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Fundamental Roots of Economic Growth: A Meta-Analytical Framework

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Abstract
In recent times economist have conducted research, from both theoretical and empirical perspectives, for identifying the fundamental reasons of economic growth. Although the theoretical propositions varied, however there is a general consensus that the historical (fundamental) variables substantially influence economic growth across countries. We find that the fundamental causes identified across various specifications, time periods and population, exhibit remarkable consistency in terms of their impact on economic growth.
Keywords: Fundamental origins of economic growth, meta-analysis.

1. Introduction

In recent times, economists have widely researched the theoretical and empirical aspects of the fundamental causes of modern economic growth [Acemoglu, Johnson and Robinson (2005) (henceforth AJR); Easterly and Levine (2003)]. Despite their divergences in theoretical foundations, the general consensus affirms that historical (fundamental) variables substantially explain variance of per capita income across countries [Putterman and Weil (2008)].

2. Fundamental Causes of Economic Growth

In analysing the fundamental causes of economic growth, we firstly concentrate on **geographical endowments**. The early proponents of this hypothesis contend that the natural environment (ambient temperature, prevalence of diseases etc.) directly influences the various factors of production both quantitatively and qualitatively [(Machiavelli, 1519; Montesquieu, 1748)]. In particular, variation in the physical and natural environment governs the preferences and opportunity sets of economic agents across countries [AJR (2005)]. Climatic conditions are viewed as an important determinant of work effort and productivity, as warmer, tropical climates are enervating and sap workers of vitality [Marshall (1890)]. Geographic temperament also limits the alternative agricultural technologies that are available to a society through its impact on soil, vegetation and animals [Myrdal (1968)]. Diamond (1997) identifies that absence of domesticated farm animals and wild plant species in tropics allowed temperate regions to gain initial technological advantage that persisted over time to give rise to the current world distribution of income. Sachs (2001) notes the relationship between ecological zones and per capita income as one of the strongest empirical relationships in economic growth. Specifically, low yield of tropical soils, elevated incidence of crop pests, ecological conditions favoring infectious diseases etc., lead to underdevelopment in the tropics [Sachs and Warner (1997); Bloom and Sachs (1998)].

Cultural values also fundamentally influence economic growth. Hall and Jones (1999) report that social infrastructure (including prevalence of global first languages) accounts for 72 % of the variance in output per capita across economies. Bloom and Sachs (1998) identify linguistic diversity contributing to the strong ethnic cleavages in African societies and constituting a barrier to trade, thereby potentially explaining Africa's growth shortfall. Barro and McCleary (2003) find that economic growth correlates positively with religious beliefs.. In empirically examining Weber's hypothesis that Calvinism facilitated the rise of modern capitalism [Weber (1930)], Cavalcanti et al. (2007) find that religious divergences explain the earlier growth of Northern Europe than Southern Europe, but not the belated growth of Latin America (in comparison to Europe).

Technological change constitutes another fundamental determinant of modern economic growth. Comins, Easterly and Gong (2010) report that the difference between adopting none or all the technologies available in

1500 AD is associated with a 26-fold increase in current per capita GDP. Galor and Weil (2000) find positive relationship between the timing of the transition to agriculture and current life expectancy.

Economic and Political Institutions also essentially influence economic development. AJR (2001) report that among former European colonies, persistence of early settler and extractive institutions (determined by concurrent mortality rates) gave rise to modern institutional mechanisms. Countries that inherited extractive institutions frequently experienced exploitive government regimes that concentrated power and influence. Conversely, nations that became heir to "settler colonies" tended to produce post-colonial governments that were more democratic and more devoted to defending private property rights than extractive colonies. AJR (2002) find that higher levels of initial population density and initial urbanization lead to lower modern institutional quality. Extractive institutions were established in comparatively densely populated and exceedingly urbanized colonies, while thinly populated, rural areas developed settler institutions. Institutional reversal was caused by the colonial experience, entailing that previously richer (and hence more-densely populated) colonies were transformed with inferior institutions. Bockstette, Chanda and Putterman (2002) find that the presence of state-level political institutions from year 1 through to 1950 leads to higher current per capita income growth.

Legal traditions (including property rights protection and degree of state intervention) being another fundamental determinant of growth, emerged from the legal traditions introduced by European colonists. La Porta et al. (1998) contend that the French civil law unifies the legal system, prevents jurisprudence, and solidifies state control of courts. In comparison, the British common law emphasizes individual rights and evolved to protect private property from the monarchy. Beck et al. (2003) demonstrate that French legal origins tend to give rise to lower protection of private property in comparison to countries with British legal origins. Table 1 summarizes the central empirical findings about the influence of various fundamental determinants of economic growth.

3. Policy and Economic Growth

A major strand of empirical research on economic growth stems from ascertaining the role of micro and macro-level policies in initializing growth. Kormendi and Meguire (1985) and Barro (1991) constitutes early forays into the subject, and they generally identify that growth and investment are positively correlated with measures of political stability (proxied by measures of revolutions, coups and political assassinations) and negatively correlated with price distortions (measured by purchasing-power-parity of investment deflators). Easterly and Levine (2003) notes that the policy view generally discounts the role of historical endowments and emphasizes more on the importance of major national policies in determining economic development. It predicts that macroeconomic policies such as openness to international trade [Frankel and Romer (1999)], absence of capital account controls, low and stable inflation [Levine, Loayza and Beck (2000)], low black market premiums, balanced fiscal-regimes [Easterly and Rebelo (1993a, 1993b)], will tend to foster long-run economic growth. In a comprehensive review of the empirics of policy and economic growth, Easterly (2005) notes that the positive relationship between economic growth and policy is driven by extreme values of the policy variables, and the findings are not generally robust across different econometric specifications. Furthermore, introduction of initial income level invalidates the positive relationship as the correlation between per capita income in 1960 and 1999 is + 0.87. Therefore, most countries' growth from 1960's onwards seems to be a function of their initial income level. In addition, the effect of policy on growth weakens significantly after controlling for institutions. The role of policies on economic development has also been explored from a more indirect perspective. For instance, Frankel and Romer (1999) note that the impact of geographical variables on economic growth is mediated through government policy, specifically trade openness.

Easterly and Levine (2003) report that the causal impact of endowments only occurs through institutions and policies do not affect economic growth after controlling for institutions. Aghion and Howitt (2006) consider policies pertaining to competitive environment and market entry, formation and enrichment of human capital through education, and general macroeconomic policies (budget deficit, taxation, money supply). They conclude that policies that encourage greater sectoral turnover (no. of firms entering and exiting the industry per unit of time) and higher education tend to positively impact growth in countries that are closer to the technological frontier. Furthermore, countercyclical public investments impact growth positively and significantly in countries with low levels of financial development (controlling both for linear time trend, country and year fixed effects). The money supply, measured by the M2/GDP ratio, tends to insignificantly affect growth (except when

controlling for linear time trend) and thus indicates towards positive correlation of growth and countercyclical M2/GDP ratio at lower levels of financial development, albeit not as significantly as countercyclical government investment.

Table 1: Regression estimates of the effect of fundamental determinants on economic growth

Independent Variable	**Range of Coefficient estimate**	**Control Variables**
Acemoglu, Johnson and Robinson (2001) Dependent Variable: Log of GDP per capita, 1995		
Average protection against expropriation risk, 1985-1995	+ 1.20 to + 0.92	Latitude, Distance from coast, Mean temperature, Dummy for landlocked, Soil quality, British colony, French colony, Asia dummy, Africa dummy, Life expectancy, Infant mortality, Malaria in 1994.
Log of European Settler Mortality (regressed on current institution index)	- 0.53 to -0.44	
French legal origin	+ 0.96 to +0.51	
Acemoglu, Johnson and Robinson (2002) Dependent Variable: Log of GDP per capita, 1995		
Urbanization in 1500	+ 0.030 to -0.024	Continent dummies, Identity of colonial power, Religion, Distance from the equator, temperature, Humidity, Natural resources, landlocked, Exclusion of "neo-Europes" (United States, Canada, New Zealand, and Australia).
Log population density in 1500	-0.08 to -0.13	
Constraint on executive in 1900	+0.50 to +0.84	
Constraint on executive in first year of independence	+0.46 to +0.37	
Easterly and Levine (2003) Dependent Variable: Log of GDP per capita, 1995		
Latitude	+5.25 to +1.59	Inflation, Openness, Real exchange rate overvaluation, Ethnolinguistic diversity, Oil exporting country, Crops, Dummy for landlocked.
Landlocked	-1.55 to -0.25	
Religion	+2.55 to +1.79	
French legal origin	+0.27 to +0.23	
Log of European Settler Mortality (regressed on current institution index)	-0.34 to -0.06	
Chanda and Putterman (2007) Dependent Variable: Growth of Log GDP per capita, 1960 to 1998		
Log GDP per capita 1500	+0.028 to +0.006	Population growth 1960-2000, Secondary enrollment ratio 1960, Log GDP per capita 1960, Investment rate 1960.
State Antiquity (whether countries had state governments in 1500)	+0.018 to +0.013	
Date of transition to Agriculture	+ 0.004 to +0.003	
Comin, Easterly and Gong (2009) Dependent Variable: Log GDP per capita, 2002		
Technology adoption level in 1000 BC	+0.471 to 0.027	Continent dummies, Distance from equator, Distance from equator squared, Dummy for landlocked, Dummy for tropical climate.
Technology adoption level in 0	+ 1.446 to + 0.157	
Technology adoption level in 1500 AD	+ 2.211 to + 1.770	
Putterman and Weil (2009) Dependent Variable: Log GDP per capita, 2000		
Geographic conditions(includes latitude, size of country, measure of a landmass's East-West orientation)	+0.752†	Latitude, Dummy for landlocked, Dummy for being in Eurasia (defined as Europe, Asia, and North Africa), Measure of the suitability of a country for agriculture, Climate, European-descended population share, Ethnolinguistic diversity.
Biological conditions (number of heavy-seeded wild grasses, number of large domesticated animals)	+0.746†	
Technology adoption level in 1 CE	+0.0924†	
Technology adoption level in 1500 CE	+ 1.55†	
State Antiquity (whether countries had state governments in 1500)	+2.38 to +1.24	
Date of transition to Agriculture	+0.313 to +0.153	

* denotes significance at 10 % level of significance. ** denotes significance at 5 % level of significance. *** denotes significance at 1 % level of significance. Range of estimates represents the Maximum and Minimum coefficient estimates for that particular variable across various specifications. † Single estimate available.

Mankiw, Romer, and Weil (1992) and Lucas (1988) utilizes the human-capital augmented Solow model and the AK model respectively to contend that accumulation of human capital positively correlates with economic growth. Hanushek and Kimko (2000) conclude that labor-force quality also strongly correlates with growth, utilizing indirect specification tests to establish a causal link. However, contradictory evidence is offered by Benhabib and Spiegel (1994), who finds human capital stocks, rather than human capital accumulation, to be positively correlated with growth. Ha and Howitt (2007) find that in the US, a decline in the growth rate of the number of RandD workers coincides with a rising productivity trend.

Privatization (or de-nationalization) policies have also been offered as an instigator of economic growth (Plane 1997; Barnett 2000), whereby privatization has a significantly positive influence on GDP growth. Cook and Uchida (2003) contradict the earlier findings, but conclude that competition and regulation are necessary precursors to the effective implementation of privatization policies.

In examining the role of fiscal policies on growth, Barro (1991) and Kneller et al. (1999) concludes empirically that growth is affected positively by productive government expenditure and adversely by taxation. Easterly and Rebelo (1993a) finds that increments in marginal income tax rate hinder growth. Although contradictory findings are also multitudinous, the general consensus entails that a robust positive relationship between government size and economic growth exists [Fölster and Henrekson (2001)].

The empirical linkage evidence allows us to note the following salient growth-augmenting policies:

1. Liberalizing trade and capital flows
2. Investment in human capital
3. Ensuring political stability
4. Maintain low, stable inflation rate
5. Ensure fiscal and monetary discipline (tax reforms, unified and competitive exchange rates, credible and stable monetary policy)
6. Privatization and deregulation
7. Secure property rights
8. Reduce corruption and introduce corporate governance
9. Reduce poverty and introduce social safety nets

4. Policy Implementation in Poor Countries

The major impediment towards the implementation of growth-augmenting economic policies, relates to the notions of **complementarity** and **conditionality**. Rodrik (2005) notices the necessity of certain prerequisites and institutional complements to exist before generally accepted macroeconomic policies (protection of property rights, market-based competition, appropriate incentives, sound monetary policy) can be implemented. For instance, trade liberalization may not produce the theoretical benefits through the reallocation of an economy's resources if labor markets exhibit real rigidity. Therefore, lack of certain institutional capabilities may render the implementation of sound policies ineffective. For instance, Castro, Clementi and Macdonald (2004) demonstrate that the growth-enhancing impact of investor protection is lower in countries with stringent capital restrictions. Therefore, complementary existence of unabated capital flows is necessary to reap the full benefits of a policy that promotes investor protection.

The imperative role of institutional conditionality is made clearly evident by Burnside and Dollar (2000), who find that the growth-augmenting impact of foreign aid depends on the quality of state institutions and policies in the host country. Therefore, as poor countries lack the pre-existing institutional framework that is necessary for policies to work effectively and is also deficient in complementary sectoral support, growth-augmenting policies cannot be effectively implemented.

Table 2 selectively reviews the empirical literature of policy and growth.

Table 2: Regression estimates of the effect of policies on economic growth

Independent Variable	**Range of Coefficient estimate**	**Control Variables**
Sachs and Warner (1995) Dependent Variable: Real annual per capita growth in GDP, 1970-1989		
Trade openness	+ 2.540*** to +2.203***	Log of real GDP per capita in 1970, Population density in 1960, Ratio of real government spending to real GDP, Number of revolutions and coups per year, 1970-1985, Average no. of assassinations per million population, 1970-1985, Relative price of investment goods, Ratio of real gross domestic investment to real GDP
Political repression and unrest	-0.882**	
Primary school enrollment rate	+0.324** to +0.126*	
Secondary school enrollment rate	+3.731** to +2.568*	
Easterly (2005) Dependent Variable: Log per capita GDP growth rate, 1960-2000		
Inflation	-0.020** to -0.018**	Log of initial real GDP in 1960, Log of total schooling years
Ratio of government budget balance/GDP	+0.124** to 0.092**	
Ratio of money supply (M2) to real GDP	+0.010 to +0.002	
Real exchange rate overvaluation	-0.014** to -0.013*	
Black market premium on foreign exchange	+0.01 to -0.012*	
Trade openness	+0.01 to -0.011	
Aghion and Howitt (2006) Dependent Variable: Growth of GDP per capita, 1965-2001		
Lagged pro-cyclical public investment	-0.005 to +0.007	Population growth, Secondary enrollment, Government size as a share of GDP, Inflation, Black market premium, Trade openness.
Lagged private investment/GDP	-0.015** to -0.012**	
Lagged pro-cyclical government consumption	+2.55 to +1.79	
Lagged pro-cyclical M2/GDP	-0.005* to +0.001	
Product market liberalization	-0.011 to +0.002	
Cook and Uchida (2003) Dependent Variable: Growth of Log GDP per capita, 1988 to 1997		
Privatization	-0.292*** to -0.063	Log of initial GDP per capita for 1988, Initial life expectancy at birth for 1987, Average population growth, Average ratio of GDI to GDP.
Government consumption	-0.156** to -0.129***	
Easterly and Rebelo (1993a) Dependent Variable: Growth rate of per capita GDP		
Marginal income tax rate with respect to GDP	- 0.064** †	GDP per capita 1960, Primary enrollment 1960, Secondary enrollment 1960, Assassinations per million 1970-1985, Revolutions and coups 1970-1985, War casualties per capita 1970-1985,
Ratio of individual income taxes to personal income	- 0.103 †	
Ratio of domestic taxes to consumption plus investment	- 0.737* †	

* denotes significance at 10 % level of significance. ** denotes significance at 5 % level of significance. *** denotes significance at 1 % level of significance. Range of estimates represents the Maximum and Minimum coefficient estimates for that particular variable across various specifications. † Single estimate available.

5. Conclusion

In examining the competing roles of endowments, culture and institutions, AJR (2005) conclude that the empirical evidence is not consistent with a major role of geography, religion or culture. Instead, differences in economic and political institutions act as the robust causal factor underlying the variance in income per capita across countries. Growth-enhancing impact of economic policies appears to be largely contingent upon the existence and quality of these political and economic institutions.

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