0.01	0.03	0.00
Malaria Ecology	-0.58	-0.62	-0.67	-0.66	-0.47	-0.09	-0.34	-0.32	-0.02	-0.16	-0.28	0.18	-0.04	-0.06
Ethnic Fractionalization 1960	-0.51	-0.56	-0.51	-0.49	-0.48	-0.08	-0.23	-0.26	0.02	-0.17	-0.28	0.24	0.00	-0.02
British Legal Origin	-0.07	-0.05	0.05	0.02	-0.18	0.21	0.10	0.06	0.21	-0.01	0.00	0.01	-0.06	0.13
French Legal Origin	-0.20	-0.19	-0.28	-0.23	-0.03	-0.20	-0.25	-0.21	-0.15	-0.15	-0.14	0.12	0.08	-0.10
German Legal Origin	0.25	0.22	0.23	0.19	0.14	-0.04	0.19	0.17	-0.08	0.11	0.32	-0.08	-0.03	-0.03
Scandinavian Legal Origin	0.33	0.29	0.27	0.29	0.30	0.04	0.15	0.17	-0.02	0.25	0.01	-0.19	-0.03	-0.02
East Asia Pacific	0.10	0.17	0.23	0.19	0.09	-0.02	0.12	0.10	0.00	-0.02	0.30	-0.07	-0.04	-0.01
East Europe and Central Asia	0.04	0.00	0.01	-0.02	0.02	-0.10	0.08	0.06	-0.05	-0.03	0.00	0.00	0.01	-0.02
Middle East and North Africa	0.16	0.13	-0.08	0.07	0.17	0.06	-0.10	-0.12	-0.09	-0.08	0.16	0.10	-0.03	0.10
South Asia	-0.20	-0.13	-0.19	-0.13	-0.21	-0.17	0.08	0.03	-0.08	-0.05	0.15	0.05	-0.02	0.01
Western Europe	0.55	0.50	0.46	0.42	0.43	0.10	0.30	0.34	0.03	0.48	0.17	-0.28	-0.06	-0.04
North America	0.22	0.17	0.17	0.21	0.18	-0.11	0.18	0.17	-0.01	0.10	-0.12	-0.07	-0.02	0.00
Sub Saharan Africa	-0.70	-0.76	-0.68	-0.67	-0.63	-0.03	-0.36	-0.36	0.00	-0.20	-0.35	0.31	-0.06	-0.04
Latin America and Caribbean	0.08	0.16	0.25	0.16	0.13	0.05	0.01	0.03	0.09	-0.14	-0.11	-0.12	0.18	0.01
Num. instrum. with |corr| > 0.1	17	17	15	15	16	7	14	13	3	10	16	10	3	2

Table 5. P Values of Hausman and Sargan Tests

for convergence estimates on rates of change of HDI components

Log GDP capita

Method	Omitted Variable:	None	Democracy	Executive Constraints	Urban
3SLS	Hausman	0.99998	0.99997	0.99998	0.99998
3SLS	Sargan	**0.99975**	**0.98869**	**0.99685**	**0.98126**
IV cluster	Hausman	**0.0000374**	**0.0000516**	**0.00004335**	**0.00008158**
IV cluster	Sargan	**0.89126**	**0.77996**	**0.81095**	**0.64304**

Life Expectancy

Method	Omitted Variable:	None	Democracy	Executive Constraints	Urban
3SLS	Hausman	0.99150	0.99163	0.99065	0.97989
3SLS	Sargan	**0.99999**	**0.99999**	**0.99937**	**0.37794**
IV cluster	Hausman	**0.00000110**	**0.00000124**	**0.00000108**	**0.00000153**
IV cluster	Sargan	**0.9865**	**0.9854**	**0.9950**	**0.9861**

Literacy

Method	Omitted Variable:	None	Democracy	Executive Constraints	Urban
3SLS	Hausman	**0.00000110**	**0.00000124**	**0.00000108**	**0.00000153**
3SLS	Sargan	0.0000374	0.0000516	0.00004335	0.00008158
IV cluster	Hausman	**0.0000319**	**0.0000254**	**0.0000233**	**3.16E-07**
IV cluster	Sargan	**0.99380**	**0.99772**	**0.96142**	0.09594

Gross Enrolment Ratio

Method	Omitted Variable:	None	Democracy	Executive Constraints	Urban
3SLS	Hausman	**0.01020**	**0.00683**	**0.00717**	**0.00815**
3SLS	Sargan	0.00003193	0.00002537	0.00002327	3.158E-07
IV cluster	Hausman	**0.000153**	**0.000132**	**0.000101**	**0.000007**
IV cluster	Sargan	**0.97586**	**0.95704**	**0.95094**	**0.85468**

Hausman tests with better than 1% significance in bold.

Sargan tests with worse that 60% significance in bold.

Table 6. Coefficients of 3SLS and Clustered Error IV Convergence Estimates

No independent variable omitted

	IV	3SLS	IV	3SLS	IV	3SLS	IV	3SLS
Variable Dependiente Tasa de cambio de:	**Log GDP per Capita**	**Log GDP per Capita**	**Life Expectancy**	**Life Expectancy**	**Literacy**	**Literacy**	**Gross Enrolment Ratio**	**Gross Enrolment Ratio**
Dep Var X Log GDP per Capita	-0.0113***	-0.0130**	-0.00613**	-0.0109*	-0.00476***	-0.00163	-0.0202***	-0.0204**
	(0.00221)	(0.00524)	(0.00250)	(0.00623)	(0.00111)	(0.00250)	(0.00313)	(0.00885)
Dep Var X Life Expectancy	-0.000253	-0.000541	0.000176	-0.000306	-0.000410***	-0.000580	-0.000412	-0.000232
	(0.000187)	(0.000634)	(0.000225)	(0.000597)	(0.000159)	(0.000395)	(0.000391)	(0.00107)
Dep Var X Literacy	0.0342***	0.0380	0.0194*	0.0548*	-0.0116	-0.0219	0.0295*	0.0157
	(0.0106)	(0.0232)	(0.0109)	(0.0294)	(0.00719)	(0.0142)	(0.0160)	(0.0415)
Dep Var X Gross Enrolment Ratio	0.00137	-0.00478	0.00422	2.04e-05	-0.0454***	-0.0487***	-0.00636	0.0285
	(0.0117)	(0.0318)	(0.0151)	(0.0381)	(0.00839)	(0.0180)	(0.0236)	(0.0632)
Dep Var X Urban	0.000288***	0.000441**	-3.56e-06	8.43e-05	0.000482***	0.000500***	0.000679***	0.000632
	(6.99e-05)	(0.000203)	(9.89e-05)	(0.000265)	(7.35e-05)	(0.000129)	(9.59e-05)	(0.000386)
Dep Var X Trade	6.14e-05	0.000137	1.48e-05	0.000122	-7.26e-06	2.57e-05	0.000196***	0.000139
	(4.02e-05)	(0.000111)	(4.95e-05)	(0.000126)	(2.91e-05)	(6.55e-05)	(6.23e-05)	(0.000171)
Dep Var X Executive Constraint	-0.00487***	-0.00514	-2.82e-05	-0.000495	0.00208**	0.00168	-0.00245	-0.000269
	(0.00145)	(0.00316)	(0.00188)	(0.00331)	(0.000888)	(0.00150)	(0.00242)	(0.00515)
Dep Var X Democracy	0.00395***	0.00485*	-0.00190	0.000754	-0.000784	-0.000180	0.00373*	0.000629
	(0.00116)	(0.00250)	(0.00180)	(0.00283)	(0.000703)	(0.00137)	(0.00195)	(0.00430)
Dep Var X FDI inflows	-4.25e-05	-0.00151	0.00192	0.000885	-0.000949*	-0.00108	-0.00676***	-0.00569**
	(0.000796)	(0.00223)	(0.00118)	(0.00204)	(0.000554)	(0.000855)	(0.00158)	(0.00274)
Dep Var X FDI outflows	-0.00274	-0.0148	0.0340***	0.0261*	-0.0313***	-0.0365***	0.00939***	0.0121
	(0.00361)	(0.0129)	(0.00695)	(0.0151)	(0.00862)	(0.0142)	(0.00248)	(0.00987)
Dep Var X Pop Density in Agr Land (log)	-0.000529	-0.00109	0.00115**	-0.000499	0.000514	0.00112	-0.00280***	-0.00346
	(0.000600)	(0.00153)	(0.000572)	(0.00188)	(0.000493)	(0.000873)	(0.000858)	(0.00256)
Dep Var X Pop Density Growth	0.0800	0.183	0.261	0.361	-0.0497	-0.0354	-0.178	-0.116
	(0.115)	(0.279)	(0.159)	(0.281)	(0.0546)	(0.112)	(0.145)	(0.317)
Dep Var X Risk Premium	0.000379	0.000445	0.000353	0.000485	0.000621*	0.000644	-0.00176***	-0.000650
	(0.000272)	(0.000618)	(0.000399)	(0.000743)	(0.000347)	(0.000459)	(0.000548)	(0.00128)
Dep Var X Inflation	-4.46e-05	-3.57e-05	-5.03e-05***	-7.60e-05*	-3.28e-05***	-1.60e-05	-0.000105***	-8.73e-05
	(3.86e-05)	(5.42e-05)	(1.25e-05)	(4.29e-05)	(9.24e-06)	(3.37e-05)	(1.12e-05)	(7.31e-05)
Log GDP per Capita	0.160***	0.196***	0.311**	0.626	0.00535***	0.00305	0.0130***	0.0128**
	(0.0270)	(0.0642)	(0.155)	(0.397)	(0.000968)	(0.00198)	(0.00166)	(0.00538)
Life Expectancy	0.00284*	0.00533	0.0224	0.0756	0.000177*	0.000241	0.000388*	0.000333
	(0.00146)	(0.00492)	(0.0192)	(0.0582)	(9.61e-05)	(0.000239)	(0.000208)	(0.000526)
Literacy	-0.238***	-0.268	-1.702***	-3.571**	0.0667***	0.0650***	-0.0327***	-0.0197
	(0.0875)	(0.186)	(0.638)	(1.805)	(0.00822)	(0.0161)	(0.00849)	(0.0227)
Gross Enrolment Ratio	-0.0501	-0.00274	0.266	0.419	0.0333***	0.0380***	0.147***	0.102
	(0.106)	(0.271)	(1.003)	(2.470)	(0.00682)	(0.0138)	(0.0193)	(0.0677)
Urban	-0.00262***	-0.00399**	0.000563	-0.00496	-0.000430***	-0.000452***	-0.000452***	-0.000416*
	(0.000638)	(0.00181)	(0.00681)	(0.0176)	(6.68e-05)	(0.000108)	(6.30e-05)	(0.000247)
Trade	-0.000457	-0.00117	-0.00192	-0.00903	3.89e-06	-1.95e-05	-0.000144***	-0.000112
	(0.000379)	(0.000999)	(0.00339)	(0.00864)	(2.58e-05)	(5.70e-05)	(4.51e-05)	(0.000116)

Standard errors in parentheses, period dummies not shown

*** p<0.01, ** p<0.05, * p<0.1

Table 6. Coefficients of 3SLS and Clustered Error IV Convergence Estimates (continued)

No independent variable excluded

	IV	3SLS	IV	3SLS	IV	3SLS	IV	3SLS
Variable Dependiente Tasa de cambio de:	**Log GDP per Capita**	**Log GDP per Capita**	**Life Expectancy**	**Life Expectancy**	**Literacy**	**Literacy**	**Gross Enrolment Ratio**	**Gross Enrolment Ratio**
Executive Constraint	0.0399***	0.0411	0.0260	0.0425	-0.00188**	-0.00178*	0.000108	-0.000886
	(0.0124)	(0.0266)	(0.118)	(0.212)	(0.000801)	(0.00107)	(0.00136)	(0.00294)
Democracy	-0.0321***	-0.0395*	0.110	-0.0683	0.000560	0.000213	-0.00137	0.000323
	(0.00976)	(0.0208)	(0.116)	(0.184)	(0.000609)	(0.000959)	(0.00110)	(0.00250)
FDI inflows	0.00127	0.0141	-0.125	-0.0646	0.00122**	0.00136**	0.00348***	0.00307*
	(0.00692)	(0.0187)	(0.0791)	(0.126)	(0.000496)	(0.000674)	(0.000989)	(0.00158)
FDI outflows	0.0244	0.148	-2.635***	-2.052*	0.0308***	0.0358**	-0.00655***	-0.00873
	(0.0372)	(0.132)	(0.536)	(1.161)	(0.00852)	(0.0140)	(0.00210)	(0.00839)
Pop Density in Agr Land (log)	0.00607	0.0121	-0.0568	0.0659	-0.000212	-0.000781	0.00201***	0.00264
	(0.00557)	(0.0136)	(0.0391)	(0.127)	(0.000436)	(0.000717)	(0.000591)	(0.00168)
Pop Density Growth in Agr Land (log)	-0.460	-1.403	-15.33	-21.22	0.0268	0.0209	-0.0401	-0.0419
	(0.966)	(2.257)	(9.963)	(17.13)	(0.0420)	(0.0757)	(0.0880)	(0.178)
Inflation	0.000403	0.000330	0.00360***	0.00542*	3.04e-05***	1.55e-05	7.76e-05***	6.63e-05
	(0.000314)	(0.000463)	(0.000831)	(0.00280)	(7.86e-06)	(2.83e-05)	(8.88e-06)	(5.32e-05)
Risk Premium	-0.00405	-0.00470	-0.0294	-0.0408	-0.000577*	-0.000607	0.00131***	0.000474
	(0.00260)	(0.00582)	(0.0296)	(0.0542)	(0.000320)	(0.000417)	(0.000404)	(0.000951)
Aids dummy	0.0233***	0.0508***	-0.410***	0.0451	-0.00108	-0.00510***	-0.00111	0.00299
	(0.00722)	(0.0142)	(0.0898)	(0.166)	(0.000798)	(0.00180)	(0.00123)	(0.00383)
Landlocked	-0.00378**	-0.00384	-0.0565*	-0.0694	-0.000208	0.000283	-7.01e-05	0.000306
	(0.00175)	(0.00617)	(0.0310)	(0.0654)	(0.000335)	(0.000727)	(0.000704)	(0.00149)
Tropical	-0.0110***	-0.00444	-0.0118	-0.0143	-0.00117***	-0.00190***	0.000218	-0.000467
	(0.00245)	(0.00574)	(0.0246)	(0.0590)	(0.000264)	(0.000696)	(0.000610)	(0.00138)
Latitude	0.000119***	0.000173	0.000648*	0.00117	1.14e-05***	1.11e-05	-3.18e-05***	-2.59e-05
	(3.83e-05)	(0.000107)	(0.000365)	(0.00107)	(2.88e-06)	(1.20e-05)	(1.10e-05)	(2.63e-05)
Dummy 1975	-0.0160***	-0.0182	0.104***	0.0911	-2.06e-05	-0.000759	-0.00294**	-0.00246
	(0.00576)	(0.0128)	(0.0380)	(0.120)	(0.000566)	(0.00161)	(0.00116)	(0.00281)
Dummy 1980	-0.0379***	-0.0383***	0.0514	0.0406	0.000313	0.000230	-0.00633***	-0.00524*
	(0.00573)	(0.0131)	(0.0379)	(0.123)	(0.000594)	(0.00160)	(0.00140)	(0.00291)
Dummy 1985	-0.0276***	-0.0300**	-0.0812	-0.0807	0.00123*	0.00163	-0.00699***	-0.00576**
	(0.00586)	(0.0125)	(0.0593)	(0.118)	(0.000630)	(0.00154)	(0.00141)	(0.00279)
Dummy 1990	-0.0222***	-0.0287**	-0.106**	-0.119	0.00122*	0.00142	-0.00138	-0.000402
	(0.00656)	(0.0128)	(0.0508)	(0.121)	(0.000641)	(0.00162)	(0.00137)	(0.00280)
Dummy 1995	-0.000493	-0.00980	-0.0382	-0.0174	0.00304***	0.00266	6.64e-05	0.000645
	(0.00750)	(0.0133)	(0.0653)	(0.130)	(0.000640)	(0.00168)	(0.00141)	(0.00294)
Dummy 2000	-0.00705	-0.0118	-0.0714	0.0382	0.00318***	0.00247	-0.00262	-0.00258
	(0.00614)	(0.0150)	(0.0664)	(0.150)	(0.000861)	(0.00185)	(0.00179)	(0.00331)
Constant	-0.563***	-0.734***	-1.032	-2.721	-0.0383***	-0.0278**	-0.0716***	-0.0632**
	(0.0844)	(0.240)	(0.842)	(2.410)	(0.00531)	(0.0124)	(0.0122)	(0.0321)

Standard errors in parentheses, period dummies not shown

*** p<0.01, ** p<0.05, * p<0.1

Table 7. Sign and Significance Patterns for Coefficients of Clustered Error IV Convergence Estimates

Omitted Variables Marked in Gray

Interacted Variables	Log GDP per Capita				Life Expectancy				Literacy				Gross Enrolment Ratio			
Log GDP per Capita	(-)***	(-)***	(-)***	(-)***	(-)**	(-)**	(-)**	(-)***	(-)***	(-)***	(-)***		(-)***	(-)***	(-)***	(-)***
Life Expectancy									(-)***	(-)***	(-)***					
Literacy	(+)***	(+)***	(+)***		(+)*	(+)*	(+)*	(+)**			(-)**	(-)***	(+)*			
Gross Enrolment Ratio				(+)***					(-)***	(-)***	(-)***	(-)***				
Urban	(+)***	(+)***	(+)***						(+)***	(+)***	(+)***		(+)***	(+)***	(+)***	
Trade													(+)***	(+)*	(+)**	(+)***
Executive Constraint	(-)***			(-)***		(-)***			(+)**	(+)***		(+)***		(+)*		
Democracy	(+)***			(+)***			(-)**				(+)***		(+)*		(+)**	
FDI inflows				(+)*			(+)**	(+)*	(-)*	(-)*	(-)*		(-)***	(-)***	(-)***	(-)**
FDI outflows					(+)***	(+)***	(+)***	(+)***	(-)***	(-)***	(-)***	(-)***	(+)***	(+)***	(+)***	(+)**
Pop Density in Agr Land (log)				(-)**	(+)**	(+)**	(+)*	(+)**			(+)**		(-)***	(-)***	(-)***	(-)***
Pop Density Growth						(+)***	(+)**	(+)*		(-)*	(-)**			(-)*	(-)*	(-)
Risk Premium		(+)**	(+)**	(+)**					(+)*	(+)**			(-)***	(-)**	(-)**	(-)***
Inflation					(-)***	(-)***	(-)***	(-)***	(-)***	(-)***	(-)***		(-)***	(-)***	(-)***	(-)***
Non-Interacted Controls																
AIDS dummy	(+)***	(+)***	(+)***	(+)***	(-)***	(-)***	(-)***	(-)***								(-)
Landlocked	(-)**				(-)*			(-)**				(+)**				
Tropical	(-)***	(-)***	(-)***	(-)***					(-)***	(-)***	(-)***	(-)***			(+)*	
Latitude	(+)***	(+)***	(+)***	(+)***	(+)*	(+)**	(+)*	(+)**	(+)***	(+)***	(+)***	(+)*	(-)***	(-)**	(-)**	(-)***

Significance indicated as follows: *** p<0.01, ** p<0.05, * p<0.1

Table 8.1 Log GDP per Capita

Instrumented Quantile Regression

	q10	q20	q30	q40	q50	q60*	q70	q80	q90
Log GDP per Capita									
Life Expectancy	0.0551***	0.0438***	0.0353***	0.0369***	0.0407***	0.0348***	0.0442***	0.0495***	0.0542***
	(0.00677)	(0.00790)	(0.00885)	(0.00615)	(0.00576)	(0.00576)	(0.00672)	(0.00920)	(0.0114)
Literacy	1.225***	1.076***	0.878***	0.984***	0.795***	0.797***	0.603***	0.517**	0.779***
	(0.292)	(0.302)	(0.328)	(0.226)	(0.204)	(0.193)	(0.212)	(0.259)	(0.292)
Gross Enrolment	-0.976**	-0.514	-0.266	-0.0562	0.0777	0.155	0.583*	1.232***	0.705
Ratio	(0.412)	(0.416)	(0.475)	(0.330)	(0.307)	(0.295)	(0.329)	(0.434)	(0.480)
Urban	0.0163***	0.0186***	0.0209***	0.0185***	0.0208***	0.0225***	0.0184***	0.0116***	0.00584
	(0.00198)	(0.00212)	(0.00228)	(0.00163)	(0.00156)	(0.00157)	(0.00188)	(0.00278)	(0.00375)
Trade	-0.00173**	0.000368	0.00244**	0.000760	0.000883	0.00113	0.00121	0.00198	0.00400**
	(0.000875)	(0.00105)	(0.00111)	(0.000784)	(0.000763)	(0.000771)	(0.000892)	(0.00125)	(0.00155)
Executive	0.143***	0.102***	0.0875***	0.0784***	0.101***	0.0997***	0.0993***	0.0727**	0.101***
Constraint	(0.0161)	(0.0198)	(0.0249)	(0.0186)	(0.0185)	(0.0187)	(0.0218)	(0.0307)	(0.0366)
Democracy	-0.0675***	-0.0354**	-0.0226	-0.0169	-0.0309**	-0.0288**	-0.0451***	-0.0619***	-0.0789***
	(0.0122)	(0.0143)	(0.0172)	(0.0128)	(0.0128)	(0.0129)	(0.0150)	(0.0204)	(0.0247)
FDI inflows	-0.0521***	-0.0803***	-0.0415**	-0.0230*	-0.0324***	-0.0452***	-0.0468***	-0.0282	-0.0208
	(0.0155)	(0.0169)	(0.0180)	(0.0124)	(0.0117)	(0.0119)	(0.0146)	(0.0212)	(0.0246)
FDI outflows	0.173***	0.124***	0.0665*	0.0192	0.0303	0.0200	0.00366	-0.0261	-0.0834
	(0.0252)	(0.0316)	(0.0368)	(0.0249)	(0.0253)	(0.0253)	(0.0311)	(0.0424)	(0.0523)
Agric Density	-0.101***	-0.0535***	-0.0444*	-0.0170	-0.0233	0.00303	-0.00858	0.00306	-0.0103
	(0.0187)	(0.0204)	(0.0228)	(0.0165)	(0.0156)	(0.0158)	(0.0183)	(0.0252)	(0.0295)
Agric Dens Growth	-10.41***	-11.90***	-0.759	2.625	8.179***	9.211***	8.750***	6.976*	8.032
	(3.399)	(3.714)	(3.873)	(2.743)	(2.549)	(2.499)	(2.898)	(4.034)	(5.151)
Risk Premium	-0.00132	-0.0110***	-0.00836*	-0.0112***	-0.0165***	-0.0196***	-0.0189***	-0.0123***	-0.00355
	(0.00327)	(0.00401)	(0.00454)	(0.00357)	(0.00352)	(0.00342)	(0.00369)	(0.00418)	(0.00528)
Inflation	0.00119***	0.000644*	0.000358	0.000127	-3.53e-05	2.44e-05	0.000115	0.000160	0.000215
	(0.000297)	(0.000344)	(0.000391)	(0.000277)	(0.000269)	(0.000269)	(0.000318)	(0.000433)	(0.000528)
Aids Dummy	0.246**	0.0120	-0.137	-0.183*	-0.0989	-0.0930	0.160	0.270*	0.155
	(0.106)	(0.128)	(0.143)	(0.0999)	(0.0917)	(0.0898)	(0.106)	(0.140)	(0.170)
Landlocked	0.225***	0.220***	0.132*	0.163***	0.144***	0.139***	0.120**	0.164**	0.114
	(0.0646)	(0.0713)	(0.0771)	(0.0540)	(0.0524)	(0.0522)	(0.0607)	(0.0816)	(0.0944)
Tropical	0.1000	0.120	-0.0480	-0.0993*	-0.0863	-0.0803	-0.0841	-0.180**	-0.374***
	(0.0712)	(0.0768)	(0.0840)	(0.0577)	(0.0536)	(0.0504)	(0.0570)	(0.0750)	(0.0931)
Latitude	0.0121***	0.00961***	0.00984***	0.0100***	0.00672***	0.00612***	0.00490***	0.00405***	0.00402***
	(0.00105)	(0.00110)	(0.00127)	(0.000923)	(0.000875)	(0.000842)	(0.000961)	(0.00120)	(0.00147)
Constant	2.727***	3.503***	3.877***	3.960***	3.698***	4.066***	3.742***	3.805***	4.057***
	(0.310)	(0.371)	(0.421)	(0.302)	(0.290)	(0.293)	(0.345)	(0.474)	(0.629)
Observations	595	595	595	595	595	595	595	595	595

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 8.2 Life Expectancy

Instrumented Quantile Regression

	q10	q20	q30	q40	q50	q60	q70	q80	q90
Log GDP per Capita	2.111**	2.968***	2.077***	1.867***	1.679***	1.761***	2.225***	1.992***	2.047***
	(0.902)	(0.452)	(0.393)	(0.341)	(0.478)	(0.464)	(0.458)	(0.284)	(0.315)
Life Expectancy									
Literacy	16.22***	14.10***	16.26***	14.70***	14.48***	12.14***	10.76***	11.01***	8.456***
	(3.002)	(1.760)	(1.573)	(1.517)	(2.245)	(2.352)	(2.394)	(1.747)	(2.088)
Gross Enrolment	-2.101	-1.241	-0.708	1.972	3.692	5.099	6.856*	10.88***	18.05***
Ratio	(4.329)	(2.530)	(2.378)	(2.328)	(3.457)	(3.541)	(3.552)	(2.503)	(2.847)
Urban	0.0480	0.0378**	0.0606***	0.0723***	0.0817***	0.100***	0.0867***	0.0764***	0.0512***
	(0.0337)	(0.0170)	(0.0148)	(0.0131)	(0.0186)	(0.0181)	(0.0182)	(0.0122)	(0.0138)
Trade	0.00790	0.0186**	0.0248***	0.0328***	0.0299***	0.0241***	0.0271***	0.0304***	0.0259***
	(0.0127)	(0.00760)	(0.00669)	(0.00590)	(0.00850)	(0.00840)	(0.00834)	(0.00548)	(0.00593)
Executive	-1.713***	-1.228***	-1.054***	-0.774***	-0.661***	-0.782***	-0.687***	-0.877***	-0.474***
Constraint	(0.287)	(0.164)	(0.153)	(0.144)	(0.206)	(0.207)	(0.203)	(0.134)	(0.142)
	1.597***	1.151***	1.044***	0.852***	0.683***	0.752***	0.691***	0.668***	0.399***
	(0.198)	(0.112)	(0.0983)	(0.0928)	(0.134)	(0.135)	(0.134)	(0.0908)	(0.102)
FDI inflows	-0.0523	-0.106	-0.0333	-0.0919	-0.0157	0.131	0.242**	0.273***	0.367***
	(0.205)	(0.130)	(0.120)	(0.105)	(0.136)	(0.125)	(0.117)	(0.0767)	(0.0737)
FDI outflows	-0.161	-0.228	-0.474**	-0.547***	-0.674**	-0.884***	-0.990***	-1.220***	-1.202***
	(0.338)	(0.277)	(0.233)	(0.209)	(0.286)	(0.277)	(0.277)	(0.201)	(0.235)
Agric Density	0.459	0.513***	0.487***	0.450***	0.539***	0.750***	0.647***	0.660***	0.375***
	(0.294)	(0.160)	(0.139)	(0.125)	(0.176)	(0.175)	(0.170)	(0.111)	(0.105)
Agric Dens Growth	-150.3***	-108.2***	-87.67***	-82.61***	-65.10**	-56.68**	-45.74*	-28.57	-35.30*
	(44.94)	(26.67)	(22.27)	(20.25)	(28.26)	(27.88)	(26.76)	(18.13)	(19.21)
Inflation	0.0871*	0.0556	0.0205	-0.00300	-0.0271	-0.0518	-0.0514	-0.0509**	-0.0283
	(0.0519)	(0.0421)	(0.0323)	(0.0297)	(0.0405)	(0.0390)	(0.0320)	(0.0205)	(0.0219)
Risk Premium	-0.00578	-0.00574*	-0.00383	-0.00402*	-0.00500	-0.00528*	-0.00834***	-0.00803***	-0.0103***
	(0.00543)	(0.00301)	(0.00253)	(0.00226)	(0.00305)	(0.00288)	(0.00269)	(0.00163)	(0.00174)
Aids Dummy	-5.242***	-5.565***	-4.712***	-3.883***	-4.422***	-4.226***	-5.140***	-5.187***	-5.357***
	(1.719)	(0.888)	(0.820)	(0.722)	(1.032)	(0.960)	(0.966)	(0.638)	(0.745)
Landlocked	-3.957***	-2.508***	-2.765***	-1.953***	-1.828***	-0.646	0.0977	0.607*	0.558
	(0.966)	(0.534)	(0.457)	(0.412)	(0.587)	(0.562)	(0.550)	(0.365)	(0.429)
Tropical	-3.058***	-3.027***	-2.560***	-2.030***	-1.938***	-1.621***	-1.316**	-1.659***	-1.609***
	(0.837)	(0.451)	(0.410)	(0.401)	(0.595)	(0.595)	(0.629)	(0.445)	(0.525)
Latitude	-0.00367	-0.00553	0.00608	0.00824	0.0140	0.0238**	0.0135	0.0136**	0.0211***
	(0.0207)	(0.0104)	(0.00869)	(0.00775)	(0.0105)	(0.00988)	(0.00916)	(0.00564)	(0.00517)
Constant	35.19***	29.32***	33.42***	33.74***	35.01***	35.42***	32.25***	33.68***	32.19***
	(4.903)	(2.780)	(2.410)	(2.148)	(3.115)	(3.102)	(3.138)	(2.035)	(2.366)
Observations	595	595	595	595	595	595	595	595	595

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 8.3 Literacy

Instrumented Quantile Regression

	q10	q20	q30	q40	q50	q60	q70	q80	q90
Log GDP per Capita	0.0417***	0.0370**	0.0372**	0.0413***	0.0399***	0.0402**	0.0329***	0.0192**	0.0243**
	(0.0159)	(0.0163)	(0.0151)	(0.0125)	(0.0127)	(0.0156)	(0.0120)	(0.00911)	(0.0105)
Life Expectancy	0.00181	0.00724***	0.00703***	0.00951***	0.0112***	0.0111***	0.0119***	0.0123***	0.0107***
	(0.00202)	(0.00185)	(0.00180)	(0.00154)	(0.00166)	(0.00221)	(0.00192)	(0.00160)	(0.00210)
Literacy									
Gross Enrolment	1.117***	1.028***	1.113***	0.989***	0.948***	0.955***	0.810***	0.697***	0.554***
Ratio	(0.0811)	(0.0861)	(0.0795)	(0.0676)	(0.0705)	(0.0919)	(0.0800)	(0.0648)	(0.0807)
Urban	-3.29e-05	-0.000595	-0.00132**	-0.00145***	-0.00221***	-0.00215***	-0.00217***	-0.00155***	-0.00132***
	(0.000549)	(0.000563)	(0.000557)	(0.000478)	(0.000481)	(0.000604)	(0.000458)	(0.000354)	(0.000443)
Trade	-0.00130***	-0.00114***	-0.000996***	-0.00100***	-0.000943***	-0.000666**	-6.60e-05	0.000289	0.000253
	(0.000253)	(0.000282)	(0.000257)	(0.000213)	(0.000219)	(0.000277)	(0.000224)	(0.000179)	(0.000234)
Executive	0.00685	0.0109	0.0111*	0.0126**	0.00806	0.0131*	0.0180***	0.0176***	0.0116**
Constraint	(0.00746)	(0.00727)	(0.00656)	(0.00548)	(0.00545)	(0.00685)	(0.00564)	(0.00439)	(0.00500)
	-0.00228	-0.00506	-0.00735	-0.0120***	-0.0121***	-0.0158***	-0.0176***	-0.0162***	-0.0122***
	(0.00510)	(0.00501)	(0.00449)	(0.00372)	(0.00372)	(0.00473)	(0.00397)	(0.00315)	(0.00381)
FDI inflows	-0.00390	-0.00756*	-0.0124***	-0.00421	-0.00324	-0.00210	-0.00424	-0.00624***	-0.00283
	(0.00379)	(0.00385)	(0.00360)	(0.00314)	(0.00334)	(0.00436)	(0.00303)	(0.00231)	(0.00267)
FDI outflows	0.0148*	0.000911	0.00556	-0.000975	0.00316	-0.000901	-0.00593	-0.00385	-0.00455
	(0.00830)	(0.00790)	(0.00814)	(0.00713)	(0.00731)	(0.00933)	(0.00778)	(0.00536)	(0.00625)
Agric Density	0.0199***	0.0107	0.00249	0.00483	-0.00203	-0.00478	-0.00508	-0.00313	-0.000304
	(0.00669)	(0.00691)	(0.00577)	(0.00458)	(0.00454)	(0.00559)	(0.00462)	(0.00362)	(0.00429)
Agric Dens Growth	-0.181	0.0363	-1.172	-1.401**	-2.130***	-1.520*	-3.672***	-4.264***	-4.673***
	(0.832)	(0.939)	(0.827)	(0.696)	(0.721)	(0.910)	(0.737)	(0.603)	(0.752)
Inflation	-0.000440	-0.000336	0.000533	0.000721	0.00177*	0.000922	3.10e-05	8.83e-05	-0.000257
	(0.00107)	(0.00108)	(0.00102)	(0.000963)	(0.00104)	(0.00130)	(0.00116)	(0.000813)	(0.00129)
Risk Premium	-6.08e-05	-0.000129	-0.000205**	-0.000165**	-0.000124	-0.000137	-7.20e-05	-3.05e-05	-6.31e-06
	(0.000132)	(0.000112)	(9.64e-05)	(7.88e-05)	(7.82e-05)	(9.51e-05)	(7.84e-05)	(6.24e-05)	(7.14e-05)
Aids Dummy	0.0208	0.0587*	0.0255	0.0218	0.0112	0.0100	-0.00794	-0.00208	-0.0299
	(0.0201)	(0.0319)	(0.0315)	(0.0265)	(0.0265)	(0.0342)	(0.0281)	(0.0223)	(0.0283)
Landlocked	0.0455***	0.0396**	0.0338**	0.0526***	0.0424***	0.0445**	0.0311*	0.0257**	0.0245
	(0.0174)	(0.0179)	(0.0168)	(0.0143)	(0.0150)	(0.0195)	(0.0163)	(0.0125)	(0.0160)
Tropical	0.144***	0.131***	0.116***	0.0931***	0.0654***	0.0552***	0.0449***	0.0472***	0.0305**
	(0.0184)	(0.0200)	(0.0185)	(0.0149)	(0.0146)	(0.0177)	(0.0149)	(0.0120)	(0.0147)
Latitude	-0.00109***	-0.000857**	-0.00106***	-0.00120***	-0.00123***	-0.000978***	-0.000723***	-0.000635***	-0.000585**
	(0.000360)	(0.000348)	(0.000319)	(0.000257)	(0.000262)	(0.000325)	(0.000276)	(0.000224)	(0.000271)
Constant	-0.504***	-0.702***	-0.653***	-0.713***	-0.698***	-0.714***	-0.584***	-0.437***	-0.256**
	(0.0965)	(0.117)	(0.104)	(0.0859)	(0.0873)	(0.110)	(0.0884)	(0.0718)	(0.0998)
Observations	595	595	595	595	595	595	595	595	595

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 8.4 Gross Enrolment Ratio

Instrumented Quantile Regression

	q10	q20	q30	q40	q50	q60	q70	q80	q90
Log GDP per Capita	0.0227***	0.0213***	0.0153**	0.00485	-0.00184	-0.00295	-0.00487	0.00571	0.0107
	(0.00833)	(0.00804)	(0.00714)	(0.00885)	(0.0111)	(0.00947)	(0.0123)	(0.0143)	(0.0124)
Life Expectancy	0.00253**	-3.56e-06	-0.000575	0.00106	0.000896	0.00265**	0.00412**	0.00423**	0.00615***
	(0.00105)	(0.00122)	(0.000988)	(0.00123)	(0.00147)	(0.00127)	(0.00161)	(0.00177)	(0.00188)
Literacy	0.322***	0.385***	0.418***	0.428***	0.460***	0.454***	0.454***	0.463***	0.431***
	(0.0323)	(0.0311)	(0.0265)	(0.0333)	(0.0402)	(0.0354)	(0.0462)	(0.0533)	(0.0564)
Gross Enrolment Ratio									
Urban	0.00243***	0.00205***	0.00181***	0.00137***	0.00156***	0.000869**	0.000295	-0.000672	-0.00128***
	(0.000306)	(0.000296)	(0.000272)	(0.000336)	(0.000409)	(0.000345)	(0.000450)	(0.000513)	(0.000447)
Trade	0.000728***	0.000537***	0.000573***	0.000327**	0.000366**	0.000304*	0.000179	1.82e-05	-0.000143
	(0.000174)	(0.000147)	(0.000123)	(0.000151)	(0.000186)	(0.000158)	(0.000200)	(0.000238)	(0.000221)
Executive	-0.00546	-0.00236	-0.00177	-0.00429	-0.00554	-0.00895**	-0.00489	-0.00607	0.00651
Constraint	(0.00430)	(0.00398)	(0.00324)	(0.00388)	(0.00462)	(0.00392)	(0.00493)	(0.00594)	(0.00543)
	0.00600**	0.00440	0.00525**	0.00595**	0.00701**	0.00754***	0.00480	0.00529	-0.00662*
	(0.00303)	(0.00275)	(0.00220)	(0.00265)	(0.00313)	(0.00264)	(0.00325)	(0.00376)	(0.00347)
FDI inflows	-0.00780**	0.00434	0.00642***	0.00874***	0.00922***	0.00829***	0.0107***	0.0105***	0.0165***
	(0.00305)	(0.00275)	(0.00214)	(0.00249)	(0.00287)	(0.00235)	(0.00278)	(0.00310)	(0.00291)
FDI outflows	0.00609	-0.00358	-0.00419	0.00125	0.00163	0.00948*	0.0215***	0.0232***	0.0361***
	(0.00628)	(0.00596)	(0.00471)	(0.00530)	(0.00607)	(0.00504)	(0.00594)	(0.00628)	(0.00640)
Agric Density	0.00185	0.0116***	0.00947***	0.00955***	0.0102***	0.00711**	0.00393	0.00156	0.00191
	(0.00370)	(0.00308)	(0.00252)	(0.00312)	(0.00379)	(0.00338)	(0.00435)	(0.00535)	(0.00592)
Agric Dens Growth	1.590***	0.303	-0.185	0.564	1.189*	1.615***	2.502***	3.173***	3.660***
	(0.513)	(0.513)	(0.417)	(0.512)	(0.610)	(0.515)	(0.658)	(0.775)	(0.689)
Inflation	-0.000743	-0.000753	-0.000682	-0.000791	-0.00101	-0.000137	-0.000452	0.00114	0.00381***
	(0.000949)	(0.000863)	(0.000665)	(0.000773)	(0.000868)	(0.000664)	(0.000780)	(0.000839)	(0.000768)
Risk Premium	0.000176***	0.000193***	0.000233***	0.000224***	0.000207***	0.000185***	0.000212***	0.000221**	0.000230***
	(4.41e-05)	(4.58e-05)	(3.73e-05)	(4.90e-05)	(6.33e-05)	(5.74e-05)	(7.47e-05)	(8.80e-05)	(8.41e-05)
Aids Dummy	0.0714***	0.0928***	0.0784***	0.0730***	0.0647***	0.0507***	0.0464*	0.0426	0.0322
	(0.0192)	(0.0178)	(0.0145)	(0.0184)	(0.0221)	(0.0188)	(0.0244)	(0.0265)	(0.0237)
Landlocked	0.000311	0.00264	-0.0139	-0.0228**	-0.0276**	-0.0308***	-0.0265*	-0.0309**	-0.0272
	(0.0119)	(0.0108)	(0.00860)	(0.0106)	(0.0126)	(0.0106)	(0.0139)	(0.0151)	(0.0169)
Tropical	-0.00927	-0.0383***	-0.0473***	-0.0508***	-0.0400***	-0.0441***	-0.0414***	-0.0447***	-0.0293**
	(0.00955)	(0.00967)	(0.00817)	(0.0102)	(0.0126)	(0.0112)	(0.0143)	(0.0163)	(0.0129)
Latitude	-6.64e-05	0.000114	0.000219	0.000134	0.000139	-2.98e-05	-0.000128	8.50e-06	0.000156
	(0.000229)	(0.000204)	(0.000163)	(0.000192)	(0.000228)	(0.000194)	(0.000249)	(0.000283)	(0.000285)
Constant	-0.273***	-0.0484	0.0458	0.0751	0.111	0.0728	0.0167	-0.0171	-0.129
	(0.0626)	(0.0591)	(0.0506)	(0.0641)	(0.0815)	(0.0708)	(0.0926)	(0.106)	(0.102)
Observations	595	595	595	595	595	595	595	595	595

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 9. Summary and Comparison of Convergence and Quantile Estimates

	Convergence Estimate Clustered Error IV, no Variable Omitted				**Quantile Level Estimates** Independent Variables Instrumented				**Summary of Significance in Convergence Estimates** Sum of Stars for		**Summary of Significance in Quantile Estimates**		**Total Significance Score**
	Log GDP per Capita	Life Expect-ancy	Literacy	Gross Enrolment Ratio	Log GDP per Capita	Life Expect-ancy	Literacy	Gross Enrolment Ratio	Divergent Coefficients	Convergent Coefficients	Positive Significant Coefficients	Negative Significant Coefficients	(sign independent)
Log GDP per Capita	(-)***	(-)**	(-)***	(-)***		9	9	3	0	11	21	0	32
Life Expectancy			(-)***		9		8	5	0	3	22	0	25
Literacy	(+)***	(+)*		(+)*	9	9		9	5	0	27	0	32
Gross Enrolment Ratio			(-)***		0	2	9		0	3	12	-1	16
Urban	(+)***		(+)***	(+)***	8	8	-7	5	9	0	22	-8	39
Trade				(+)***	1	8	-6	5	3	0	15	-7	25
Executive Constraints	(-)***		(+)**		9	-9	4	-1	2	3	13	-10	28
Democracy	(+)***			(+)*	-7	9	-6	5	4	0	14	-13	31
FDI inflows			(-)*	(-)***	-6	3	-3	6	0	4	10	-10	24
FDI outflows		(+)***	(-)***	(+)***	2	-7	0	3	6	3	5	-7	21
Pop Density in Agr Land (log)		(+)**		(-)***	-2	8	1	5	2	3	14	-2	21
Pop Density Growth					1	-6	-5	5	0	0	8	-13	21
Low Risk Premium			(-)*	(+)***	-1	3	2	-9	3	1	7	-1	12
Low Inflation		(+)***	(+)***	(+)***	6	1	0	-1	9	0	5	-10	24