

Force and Field Factors of Growth and Development: Evidence from International Experience

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Abstract

It is widely accepted that parents in many developing countries make extra ordinary efforts to educate their children and to instil a higher level of human capital in them. I label such a development in human capital as a 'force factor' of economic growth. However, this force factor alone cannot generate lasting economic growth and development when 'field factors' of growth are not present. Field factors are the growth promoting factors the economic environment should provide. Examples are national security, law and order, governance and property rights. In the absence of healthy field factors, the human capital development gets retarded, or flies out of the country, inhibiting economic growth and development. In this paper, I provide an analysis of international data on force and field factors to support this hypothesis.

Keywords: Economic Growth - Field Factors - Force Factors - Human Capital - Human Development - Transparency

Introduction

Economic growth is the growth of per capita real income of countries. It is the principal force leading to a higher level of development of a country. Economists have documented various

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factors that lead to higher rate of economic growth in countries. Among them are technology, research, human capital, infrastructure, democracy, and governance.

The impact of growth promoting factors is seen in the varying rates of economic growth in different countries. Over the years, some poor countries have grown at low or negative rates, some other poor countries have grown at faster rates and have achieved higher levels of per capita income, some rich countries have grown at even higher growth rates, and some other rich countries have become poor.

Economic development embodies the economic growth and few other factors that characterize human wellbeing, such as health, education, and economic and political freedom.

The purpose of this paper is to illustrate the economic growth and development episodes across countries in the world, and to propose that high economic growth and high level of income arise from two distinct sets of factors, one set of factors that an individual could develop (force factors), and another set of factors that the government and the society at large should provide (field factors). The study then proceeds to examine the impact of these factors on economic growth and levels of income using international data. Finally, the study concludes on the importance of these factors.

Economic Growth and Development

Economic growth is defined as the growth of per capita real income. The power of economic growth is significant. A slight drop in the rate of economic growth can lead to a vast difference in the income level in the long run. This power of economic growth is illustrated by the following facts. If a country grows at only 2 per cent per annum it will take 35 years to double its income. Thus, people of such a country will have to wait 35 years to see a significant change in their income. If the country grows at 5 per cent (i.e. 3 percentage points higher) it will take 14 years to double its income. This is a significant development as a result of enhancing growth by 3 more percentage points. The result gets better as the growth rate increases. If the economic growth is 7 per cent the income level doubles in every 10 years, and if the growth rate is 10 per cent the income doubles in every 7 years. In the recent past few countries have achieved growth rates of above 10 per cent, and enhanced the quality of life of people in those countries significantly.

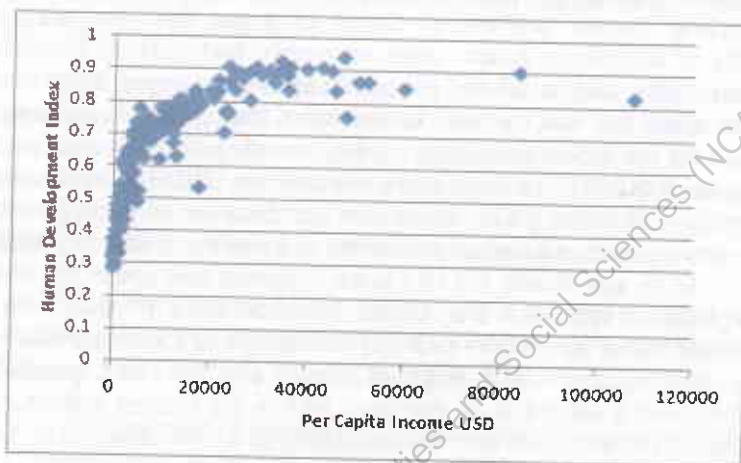
Economic development is a much broader concept than the economic growth. It should embody, *inter alia*, a series of features portraying human well-being. Some of those features are the quality of education, health care, economic and political freedom, opportunities, and social and physical security. However, there is no single index that can be used to represent the human development except for the index developed by the United Nations Development Program (UNDP). The index developed by the UNDP is the Human Development Index (HDI) which is a combination of three factors: economic growth, education standards and health standards (UNDP, 2011). More specifically, the HDI is the weighted average of the three categories of variables: Per capita Gross National Product with a weight of 30 per cent, Mean Years of Schooling and Expected Years of Schooling together with a weight of 30 per cent, and Life Expectancy at Birth with a weight of 30 per cent. HDI is the closest indicator of economic development with the availability of a consistent set of data for a large number of countries.

Economic growth is an essential component of human development. A higher economic growth propels countries to reach higher levels of per capita income. The importance of having a per capita income level above a certain threshold to promote economic development is illustrated in Figure 1, which shows the relationship between the HDI and the per capita income measured in Purchasing Power Parity terms by the World Bank (World Bank, 2011).

The figure shows that the HDI rises rapidly with the increase in per capita income when income level rises from low to high. After achieving a per capita income level of around USD 35,000, the HDI comes to a steady level. It is, therefore, suggestive that a country should reach a certain threshold income level to reach a higher degree of development.

Force and Field Factors of Economic Growth

The existing research highlights several important factors of economic growth. Barro and Sala-i-Martin (1995) provide a detailed account of the research leading to identifying factors of economic growth. The primary factors are the accumulation of physical and human capital, technological progress, and research and innovations. Those factors have been incorporated in the theoretical models of economic growth developed by Solow (1956) Romer (1986) Lucas (1988) and Grossman and Helpman (1991).

Figure 1: Per Capita Income vs. Human Development Index

Source: Compiled by the author based on data of the World Bank and the UNDP 2011

In addition to those factors, empirical research has highlighted several other factors such as geography, institutions, opportunities, incentives, competition, accountability, and rule of law, property rights, free markets, absence of corruption, absence of uncertainty, good economic policies, civil rights, role models, and public health (Secondi, 2008).

The growth promoting factors can be divided into two broad groups, namely (a) factors that can be developed by individuals exerting their own strengths, and (b) factors that have to be provided by economic environment. Those two distinct groups can be identified as 'force' and 'field' factors respectively. The force is what individuals can do to enhance their productivity and production. The field is the environment the individual is living in. Individual efforts have to be complemented with environmental factors to generate a high rate of economic growth.

The force and field factors in growth can be thought of as the force and field factors of generating electricity as explained by Einstein in 1905. As Einstein explained, a metallic body moving in an electromagnetic field could generate electricity, which is employed in all important economic activities. The force is the motion of the

body within the field. The field is the magnetic field. Both the force and field are essential to generate electricity. If any one of the two factors is missing, the electricity is not generated, i.e. if the body does not revolve, or the field does not contain magnetism, no electricity is generated. Another way to look at the impact of field factors is that it could imprison the force factors inhibiting any productive growth (Harberger, 2005).

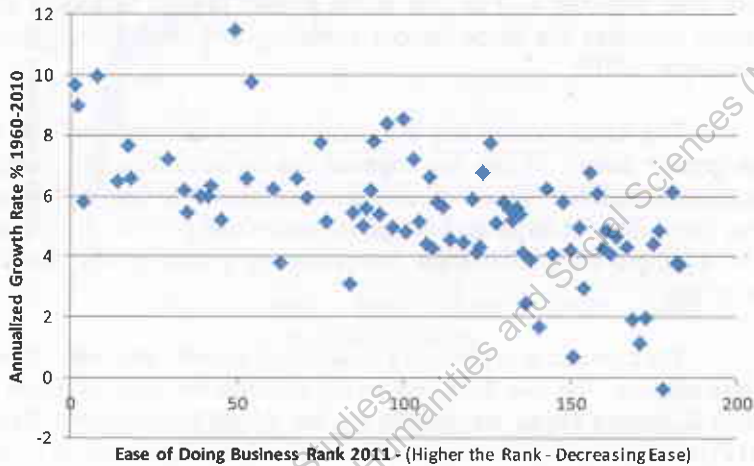
The force factors are discussed in neo-classical as well as new growth theory. Those are physical capital accumulation, human capital accumulation, research, and animal spirits. The field factors are what the society at large and the government can provide. Examples of field factors are governance, transparency, public goods, and the rule of law.

We conduct a preliminary analysis of growth and field factors in this section. The two field factors we use are the rank of 'Ease of Doing Business Index' developed by the World Bank (World Bank, 2012) and the rank of 'Corruption Perception Index' developed by the Transparency International, an international organization based in Berlin. The ease of doing business index takes into account several important factors: dealing with construction permits, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts, resolving insolvency, and getting electricity. These factors explain the ease at which a new business can be established in a country. They are also proxies to having a good economic environment, such that individual efforts (or force factors) may flourish. Having a difficult economic environment discourages investment. Countries are ranked according to the decreasing order of the index, i.e. the higher the rank, the lower the ease of doing business. The corruption is defined as 'Corruption is the abuse of entrusted power for private gain' by the Transparency International (2011). A high degree of corruption increases the risk of investment returns and discourages investment. In this index also a higher rank shows a higher perception of corruption.

Figure 2 and 3 respectively show the relation between long-run growth and the 'Ease of Doing Business' and the 'Corruption Perception' in a cross section of countries. The Figures show that long-run growth declines with increasing degree of difficulties in doing business and with increased degree of corruption in countries. This suggests that field factors are important for the long-run economic

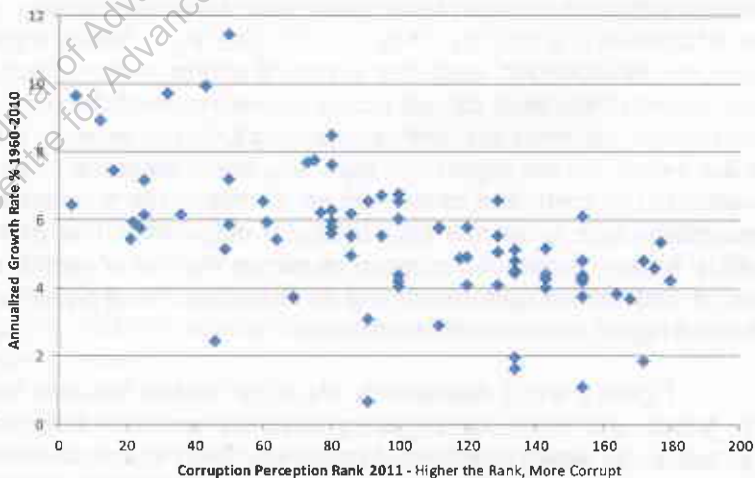
growth. A similar conclusion regarding HDI and field factors can be drawn by examining Figures 4 and 5.

Figure 2: Economic Growth vs. Ease of Doing Business

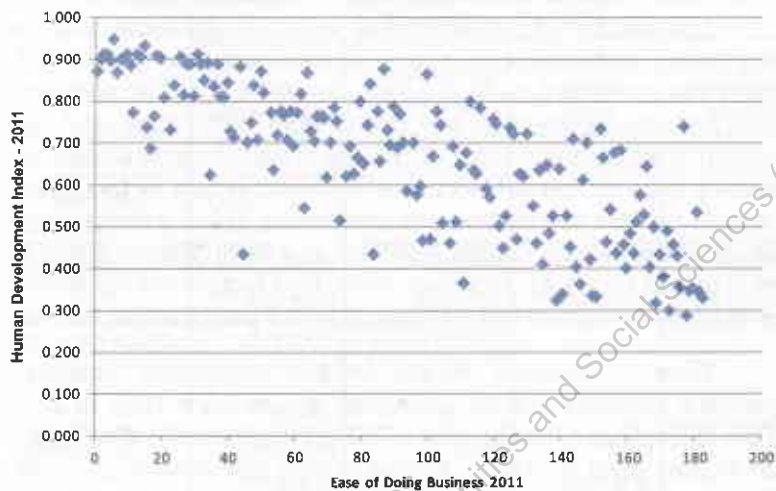


Source: Compiled by the author based on data of the World Bank and the UNDP 2011

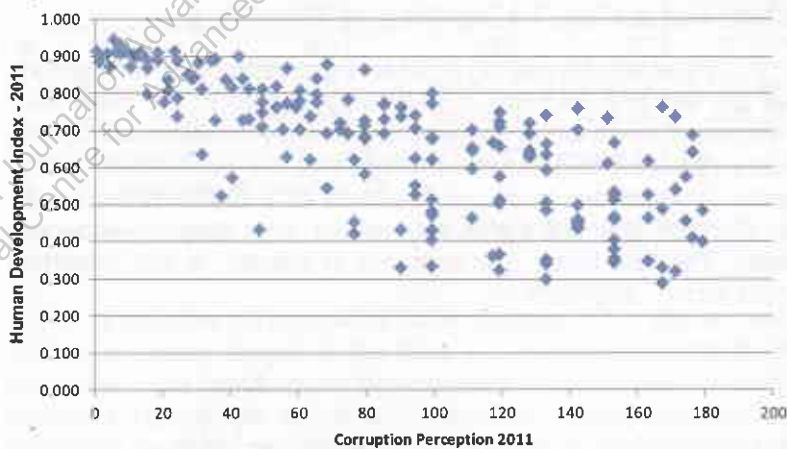
Figure 3: Economic Growth vs. Corruption Perception



Sources: Compiled by the author using data from the World Bank and Transparency International and the UNDP 2011

Figure 4: Human Development Index vs. Ease of Doing Business

Sources: Compiled by the author based on data of the World Bank and Transparency International and the UNDP 2011

Figure 5: Human Development Index vs. Corruption Perception

Sources: Compiled by the author based on data of the World Bank, Transparency International and the UNDP 2011

Impact of Force and Field Factors on Growth and Income Levels

This section provides a more vigorous statistical analysis linking growth and per capita income to force and field factors. We suggest that the slow growth in poorer countries could be attributed to the under-development of any one or both of the force and field factors. It could be argued that individuals in each country endeavour to develop force factors subject to the limitations of field factors. Thus, we should be able to see some developments in force factors such as physical and human capital, research, and technological progress even in poorer countries. However, when field factors are not strong, even the fully developed force factors may not yield positive results.

Table 1 presents results of four regression analyses. Dependant variables are the economic growth from 1970 to 2009 and the level of per capita income in 2009. Independent variables are initial income level (in 1970), human capital (percentage of people progressed to secondary school education), migration (the percentage of tertiary educated people leaving the country), technology (secure internet servers for 1 million people), transparency (degree of transparency, the inverse of the corruption perception index). In this case when a country is ranked higher in corruption perception, it represents a lower degree of transparency. The data source for all variables except the transparency is the World Bank. Data on transparency are from the Transparency International.

Equations (1) and (2) of Table 1 shows that economic growth over the last four decades is negatively related to the initial level of income. This result is consistent with the Neo Classical Growth Theory (Solow, 1956). It further shows that the force factor, human capital, is important to propel countries to a higher growth path. Migration, though not significant, affects negatively on economic growth. The field factor, Transparency of policies, is also important for the economic growth.

Table 1: Results of OLS Regression Analysis

	Dependent Variable			
	Growth from 1970-2009	Growth from 1970-2009	Income Level in 2009	Income Level in 2009
Equation No.	(1)	(2)	(3)	(4)
Independent Variables				
Constant	0.00349 (-0.281)	-0.0057 (-0.502)	-14671.7 ***(-3.098)	-6963.3 ****(-3.621)
Income Level in 1970	-0.00001 ***(-2.92)	-0.00001 **(-2.71)		
Human Capital	0.00084 ****(5.61)	0.0008 ****(5.72)	74.13 (1.363)	
Migration	-0.00011 (-0.892)		-113.9 **(2.575)	-119.4 ****(-3.67)
Technology	0.00001 (1.102)		9.335 *** (2.914)	11.302 **** (5.15)
Transparency	0.00641 *** (3.215)	0.00742 *** (4.534)	5024.8 **** (6.935)	4575.9 **** (9.173)
R ²	0.6	0.6	0.7	0.74
F Value	15.77 on 5 and 52	27.89 on 3 and 55	55.21 on 4 and 98	155 on 3 and 167

Note: * significant at 10%, ** significant at 5%, *** significant at 1%,
**** significant at less than 1%

Source: Compiled by the author based on data of the World Bank 2011

Equations (3) and (4) of Table 1 shows that income level in 2009 is positively related to the force factors of human capital and technology, and field factor of transparency. It is negatively related to migration. The Human capital is not significant in explaining the level of income, because countries with higher levels of human capital have not been able to achieve higher level of income due to the absence of field factors in their economies.

Disparity of Income and the Impact of Force and Field Factors

In this section the impact of force and field factors on economic growth of four different groups of countries is presented. The economic growth so essential to economic development did not take place in many poor countries over the last few decades. To facilitate the analysis, countries are divided into four categories; low income countries in 1960 remaining as low income countries in 2009, low income countries in 1960 becoming high income countries in 2009, high income countries in 1960 becoming low income countries in 2009, and high income countries in 1960 remaining high income countries in 2009. Results are given in Table 1. The low income is defined as having a per capita income of less than USD 100 in 1960, and USD 3700 in 2009, whereas high income is defined as having a per capita income of USD 100 and above in 1960, and USD 3700 and above in 2009.

The transition from a low income country to a high income country is a difficult task. It has required maintaining an annual average growth rate of 13 per cent over the five decades. Out of 22 low income countries in the sample, only 3 countries could achieve this feat. The three countries are Oman, Botswana and China. Oman is a country with rich endowment of petroleum, and that resource propelled it to a high income country. China has harnessed its human capital with overwhelming economic liberalization measures. Botswana also had implemented an impressive series of economic measures. A large number of high income countries have fallen to low income level in 2009, with an annual average growth rate of 4.5 per cent (Table 2). Such a low rate of growth has kept low high income countries imprisoned in the low income category in 2009.

We will now explain the possible causes of those income and growth disparities. To illustrate this, we divide countries into another set of four groups; poor countries with less than or equal to USD 1,000 per capita income per annum in 2009, moderately poor countries with per capita income higher than USD 1,000 and less than or equal to USD 3,600 in 2009, moderately rich countries with per capita income higher than USD 3,600 and less than or equal to USD 10,000 in 2009, and rich countries with per capita income higher than USD 10,000 in 2009. The force and field factors in those categories of countries are given in Table 3.

Table 2: Transition of Countries During 1960 - 2009

Transition	Number of Countries in the Sample	Average Income in 1960 (USD)	Average Income in 2009 (USD)	Annual Average Growth Rate (%)
Low Income in 1960 Low Income in 2009	19	72	652	4.5
High Income in 1960 Low Income in 2009	31	181	1,621	4.5
Low Income in 1960 High Income in 2009	3	76	8,940	10
High Income in 1960 High Income in 2009	35	690	17,320	6.7

Notes: Low income - per capita income of less than USD 100 in 1960, and USD 3700 in 2009, high income - per capita income of USD 100 and above in 1960, and USD 3700 and above in 2009

Source: Compiled by the author based on data of the World Bank 2011

Table 3 provides evidence that difference in human capital is substantially high in moderately poor countries than in poor countries. The Human capital and transparency are significantly higher in moderately rich countries than in moderately poor countries. The degree of transparency is substantially higher in rich countries than in moderately rich countries. This suggests that the level of human capital and the extent of transparency increases as the income level of countries increase.

The impact of those on the level of income is shown in the statistical analysis given in Table 4.

According to the analysis, the variation in income level in poor countries cannot be explained by the variations in human capital and transparency. This is because such factors do not show a higher degree of progress to generate any significant relationship. However, the variation in income in moderately poor countries can be explained by the variation in human capital, and the variation in income in rich countries can be explained by the variation in the degree of transparency since such factors have shown a significant development in those countries.

Table 3: Disparity of Force and Field Factors in Four Groups of Countries

	No of Countries	Average Income	Average Human Capital	Average Degree of Transparency	Growth in Income	Growth in Human Capital	Growth in Transparency
Poor	24	547	64	2.5			
Moderately Poor	26	1,998	81	2.9	265.3	26.6	16.0
Moderately Rich	22	5,896	89	3.8	195.1	9.9	31.0
Rich	16	35,710	97	6	505.7	9.0	57.9

Source: Compiled by the author based on data of the World Bank 2011

Table 4: Regression Analysis of Income Level and Force & Field Factors

	Dependent Variable		Income Level in 2009	
	Poor	Moderate Poor	Moderate Rich	Rich
Equation No.	(1)	(2)	(3)	(4)
Independent Variables				
Constant	30.69 (0.086)	2.99 (0.005)	3877.1 (1.895)	-47820.2 (-0.613)
Human Capital	5.263 (1.9)	17.6 *(2.79)	14.99 (0.728)	408.3 (0.505)
Transparency	57.08 (0.46)	148.9 (1.167)	260.56 (1.039)	6401.8 **(5.196)
R ²	0.215	0.31	0.06	0.5
F Value	2.05 on 2 and 15	5.3 on 2 and 23	.83 on 2 and 27	14.75 on 2 and 29
p-Value	0.163	0.013	0.4477	0.000039

Note: * significant at 5%. ** significant at less than 1%.

Source: Compiled by the author based on data of the World Bank, 2011

Conclusion

This paper highlights the existence of two sets of factors of economic growth which are fundamental to human development. Both sets of factors have to be present to generate a high rate of economic growth, as in the field of electromagnetism, where the motion of a revolving body and an effective magnetic field are necessary to generate electricity. The force factors are what individuals can generate by their own strength, while field factors are what the environment should provide. In the absence of positive field factors, the force factors cannot generate growth or a higher level of income. This absence of positive field factor imprisons the force factors inhibiting the economic growth. The lack of economic growth hinders the human development, and increases human suffering.

References

- Barro, Robert., & Xavier, Sala-i-Martin (1995). *Economic growth*. New York: Mc- Graw Hill.
- Einstein, Albert (1905). On the electrodynamics of moving bodies. *Annalen der Physik*, 322(10), 891-921.
- Grossman, Gene M., & Elhanan, Helpman (1991). *Innovations and growth in the global economy*. Cambridge: MA, MIT Press.
- Harberger, Arnold C. (2005). *On the process of growth and economic policy in developing countries*. Bureau of Policy and Program Coordination issue paper 13. Washington DC: USAIDPPC issue paper 13, USAID.
- Lucas, Robert E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22, 3-42.
- Romer, Paul M. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94, 1002-1037.
- Secondi, G. (2008). *The development economics reader*. London: Routledge.
- Solow, Robert (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, 32, 65-94.
- Transparency International. (2011). *Corruption perceptions index 2011*. Washington DC: Transparency International.
- United Nations Development Programme (2011). *Human Development Report*. Washington DC: UNDP.
- World Bank. (2011). *World Development Report*. Washington DC: World Bank.
- World Bank. (2012). *Doing business 2012*. Washington DC: World Bank.