

The Interdependence of Economic Growth, Human Development and Political Institutions

A General Equilibrium Framework

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Abstract

The causal links between growth, human development and institutions are central to understanding the long-run development process. The turn of the millennium has seen influential research in development economics attempting to uncover some of these links, but a focus on root-causes of growth has limited its insights in both scope and method. This paper provides an extended analysis of the interdependence of growth, human development and institutions using a general equilibrium framework. The framework is tested using 4 different cross-sectional and panel-data specifications including data from 1820. Findings implicate that both growth and human development, but also human development and institutional progress strongly depend on each other in the long run. The results signify the existence of significant general-equilibrium effects shaping the long-run trajectories of countries. These mechanisms defy overly deterministic views of development, and invite careful further study.

Keywords

Growth, Human Development, Institutions, General Equilibrium, Simultaneous Equations, Long-term Development.

Introduction

The existing empirical literature on institutions, human development (HD) (or human capital (HC)) and economic growth (EG), can be partitioned into four separate camps. The first of these groups is the *geographic determinist* or *endowment* camp associated with studies such as Sachs and Warner (1995, 1997), Bloom and Sachs (1998) and Sachs (2003). These studies assert that geographic factors such as tropics, germs, and crops have a direct and fundamental effect on economic development and can explain a good part of the international development divide. Bloom et al. (1998) for example hold that the high disease burden in Africa negatively impacts productivity, investment and saving, and therefore impairs African economic performance. They empirically find that the high incidence of malaria reduces the annual growth rate of the continent by 1,3%, and that an eradication of malaria in the 1950's would have doubled income per capita today.

The institutionalists, associated with studies such as Hall & Jones (1999); Acemoglu et al. (2001, 2014) and Rodrik et al. (2004), believe that early (colonial) institutions and subsequent institutional developments lie at the heart of the development divide (Vieira et al., 2012). These authors affirm the effects of geography, the disease burden and HD on economic development, but rather assert that these factors have as their root cause extractive and ineffective institutions which were put in place by the activities of European settlers during the colonial era. Acemoglu et al. (2001) use data on the mortality rates of European settlers in different parts of the world to instrument for their measure of institutions, and show a robust positive effect of institutions on EG. They assume that European settlers set up "extractive states," (e.g. Belgian Congo) when climactic conditions were un-

favourable and the disease burden high, and settler colonies (e.g. Australia and the USA) where the climate and the disease environment were more favourable (Acemoglu et al., 2001). This leads to the following identification mechanism:

SETTLER MORTALITY \Rightarrow SETTLEMENTS \Rightarrow EARLY INSTITUTIONS \Rightarrow
CURRENT INSTITUTIONS \Rightarrow CURRENT ECONOMIC PERFORMANCE.

The third group of studies in this literature express the so called *policy view*. These authors hold that good macroeconomic policies, openness to international trade, and financial integration into capital markets are the fundamental drivers of long-run economic success (Vieira et al., 2012). Representative studies are the ones by Frankel & Romer (1999) and Dollar & Kraay (2003). These studies have tried to identify the effects of trade on income by exploiting deep geographical determinants of trade such as landlockedness and remoteness from major markets. Dollar & Kraay (2003) find that trade has the largest effect on EG in the short run.

A final set of studies is in support of the *HD (HC) view*. These authors hold the modernization view by Lipset (1960) that HD is a more basic source of growth than institutions, and that poor countries get out of poverty through good policies, often pursued by dictators, which lead to an accumulation of human and physical capital, and subsequently to improvement of political institutions (Glaeser et al., 2004). In support of their view they recite the experiences of Asian nations such as South Korea, Taiwan, and Singapore, which first grew rapidly under one-party dictatorships and eventually became democratic. In policy considerations these authors hold that establishing democracies in countries with low human capital might not be viable strategy, development efforts should be directed towards improving human capital.

Next to these distinct camps and the vigorous debates among one another, few studies have presented new ideas. Bhattacharyya (2009) tries to marry the institutionalist to the disease view by promoting a stage theory where diseases are more important at early stages of development and institutions take primacy once growth has embarked. Two studies, Ranis et al. (2000) and Suri et al. (2011), have attempted in estimating a dynamic cycle between EG and HD. Using cross-country regressions they demonstrate a significant relationship in both directions. They also investigate the development paths of countries over time which they categorize into "virtuous" and "vicious" cycles, and establish that in terms of sequencing HD appears to be a more fundamental driver than EG (Ranis et al., 2000).

The source of the fascination that this literature in its effort to disentangle the root causes of development has exerted on the wider economics profession is thereby also the source of its greatest weakness: The picture of long-term development emerging from it is highly deterministic. A central issue with the results of the 4 camps is that in estimating single

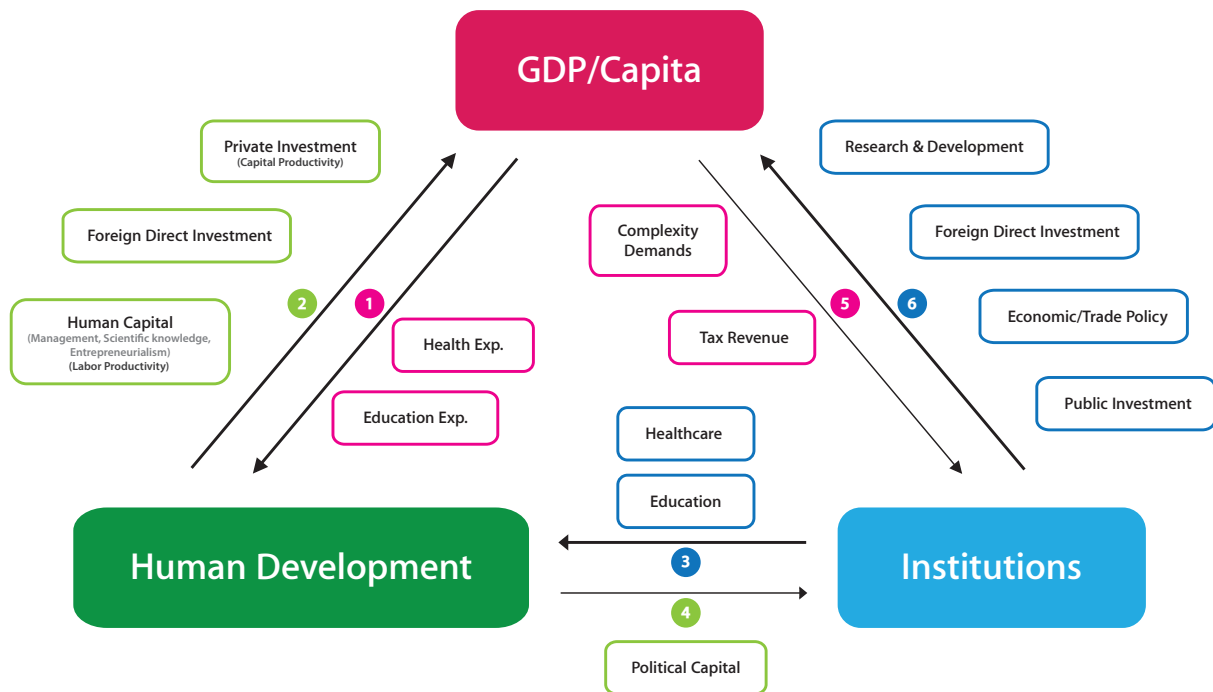
equations, they have produced partial equilibrium estimates that take neither feedback loops from the dependent variable (per capita income in most cases) to the independent variables (institutions, HD etc.), nor relationships between predictor variables into account. Development is treated as a linear growth focused process with very limited room for interaction. Ranis et al. (2000) have provided important progress in terms of modelling, but in treating institutions as exogenous and refraining from the use of rigorous empirical identification methods, they leave large room for improvement.

Theoretical Model

This paper addresses these conceptual and methodological shortcomings by building and testing a general equilibrium

model of development focusing on the interactions of growth, human development and institutions. The model builds on the model of Ranis et al. (2000) but endogenizes institutions. It's central theoretical contribution is the conceptualization of macro development as a long-run equilibrium process characterized by an equilibrium path subject to exogenous shocks. The aim of the modelling thereby was to build a generic "IS-LM" type model of development, combining simple theoretical assumptions with rigorous empirical efforts to identify the model, which may be expanded upon in further research. The research question may thus read: "How strong are the long-term links between EG, HD and institutions, and what do they imply for future macro development research"? The model is shown graphically in Fig. 1. It comprises of 6 chains which are described in this section.

FIGURE 1: THEORETICAL MODEL



Economic Growth and Human Development

Income directly influences HD¹ by advancing the economy's command over resources and therefore the individuals ability to undertake private health and education expenditures (Ranis, 2004). Central mediators for how effective income translates into HD via private expenditure are the income distribution, the structure of the economy, and cultural factors such as gender equality (Ranis, 2004; Ranis et al., 2000). HD also impacts EG and income. Following Amartya Sen, healthier, more educated, and therefore more capable people can choose from a broader variety of possible functioning's and are therefore more likely to find an occupation in which they are most productive (Sen, 1985). Health and education also strongly interact and enter the production function directly by their contribution to what the literature has termed "human capital". HC for its part is strongly related to labour productivity and scientific progress, but also to the quality of private investment and economic management. Decreased fertility rates, greater investment in children's education and increased equality are further positive externalities of HD. All of the above factors then translate either directly or proximately (e.g. via technological progress) into EG.

¹Defined here reductionistic as health and education.

Institutions and Human Development

Institutions impact HD through government expenditures on health and education, social services and family-support, pension systems and more generally their success in levelling the income distribution and creating an equal-opportunities environment. The effectiveness of government social expenditures in advancing HD, depends on the quality of government expenditure targeting and delivery, which in turn highly depends on its structure (Ranis, 2004). Governments must however also have the institutional capacity to efficiently allocate these expenditures. This capacity, for the most part, is found in the education of its public servants. Education is fundamental to running government institutions such as courts or parliaments, and for ordinary citizens to engage with the polity. Literacy and public press were characteristic of early modern societies and increased the general public attention to political matters (Glaeser et al., 2004). As an early proponent, Lipset (1960) holds that educated people are more likely to resolve their differences through negotiation and voting instead of violent conflict. These aspects together constitute what was termed "political capital" in Fig. 1.

Institutions and Economic Growth

Countries with better institutions are characterized by and independent judiciary and the enforcement of property rights and contracts. They encourage investment (domestic or foreign) in machinery, R&D, human capital and technology, all of which promote growth. Other important channels furthering EG are public research and development expenditure, and the quality of economic and trade policy. For the reverse chain from income to institutional quality, it is evident that increased incomes enhance the possibilities of governments in terms of taxation, public expenditure and investment (Ranis, 2004). A second mechanism is the natural demand posed by rising and changing levels of economic activity for different forms of social organization and regulation. This effect, termed "complexity demands" in Fig. 1, goes back to Walter Rostow's stages of economic development and the experience of countries during the industrial revolution. Bhattacharyya (2009) elaborates further upon the impact that moving past subsistence levels of production has on the organization of society and political institutions.

Empirical Strategy

The theoretical model is estimated using a cross-sectional and three panel-data specifications. To represent the central constructs of interest, the logarithm of GDP per capita 2011 PPP \$ (LGDP) is taken for income/EG, for HD the non-income HDI (NIHDI) is computed following UNDP's technical notes, and for Institutions a multidimensional institutions index (MII) is computed from various institutional indicators. The latter can be broadly split into political system variables (e.g. from organizations like Freedom House) and governance outcome measures (e.g. the Worldwide Governance Indicators of the World Bank)².

Cross-Section with 2005 as Base-Year

In the cross-section, data on 181 countries in 2005 is used. The theoretical model is operationalized in form of a 3-equation simultaneous equation system (SEM) as shown in Eq. 1, and the SEM is identified using two-stage least squares

$$\begin{aligned} \text{Income} &= \beta_0 + \beta_1 \text{Institutions} + \beta_2 \text{Human Development} + \text{ctr.} + \varepsilon \\ \text{Human Development} &= \beta_3 + \beta_4 \text{Income} + \beta_5 \text{Institutions} + \text{ctr.} + \varepsilon \\ \text{Institutions} &= \beta_6 + \beta_7 \text{Human Development} + \beta_8 \text{Income} + \text{ctr.} + \varepsilon \end{aligned} \quad (1)$$

(2SLS) under limited-information maximum likelihood estimation with heteroskedasticity robust errors. The instruments used to identify the SEM are taken from the literature and summarized in Tab. 1. Income is instrumented by the

TABLE 1: CROSS-SECTION 2005: INSTRUMENTS

Instrument	Source	Used for
Primary enrolment in 1900	Acemoglu et al. (2014)	NIHDI
Protestant missionaries per 10,000 people in the 1920's	Acemoglu et al. (2014)	NIHDI
Dummy=1 if protmiss computed from Dennis et al.	Acemoglu et al. (2014)	NIHDI
Malaria Ecology, pop-weighted	Sachs (2003)	NIHDI
Log settler mortality, mortality capped at 250	Acemoglu et al. (2014)	MII
Log population density 1500 (baseline)	Acemoglu et al. (2014)	MII
Share of the population that speaks English	Dollar & Kraay (2003)	MII
Share of Pop. that speaks a major European language	Dollar & Kraay (2003)	MII
Legal Origin	La Porta et al. (1999)	MII
(Avg<2005) Net oil export value/capita, const. 2000 \$	WDI / Authors Calc.	LGDP

net oil export value per capita, averaged over all available

²For the construction of indexes and empirical details consult the original paper. To enhance interpretation, the NIHDI is scaled by 10 and the MII scale is 0-10.

years up to 2005. For each equation in (1), 24 specifications are estimated using different instrument subsets and various sets of control variables relating to geography, agriculture, population, fractionalization, religion, war/conflict, climate, diseases, culture, colonial history and globalization/trade.

Decadal Averages 1960-2010 with External Instruments

In this second strategy data for around 104 countries is computed as decadal averages from 1960-2010 (5 time-periods), and an identification strategy using time-varying external instruments is followed to estimate (1). These instruments are

TABLE 2: DEC. AV. PANEL 1960-2010: INSTRUMENTS

Instrument	Source	Used for
Constant price of oil in 2000 \$/bbl	Worldbank WDI	LGDP
Constant price of gas in 2000 \$/mboe	Worldbank WDI	LGDP
Financial Crisis Dummy (1=Crisis)	WDI / Authors Calc.	LGDP/MII
Oil production in metric tons per Capita	WDI / Authors Calc.	LGDP
Biol. Disaster (Epidemic etc.) Occurrence	EM-DAT at CRED	NIHDI
Biol. Disaster (Epidemic etc.) Total Deaths	EM-DAT at CRED	NIHDI
Biol. Disaster (Epidemic etc.) Total Affected	EM-DAT at CRED	NIHDI
Number of Revolutions	CNTS Data Archive	MII
Number of Coups d'Etat	CNTS Data Archive	MII
Number of Major Constitutional Changes	CNTS Data Archive	MII

shown in Tab. 2 and represent plausibly exogenous shocks impacting the endogenous variables of interest. For each equation in (1), 12 specifications are estimated using 4 different estimators and time-varying controls relating to conflict, population development, weather, agriculture and trade. The 4 estimators are (I) a first-difference 2SLS (FD-2SLS) estimator (II) a fixed-effects 2SLS (FE-2SLS) estimator (III) a one-step difference generalized method of moments (1s D-GMM) estimator and (IV) a two-step system generalized method of moments (2s S-GMM) estimator. All 4 include time-fixed effects, and the error matrix is cluster-robust.

5-Year Averages 1945-2010 with Lags as Instruments

In addition to the previous strategies using external instruments, a 5-year panel using lagged values as instruments is estimated. The same 4 estimators (I-IV) are employed. For the FD-2SLS and the FE-2SLS estimators lagged levels 1-5 of the endogenous variables in (1) are used as instruments. For the 1s D-GMM and the FD equation of the 2s S-GMM lagged levels 2-5 are used, whereas lagged differences 1-5 are used to instrument the levels equation of the 2s S-GMM estimator. The same control variables as in the previous strategy are employed, and for each equation in (1), 8 models (the 4 estimators with and without controls) are estimated.

Decadal Averages 1820-2010 with Lags as Instruments

At last, a long term panel with decadal average data for 109 countries reaching down to 1820 is estimated. The data herefore was obtained from the Gapminder Foundation and the Cross-National Time-Series Data Archive (CNTS). Identification is achieved using lagged values as instruments in the same manor as in the previous strategy. In contrast to the previous strategy, the maximum lag value is set at 4 (e.g. lags 1-4 or 2-4 are used), and no control variables are available over this long time-frame. For every equation in (1) thus only 4 models (the 4 estimators I-IV) are estimated.

Results

The results from all 4 estimation strategies are summarized in Tab. 3. The reported coefficients are qualitative averages over the different specifications (instruments and controls).

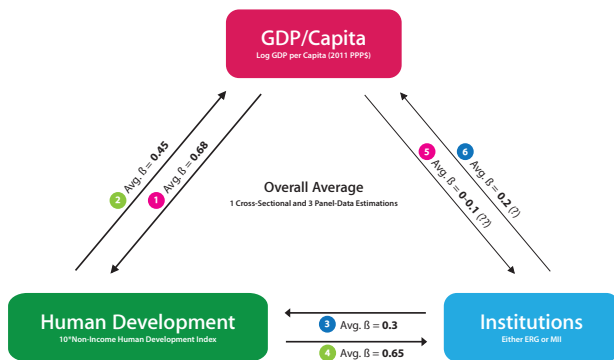
TABLE 3: EMPIRICAL RESULTS FROM 4 STRATEGIES

Chain in Figure 1 β in Equation 1	(6) β_1	(2) β_2	(1) β_4	(3) β_5	(4) β_7	(5) β_8
Cross-Section (2005)	0.25	0.5	0.65	0.45	0.9 (?)	?(0.1)?
Decadal Panel (1960-2010)	0.1 (?)	0.5	0.65	0.3	0.6 (?)	??
5-Year Panel (1945-2010)	0.06 (?)	0.35	0.73	0.1	0.63	?(0.05)?
Long Panel (1820-2000)	0.08 (?)	0.45	0.71	0.11	0.66	??

NOTE: A (?) indicates that there was some variation among significant coefficients in different specifications (different choices of controls or instruments). ?(...) indicates that few coefficients were significant at the 5% level, and ?? indicates that no coefficient was significant at all (the effect is too small to be determined or identification failure).

An additional qualitative overall average result is presented visually in Fig. 2. The results show a large and very robust

FIGURE 2: RESULTS



two-way relationship between EG and HD, and also a large and considerably robust relationship between HD and Institutions. The relationship between EG/income and institutions proved difficult to establish empirically. The channel from institutions to income was large in the cross-section but became significantly smaller in the panel-data models. The channel from EG to institutional change was hard to detect at all (possibly also due to weak instruments for this effect).

Discussion & Conclusion

The findings produced in this paper show that applying general equilibrium modelling to the macro development context is a fruitful exercise. The results of all specifications reveal the presence of significant feedback loops and interactions between income, human development and institutional quality, and the magnitude of the estimated coefficients signifies that these relationships are formative, rather than secondary, to the long-term development process. The cross-sectional analysis also confirmed the impact of deep geographical and historical influences impacting all of the endogenous variables in this theory. The findings however implicate that the development process is far more dynamic and far less deterministic than the literature (e.g. the findings of Acemoglu et al. (2001) and others) implies. This purports that the focus on root causes and use of linear equations in the literature is likely to be of limited value when it comes to learning about development. More research efforts should be devoted to understanding long-term development mechanisms using structural general equilibrium models.

Further investigations of the data have revealed that EG and HD move very closely together, and confirmed the find-

ings of Ranis et al. (2000) that in terms of sequencing HD improvement tends to precede EG. The data however also reveal that institutions are empirically not quite on equal footing with EG and HD. Institutions are more persistent than HD and income levels, and improve slower. This is also evident in the time frame under study: Whereas around 1820 income and HD levels were similarly low on all continents, there already existed greater divergences in the quality of governance. Table 3 testifies to this in that the cross-section (which is thought of as considering the outcome of a 500+ year development process) picked up large and very significant effects of institutions on income, institutions on HD and HD on institutions. These effects become smaller in the panel-data models where 5 or 10-year changes are considered, whereas the two-way relationship between EG and HD does not change under the shift from cross-sectional to panel-data. The data also show significant correlations between levels of institutional quality and the growth rates of income and HD. These demand further investigation.

If this research were taken as a guide to international policy making, it would suggest that investments in HD have the greatest long term returns since HD significantly impacts both EG and institutions, which in turn feed-back into further improvements in HD. Aside from possible direct policy considerations however the more important message of this paper is that general equilibrium effects play a central role in the long-run development process and need to be given more theoretical and empirical attention. If future macro development and political economy research is to present itself relevant to contemporary policy options, more theoretically founded structural general equilibrium modelling and thinking (possibly inspired by macro, DSGE etc.) is necessary. A positive externality of such a turn would be the increased efforts devoted to building stronger theoretical foundations in development economics.

NOTE: This paper summarizes my honours thesis in economics. The original work (23,000 words) and supplementary materials (datasets & code files for STATA and R) can be accessed here. The findings can be fully reproduced using these materials.

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