Why Poverty Traps Emerge?

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(1) Introduction

In the literature of economic development, a phrase that comes across quite frequently is 'the vicious circle of poverty', or 'poverty trap'. These phrases refer to a situation confronted by individuals, communities, regions or economies, in which these economic agents get stuck up in extreme poverty and find themselves unable to break out of it for significantly long periods of time. In a typical real scenario of a poverty trap, more than one of these agents are involved with a varying degree of interdependence in relationship with the poverty trap. The most destructive case of a poverty trap could be where all the economic agents, right from individuals to the national governments are entrapped in the 'vicious circle of poverty'.

It is a distressing fact that one fifth of the world's population suffers extreme poverty, living on less than $1/day and one half of the total living on less than $2/day. (Chen and Ravallion, 2001). The plight of the poor appears even more striking if compared to the remarkable wealth of the rich. Azariadis and Stachurski (2004) quoted that average yearly income per capita in Luxemburg for 2000 was over $46,000. In Tanzania, on the other hand, it was around $500 for the same period; meaning that people in Luxemburg are nearly 100 times richer on overage than people in Tanzania. In a simple growth accounting study conducted by Hall and Jones (1999), they calculated that for the year 1988, the geometric average of output per worker for the five richest countries in their sample was 31.7 times higher than for the five poorest countries.

The gap between richest and poorest countries increased tremendously, especially after the post war era. And it is a fact that since the later half of the last millennium, less developed countries with the exception of east and Southeast Asia, are not catching up with the advanced developed countries. It conceivably indicates that they are caught in poverty trap and are unable to get rid of it. (Fig 5, appendix)

'The Least Developed Countries Report 2002' published by UN, highlights that *extreme poverty is pervasive and persistent in most LDCs,* and that the phenomenon of poverty is so overwhelming that most of the LDCs are caught in a massive *international poverty trap*, marked with a *vicious circle of low savings and few investment opportunities.*

This paper is written in context of such cases of extreme poverty and the prevalence of poverty traps. It attempts to address directly the question of why such poverty traps emerge and

what causes them to reside permanently then in regions and communities. Addressing this question and understanding the causes of why poverty traps emerge will enable us to present better and effective remedies for elimination of poverty around the globe. This however is not the objective at this stage, unless we understand thoroughly the factors causing the poverty traps, before suggesting anything for policies. In short, the paper emphasizes on the causes and consequences of poverty traps, theoretically as well as empirically.

Section II defines poverty traps and explains how poverty trap models differ from the standard growth models. Section III discusses the reasons of why poverty traps emerge and states different explanations for it. Section IV discusses why specifically some of the LDCs, especially those in sub-Saharan Africa are the most prone to getting stuck up in poverty traps and suggests possible reasons for it. And finally section V concludes.

(2) Poverty Traps in Theory

In a theoretical perspective, the mechanics of a poverty trap work on a *self-perpetuating* condition where if an economy is caught in a poverty trap, suffers from persistent underdevelopment and stagnant growth. In general, a poverty trap is any self-reinforcing mechanism, which causes poverty to persist. (Azariaidis and Stachurski 2004)

In technical terms, we can think of a poverty trap as a stable steady state with low levels of per capita output and capital stock. This outcome is a trap because if agents attempt to break out of it, the economy has a tendency to return to the low-level stable steady state.

This idea can be explained by taking the standard neo-classical growth model and allowing for 'non-linearities' in the production function. Specifically, the point is that the production function has a middle portion where it exhibits increasing returns to scales.

In Fig 1, increasing returns to scales can be seen between k_a and k_b. There are four steady states; 0, k_1^*, k_2^* and k_3^*. Of these, k_1^* and k_3^* are stable, while 0 and k_2^* are unstable. k_1^* is the stagnant steady-state. This model implies that if a country begins with a capital-labor ratio that is below k_2^*, then it will bound itself to approach the stagnant steady-state ratio k_1^*. However, if its initial capital-labor ratio is above k_2^*, then it will approach the higher steady state k_3^*. The ratio k_2^* is thus a *critical threshold* which a nation must reach to 'take-off' and achieve the higher steady state. In poverty trap models, the long run performance of the economy essentially
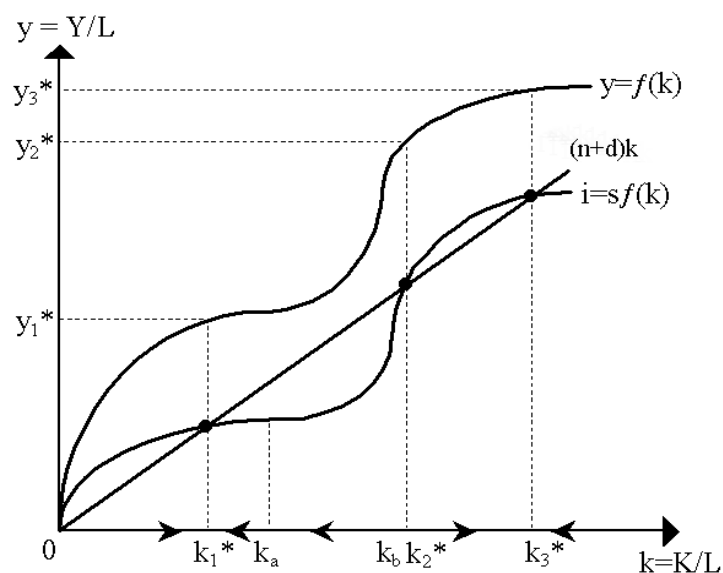
Fig 1
A poverty trap

depends on the initial condition; such that if it starts below the threshold it will be trapped forever below k_2^*, so the economy will remain poor, only because it is poor. Thus, *poverty becomes its own cause*. This characteristic of poverty traps is what makes them self-perpetuating and self-reinforcing in nature. In any such case, it is most unlikely that the economy will escape the trap without any external assistance.

The idea of a poverty trap differs in an important way from standard growth models of growth. In particular, the notion of a trap as such, emerges from the concept of 'multiple dynamic equilibria'. Standard growth models implicitly assume a *single dynamic equilibrium* and thus convergence of all growth paths towards a single level of productivity. But if multiple dynamic equilibria exist, then the scene is somewhat different, and the growth function becomes S-shaped, with stable dynamic equilibria at high and low levels of productivity.

Another important idea is the distinction between poverty traps and *bad market outcomes* such as recessions or financial crises etc, which are most probably transitory and the economy could recover without a typical external assistance. In the context of microeconomics for example, people in transitory poverty are able to recover from adverse shocks relatively quickly but those stuck up in persistent or chronic poverty remain poor for very lengthy periods.

Barrett and Swallow (2005) have elaborated this distinction between persistent and transitory poverty through a simple comparison of poverty dynamics in the United States with that in three rural African sites; northern Kenya and central and south central Madagascar. (Fig 2)
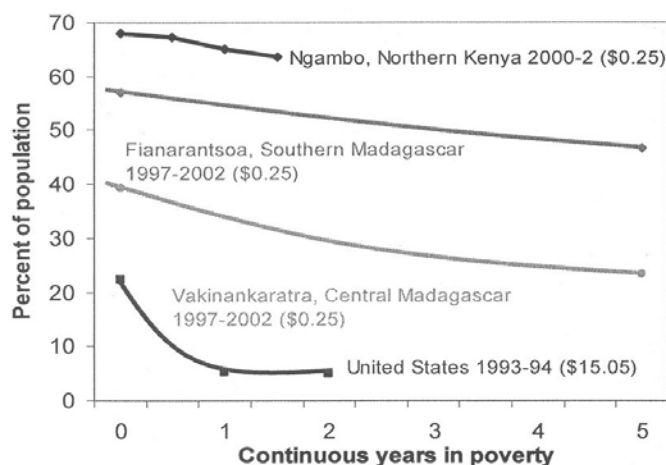
Fig 2
Persistent vs. Transitory
Poverty

In case of US, poverty is seemingly transitory, with the median time in poverty equal to 4.5 months. By contrast, most poverty in African cases appears to be highly persistent. In central Madagascar, which is the wealthiest province of the country; 60 percent of those who were *ultra poor* in one year remained ultra poor five years later. In Madagascar's poorest province, more than 80 percent of the ultra poor were still ultra poor after five years. And in north central Kenya, more than 90 percent of the initially ultra poor remained so after 18 months.

After this distressing comparison, the authors concluded that it is not just the magnitude of poverty, but more importantly the nature and duration of poverty that differentiates much of the developing world from the rich countries.

(3) Why Multiple Equilibria Emerge?

Some of the pioneering research on the issue of multiple equilibria and poverty traps has been done long ago by Young (1928), Rosenstein-Rodan (1943,1961), Nurske (1953), and Myrdal (1957) etc. They noticed that there does appear sometimes, a *bifurcation of economic progress* among the developing countries of the world. More recently, empirical evidence in support of the earlier work has emerged suggesting the causes and consequences of multiple dynamic equilibria in more detail and their relationships to poverty traps. An example of one such study is presented below:

This study has been done by McPeak and Barrett (2001) in the context of productive assets. They argued that the idea of poverty traps and multiple dynamic equilibria is ultimately attached to the role of productive assets. The initial situation of productive assets, their productivity and *expected asset dynamics* help to define household poverty status over time.

They collected quarterly data from March 2000 to December 2001 among 177 pastoralist households in six sites of northern Kenya, where the primary non-human assets are herds of livestock. The relationship between herd-size, measured in *tropical livestock units* 'TLU' (the weighting system used in the study is, 1 TLU = 1 cattle = 0.7 camels = 10 goats = 11 sheep) and daily per capita income turns out to be strong and increasing, as depicted in fig 3.
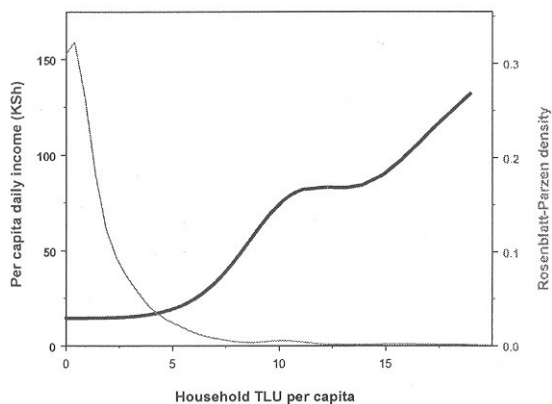

Fig 3
Income – Herdsize
Relationship

This simple bivariate regression suggests that per capita daily income is convex in per capita TLU holdings over most of the data range, which further suggests that income may increase at more than a one-for-one rate as wealth/asset increases. Fig 4 shows the multiple equilibria generated by this Kenyan data with the specific asset dynamics.
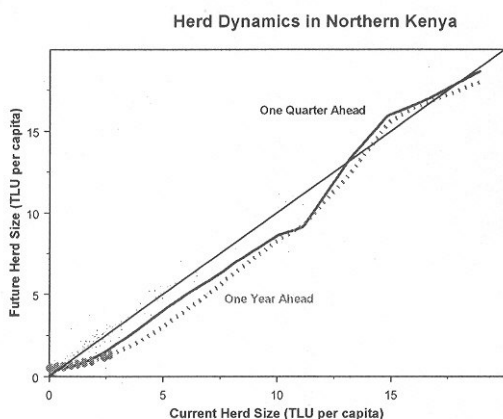

Fig 4
Multiple Equilibria

The black 45 degree line represents dynamic equilibria where expected future herd size equals current herd size. Observations above the 45 degree line indicate growth in asset stock over time, observations below it reflect asset decline. It is noticeable that herd collapse is far more common than herd growth as greater number of points lie below the 45 degree line than above it. The authors suggested that these herd collapses shown in the data are mostly due to a widespread drought that occurred in northern Kenya.

These herd dynamics clearly show an S-shaped pattern, which reveals multiple dynamic equilibria. Stable equilibria appear at approximately 1 and 18 TLU per capita, with an unstable equilibrium around 13 TLU per capita. The unstable equilibrium reflects a critical threshold. Herd sizes that reach or exceed the threshold of 13 TLU, on average grow to the higher, stable equilibrium herd size, which yields expected per capita daily income of roughly US$ 1.50/day. But only about 1% of the sample attains this high-level equilibrium. When herd sizes fall below the threshold level of 13 TLU, future per capita herd sizes steadily decrease in expectation, to the point where per capita herd size is about 1 TLU and expected daily per capita income only around $0.25/day. From Fig 4, it is noticeable that few pastoralists are able to surmount the critical threshold to reach the high stable equilibrium. Instead, most people find themselves trapped in extreme poverty earning $0.25/day.

Analysis of this study suggests two factors behind the poverty traps in northern Kenya. First, because people are born into extreme poverty and have a very difficult time in accumulating assets (initial productivity factor). Second, people suffer from adverse natural and stochastic shocks that throw them below the critical threshold point.

The ongoing research on multiple dynamic equilibria and poverty traps is extensive and multi-dimensional. But as such no consensus has been made on why the self-reinforcing inefficient equilibria persist. Rather different explanations have been sought.

Azariadis and Stachurski (2004) have raised a question that if modern production techniques are *essentially free for taking,* then why is it that so many people are still poor? They argued that the fact that technology is the primary determinant of a country's income, is true; but the most productive techniques are not always adopted, because of these self-reinforcing mechanisms, or traps that act as barriers to adoption. They pointed out that traps arise both from *market failure* and also from *institution failure.* Because of these failures good technologies are

not always adopted, meaning that inefficient equilibria exist. Moreover these inefficient equilibria have a bad habit of reinforcing themselves. Consider for example, corrupt institutions can generate incentives which reward more corruption, or low demand discourages investment in increasing returns technology, which reduces productivity and thus reinforces low demand. It is important to note that these inefficient outcomes are self-reinforcing, otherwise agents would soon start approaching the better equilibrium.

Describing the market failures causing poverty traps in a theoretical perspective; Azariadis and Stachurski (2004) mentioned that these market failures arise due to *'departures from the competitive neoclassical benchmark'*. For example, the increasing returns to scales; which imply that a rise in output lowers unit cost. This starts a chain of positive self-reinforcement. Lower unit cost encourages production, which further lowers unit cost and so on. Such positive feedbacks can strongly reinforce either poverty or development.

Another deviation from the 'competitive neoclassical benchmark' could be failure in credit and insurance markets. The poor are credit constraint because they lack collateral. This can lead to an inefficient outcome which is self-reinforcing. Without collateral there is no borrowing of funds and hence no economic opportunities, which leads to poor income and no wealth, and thus their inability to provide collateral. Hence, the poor lack access to credit markets, which in turn becomes the cause of their poverty.

Barrett and Swallow (2005) stated that poverty traps arise because there exists a range of different strategies as regard to the economic activities. A strategy is defined as a set of economic activities undertaken by individual or collective decision-makers who use their available assets for shaping present and future standards of living. This approach implies that when there are multiple strategies in a dynamic equilibrium, poverty traps may arise. As each strategy is associated with a *distinct* stable dynamic equilibrium, so when one chooses a strategy, one implicitly selects the equilibrium towards which one naturally moves over time. They also argued that financial market failures are essentially connected to the possibility of a poverty trap. If poor could borrow freely, they might be able to cross the critical threshold by adopting superior strategies associated with better productive techniques, which could ultimately lead them out of poverty trap.

Barrett and Swallow (2005) introduced a new term of *fractal poverty traps*, which refers to the presence of multiple equilibria simultaneously at multiple scales of the economy. For this reason fractal poverty trap is the most destructive and harmful type of poverty trap. For example a financial constraint faced by individuals and households unable to access financial markets due to insufficient collateral, to local governments who are unable to borrow on capital markets due to limited tax collection capacity, to national governments who are swept out of global financial markets because of financial risks. Such constraints at multiple levels are highly inter-dependent to each other in self-reinforcement of poverty traps. For example, if the government is poor because its tax base is weak due to a poor population, it is then unable to afford expensive investments in infrastructure that is necessary to induce firms to invest in *fixed capital formation*. Firms thus do not expand, meaning that most production takes place at small units which can not even manage to finance the acquisition of modern technologies. Due to the absence of modern technologies, the productivity is of low-level which hardly covers the owner's consumption needs, leaving little or none to save; which implies little or no investment in public and private sector….. and so on. This kind of scenario tells that governments, markets, communities, and households, all are simultaneously weak and operating at low-level equilibria.

Although Barrett and Swallow did not test a formal hypothesis whether there exists a fractal poverty trap, but maintained that the available empirical evidence is well consistent with the hypothesis of fractal poverty traps. They stated that fractal poverty traps arise mainly from differences in (i) initial asset holdings (ii) available productive technologies (iii) *sunk costs* to technology acquisition and institution building, and (iv) internal and external social factors (e.g. coordination or conflict)

Loury (1981) identified another cause of poverty traps, at micro scale; where traps emerge from *irreversible human capital accumulation failures* due to childhood under-nutrition, illness and lack of education etc. Under-nutrition and morbidity early in life can lead to permanent reductions in physical stature and health status which gets associated with lower incomes in adulthood, following underinvestment in the education of children; thus extending poverty across generations.

(4) Poverty Traps in Sub-Saharan Africa and Other LDCs

Among all LDCs, those geographically located in the region of sub-Saharan Africa are probably the most prone to getting stuck in a poverty trap than other countries. The UN Millennium Project Final Report stated that sub-Saharan Africa is the most vulnerable region in the world to a persistent poverty trap. The report attempted to investigate the causes of Africa's poverty trap and proposed five structural reasons which seemingly keep these countries severely entrapped in poverty, these are briefly discussed below:

1. <u>High transport costs and small market size</u>: Transport costs are enormously high in sub-Saharan Africa, mainly due to geographic reasons. And not only the domestic markets are small but poor access to global trade due to high transport costs makes things even worse.

2. <u>Low-productivity agriculture:</u> Again due to bad geography Africa has the lowest share of irrigated cropland than any other region of the developing world. Rainfall in most parts is quite erratic, and temperatures are high. High transport costs also mean that farmers can afford little fertilizers. All these factors contribute to the poor agricultural output is sub-Saharan Africa.

3. <u>Very high disease burden:</u> Africa carries a very high and extremely severe kind of disease burden. In recent years, the most prominent disease in the region has been HIV/AIDS. In tropical sub-Saharan Africa HIV rate in 2001 was around 7.3%, while in any other region of the world it did not exceed 1%. Africa is also home to numerous *endemic tropical diseases,* among which malaria is probably the most threatening and causes around two million deaths every year. (WHO and UNICEF 2003)

   Malaria contributes to a classic case of a poverty trap. Controlling malaria needs substantial investment in health sector and latest medical technologies, which Africa can not afford. Thus Africa is too poor to control malaria and meanwhile malaria reduces productivity, helping to keep Africa poor!

4. <u>Adverse Geopolitics:</u> The report argued that in history Africa has suffered most tragically from colonial powers and pre-colonial invaders, than any other region in the world. A massive slave trade in history might have resulted in poor formation of *national states.* Then a century of colonial rule exploited Africa's natural resources deeply. And at the end most of Africa was left with little or no infrastructure and education. Even afterwards it did not get any significant help from the major powers, until very recently. There were

trade discriminations against Africa for decades, even new initiatives such as 'African Growth and Opportunity Act (AGOA)' has a number of constraints for African exporters.

5. <u>Slow diffusion of technology from abroad:</u> Africa drastically lags behind in technology especially in agriculture and health. Most of the developing world experienced a 'Green Revolution' in 70s and 80s in connection with high-yield agricultural products, but most of Africa could not uptake it, due to climatic and economic conditions. The absence of Green Revolution had a very negative impact on food productivity. Infact, tropical sub-Saharan Africa experienced a slight decline in food production per capita during 1980 – 2000.

All these factors are associated with the geographic, economic and historical circumstances of sub-Saharan Africa, and make it very hard to lift itself up. Trapped in such circumstances it is unable to generate enough surplus above survival levels which could be invested to overcome these factors. The UN Millennium Project report suggested that Africa's poverty trap can be overcome if an intensive investment program is injected which directly addresses all these factors mentioned above.

Another report published by UN, The Least Developed Countries Report 2002, has coined the phrase of 'generalized poverty' referring to those LDCs which are stuck up in a poverty trap. It stated that there are two aspects of a poverty trap, namely domestic and international. And both of these aspects are associated with certain inter-relationships, which generate various cause-and affect- elements which become part of the poverty cycle.

The domestic aspect has five inter-relationships. First, domestic resources available for physical and human capital investment are low in most LDCs due to generalized poverty. Second, the state capacities are weak. Third, the corporate capacities are weak. Fourth, generalized poverty leads to rapid population growth and environmental degradation. Fifth, in the presence of generalized poverty, the probability of political instability and conflict is greater. All these factors act to reinforce generalized poverty directly or indirectly, and thus results in low savings, low investment and low productivity.

The international aspect has three main inter-relationships, identified in the report. They need little more explanation here:

1. <u>The form of primary commodity dependence</u>: Primary commodity dependence itself is not bad for growth performance of a country – but it is the form of primary commodity dependence which is important. For example, most commodity exporting LDCs have a low productivity, low value-added and weakly competitive commodity sector and it usually consists of a very narrow range of products. This form of primary commodity dependence is associated with a low export growth due to falling real commodity prices and loss of market share.

2. <u>Unsustainable external debt:</u> External debt burden can become highly unsustainable due to slow export growth, large terms-of-trade shocks, and weak state capacities. The report found a strong correlation between export structure and external debt, 85% LDCs dependant on non-oil primary commodities were found to have unsustainable external debt. A main condition for debt-sustainability is that the rate of growth of exports must be greater than the rate of interest on outstanding debt. Most LDCs have very slow export growth rates; as a result they fall into debt problems, even after debt relief sometimes. Once a country has an unsustainable external debt, it gives rise to many other negative features which further reinforce the poverty trap; for example debt servicing reduces resources available for public investment, also domestic interest rates may become very high and foreign exchange constraint may be tightened.

3. <u>The aid/debt service system:</u> When external debt becomes unsustainable, it also affects the effectiveness of aid. The report found that official donors, who are also the major creditors, have been supplying aid just to ensure that official debts can be serviced! Devarajan, Rajkumar, and Swaroop (1999) estimated that in 18 sub-Saharan African countries, the sum of 31 cents of every additional dollar of concessional grants was used to finance principal repayments of foreign loans, and 50 cents of every further additional grants was used for the same purpose. This aid/debt relationship contributes to reinforce the cycle of economic stagnation, slow export growth and external debt.

The report concluded that all these three mentioned factors reinforce each other and affect external trade and finance relationships resulting into 'generalized poverty'. This in turn reinforces the domestic inter-relationships which causes generalized poverty to persist.

If we talk about the policy implications against the poverty traps in LDCs, the most important and basic measure is to raise the economy's capital stock by a big magnitude; such that it crosses the critical threshold at once and gains momentum towards a higher equilibrium. This is where the 'big push' theory comes in, as explained in the UN Millennium Project Final Report:

> "The key to overcoming the poverty trap is to raise the economy's capital stock – in infrastructure, human capital, and public administration – to the point where the downward spiral ends and self-sustaining economic growth takes over. This requires a 'big push' of basic investment…." (p39)

The suggestion of the report is quite clear that the increase in the capital stock should come in one step as a large injection of external assistance, which is supposed to act as aid not for the sake of charity, but as a means of rehabilitation and an exit scheme from the poverty trap. The report concluded that there is apparently no other likely strategy for ending the poverty trap of various LDCs.

(5) Conclusion

In this paper, we saw that factors causing poverty traps to emerge and persist are many and have different aspects. In all cases, the initial capital stock and productivity techniques are very important in determining the poverty dynamics of the economies. Besides, financial market failures and institution failures are also counted as important factors in this context.

In geographically vulnerable regions such as in sub-Saharan Africa, natural shocks in the form of droughts and famines etc play important role in the prevalence of poverty traps. Adverse geography itself is a big factor behind the poverty traps of various African LDCs. Non-friendly agricultural conditions with very hot and humid temperatures result in low outputs due to which exports get stagnant. Upon it, initial debt grants which could not help in escaping the poverty traps earlier often result in unsustainable debt-servicing payments which become another cause of the persistence of poverty traps.

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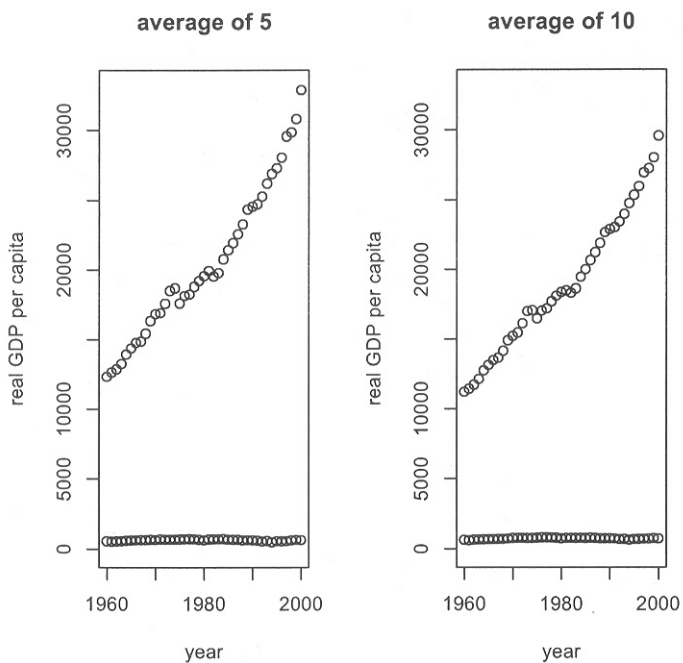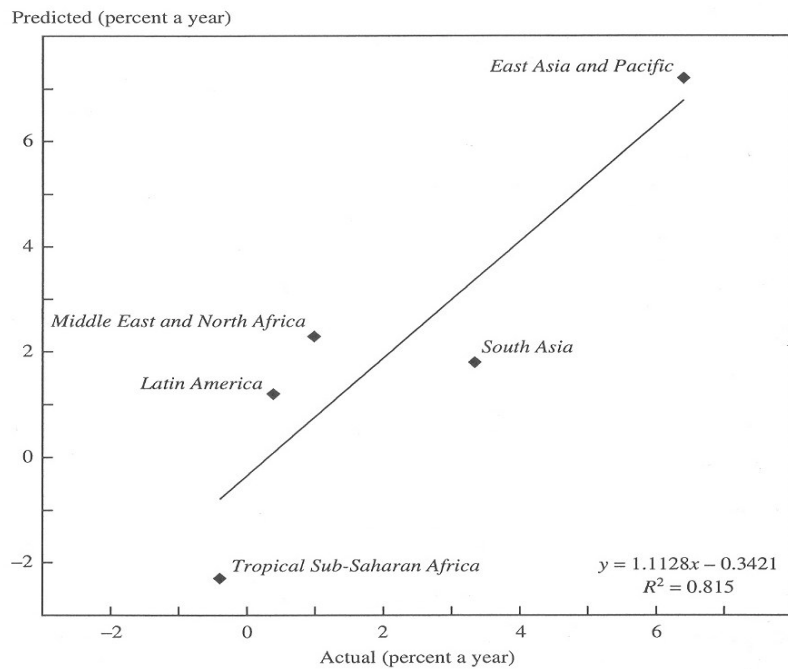**Appendix**

Fig 5

average of 5   average of 10

Fig 5:
Growth difference between 5 richest and 5 poorest countries. 10 richest and 10 poorest on right side. (Azariadis and Stachurski 2004)

Fig 6

Figure 6. Growth in Gross National Income by Developing Region, Actual and Predicted, 1980–2001

Predicted (percent a year)

East Asia and Pacific

Middle East and North Africa

Latin America

South Asia

Tropical Sub-Saharan Africa

$y = 1.1128x - 0.3421$
$R^2 = 0.815$

Actual (percent a year)

Source: World Bank (2003a) and authors' calculations using model described in the text.

Agricultural Technology and Productivity by Developing Region

Developing region	Share of area planted to modern varieties (percent)				Contribution of crop genetic improvement to yield growth, 1960–98	Cereal yield (kilograms per hectare) 2000	Average annual growth in cereal yield, 1980–2000 (percent)	Average annual growth in food production per capita, 1980–2000 (percent)
	1970	1980	1990	1998				
Sub-Saharan Africa[a]	1	4	13	27	0.280	1,111.6	0.7	–0.01
Asia	13	43	63	82	0.884	3,662.4	2.3	2.3
Latin America	8	23	39	52	0.658	2,809.2	1.9	0.9
Middle East and North Africa	4	13	29	58	0.688	2,659.9	1.2	1.0

Sources: Evenson and Gollin (2003); World Bank (2003a); FAOSTAT data base (available at apps.fao.org/default.jsp).

a. All countries in sub-Saharan Africa, except in last three columns, which refer to the thirty-three countries listed in table 2.