

# REAL WORLD DIVERGENCE, THEORY CONVERGENCE: GROWTH MODELS AND CUMULATIVE CAUSATION (BY: BRENDAN FISHER)

## I INTRODUCTION

In our market driven society the word *development* has become synonymous with economic development which in turn has transmuted into economic *growth*. Neoclassical economists describe development as ‘*growth* which reallocates production factors from low productivity, labor intensive, decreasing returns system to high productivity, modern, increasing returns system’ (Adelman and Morris, 1997). Growth has become the goal we seek in order to increase our well-being. Some economists have moved towards viewing development as an increase in the *quality* of goods and services and how they relate to our well-being (Daly and Farley, 2004), but the growth idea still holds the mainstay.

On the macro level, the idea that development means growth is mainly applied to how we seek to ‘raise’ developing countries from their place of poverty. Gandhi said the basic problems in the so called ‘developing world’ stem from low total investment in impoverished areas, population growth, and the capital intensive, labor un-intensive nature of modernization (Das, 1979). Nonetheless, growth, if great enough, is assumed to address these issues.

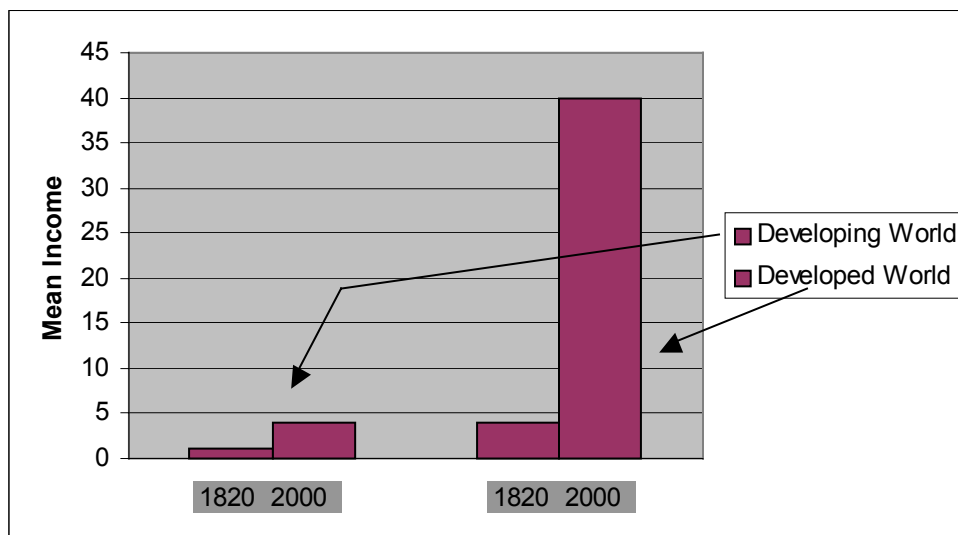


Figure 1. Mean income rise since 1820, with developing income in 1820 assumed as unity.

This paper addresses the fact that economic growth rates across nations are diverging in spite of overall global economic growth. Traditional growth theory purports that growth will lead to a convergence of global GNPs. This has not been realized in the real world. In fact, in a recent in-depth study of global inequality Bourguignon and Morrisson (2002) show that the bottom 60% of countries have seen a fourfold increase in mean income since 1820, where as the top 10% has seen tenfold increase (Figure 1).

New growth theories, still within the neoclassical framework, try to patch the failures of traditional theory to account for the truth of divergent economies. This paper looks into these new theories and asks whether they are enough to mend the old growth model or do the ideas of *cumulative causation* need to be recognized and new foundations for development constructed. This term is discussed below along with its differences and similarities with new growth models. The question of whether or not these theories are converging themselves is also addressed. The paper closes with some thoughts on whether the theories matter in the real world at all.

## II GROWTH THEORY

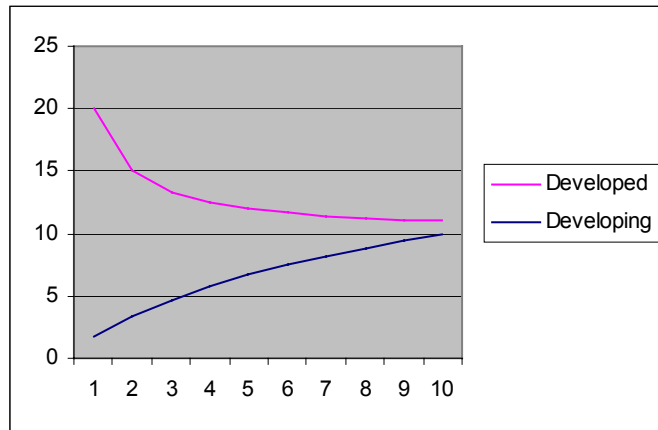
Part of the cooption of the word *development* now meaning economic growth has been at the hands of neoclassical economic growth models which were built around the idea that output or growth can be explained by the “fundamentals” of market analysis: resources, technology and preferences (Hoff and Stiglitz, 2001). The most notable of these models was developed by Noble Laureate Robert Solow. His model showed that growth was a function of capital, labor and technology. In the form:

$$Y = f(K * AL)$$

Where  $Y$  is output or growth,  $K$  capital and  $AL$  an efficiency term representing the amount of labor and its subsequent productivity due to technological factors (Deardorff, 2001). This model is well accepted and has been the foundation upon which growth models have been built upon for the past almost 50 years.

This model and its descendants led to theories of the convergence for national economies. The logic of this argument comes from the belief in decreasing returns. As

investment would experience a greater *rate* of return in a developing economy compared to a developed economy, investment would flow in that direction. Hence, in high wage countries growth would be dampened at the gain of low wage countries. Income levels would therefore meet in some “affluent middle” as seen in Figure 2.



**Figure 2.** General shape of economic convergence

Of note is how convergence models do not account for history, institutions or income distribution and its effects (Hoff and Stiglitz, 2001). Unfortunately, the past 50 years of economic growth and a move towards a new global economy show little in support of convergence models. Even contemporary neoclassical economists recognize the inaccuracy of these traditional model predictions (Skott and Auerbach, 1995), and have come up with many responses to the inaccuracies of this model while not abandoning the general premise of decreasing returns or the need for overall growth. These new arguments include government impediments, trade barriers and market imperfections. These issues will be discussed at greater length below.

Land based economies are dictated by diminishing returns, but in the modern era of manufacturing and service economies increasing returns are possible and often likely (Skott and Auerbach, 1995). This fact would seem to bring the traditional growth theory to its knees, unless the new growth models account for this in an implicit way. I will cover this issue below, once we have discussed a conceptual model that explicitly takes into account the possibility of increasing returns. This is the idea formulated by Young (1928) and coined by Myrdal (1957) ‘cumulative causation’ (Romer, 1986).

### III CUMULATIVE CAUSATION

Growth theories based explicitly on diminishing returns ignore even the possibility of increasing returns and its effects on growth, which was featured even in the work of Adam Smith (Romer, 1986). Likewise Marx presented a similar argument in that increasing returns led to what he called 'uneven' development (Skott and Auerbach, 1995). In the 1920's Allyn Young developed conceptual ideas of increasing returns and competitive equilibrium (Romer, 1986). Probably influenced by Young, Kaldor early on rejected non-increasing returns to scale (Setterfield, 1998) and he posited that with increasing returns productive possibilities depend on levels of production in the past. This is the essence of what Gunnar Myrdal called *cumulative causation* (ref). As described by Setterfield (1998):

Cumulative Causation involves a self-reinforcing, circular interaction between economic variables, so that, for example, an initial increase in some variable X induces changes in a second variable Z which result in a further increase in X and so on...

In other words the conditions of a system and the initial path the system is following at time  $t=0$ , has a strong affect on the direction the system travels at time  $t=1,2,3\dots$ . This is also known as path dependency or positive feedback to systems thinkers. The idea can be applied to individuals, firms, countries and possibly the global economy to come. As Arrow (1962) noted, a firm's success is based upon the knowledge accumulated historically by the industry as a whole. In this vein where history plays a role, Brian Arthur (1999) finds that 'expectational' results can become self-reinforcing.

This idea that historical conditions and decisions directly affect growth with the possibility of continuing to decide the path a system will travel, seem to fly in the face of traditional growth theory. The latter which contends that with enough capital and technology a system in a low state will move to a high steady state, while the former purports that there are factors which largely decide the fate of the system and are not accounted for in neoclassical growth theories. These two explanations of growth are

incompatible with each other. However, there are new growth models, which are still heavily based on Solow's work, that try to incorporate other factors such as government impediments, trade issues, and human capital.

The looming questions are:

Are the new growth models still contradictory to the ideas espoused by the *cumulative causation* argument?

Or

Is the new neoclassical work on growth theory converging with the ideas of *cumulative causation* in an attempt to better explain the divergence of economies we see in the real world?

#### **IV DIVERGENT THEORIES?**

Critics of the traditional growth theory are many. Their strongest and most obvious argument that the convergence predicted by growth models is a cruel joke compared to what we find in the real world in spite of the economic growth we have seen globally over the past 50 years. They also point out that by ignoring endogenous societal factors and the initial conditions of the system, neoclassicists have missed the most telling variables for successful prediction. Some of the main critics of these ideas have been the development theorists. Where neoclassical convergence analysis assumes that there are few technological and institutional impediments to reallocation, development theorists presuppose institutional and technological barriers, investment lumpiness and infrastructure problems (Adelman and Morris, 1997).

Proponents of cumulative causation have been criticized for placing too much emphasis on the initial conditions of a system and for relying too much on a self-reinforcing mechanism with little possibility of breaking the cycle (Setterfield, 1998).

There are new ideas within the 'traditional' growth framework that have attempted to close the gap between theory and reality. These attempts often focus on simply adding one more variable to the model or pointing out that the execution of growth has not

followed the assumptions of the model. This second idea is analogous to saying “it is not the model, but the real world which is amiss.” The following analysis ignores the latter explanation as absurd and focuses on some neoclassical answers to the growth model and attempts to bring the predictions closer to reality. These new avenues down which growth theory is traveling fall mainly into the following categories: governments and trade, human capital and distribution issues. The discussion below is laced with how these issues are dealt with by *cumulative causation*.

### *Governments and Trade*

The most common reply from neoclassical economists on why the traditional growth model has not been accurately predictive is that governments are impeding markets and hence the market is not responding appropriately (Hoff and Stiglitz, 2001). The policies often pointed to as major impediments to proper market functioning are financial and trade policies.

Perotti (1994) argues that globalization will provide the predicted convergence as soon as governments remove all trade barriers and therefore market imperfections. Likewise, Adelman and Morris (1997) contend that once the financial and trade barriers are removed we will begin to witness the global benefits of comparative advantage. It is often argued that protectionism leads to further impoverishment and that once low income countries realize the benefits of trade a simple increase in national savings levels would break the poverty trap that these countries have been mired (Deardorff, 2001)<sup>1</sup>.

Although government and trade impediments may explain some of the realized divergence, but they are far from being the panacea needed to heal the traditional growth model. As Deardorff (2001) continues, if the initial conditions contain large inequalities then trade only makes these inequalities worse. This is a vote for cumulative causation. As initial inequalities, such as those we see and have seen amongst nations, cause what Marx calls *uneven development* and uneven development produces winners and losers,

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<sup>1</sup> Although this argument has some merit they still ignore the role of institutions, such as the World Bank and International Monetary Fund and is it even possible to increase national saving rate in light of debt service?

surely the winners have the upper hand in future interactions. In reference to globalization, Herman Daly (1999) refers to this idea when he says that we are moving from an era of *comparative* advantage to one of *absolute* advantage. In a global market where capital is freely mobile, trade cannot bring comparative advantage, but fosters an absolute advantage.

Thus, a model where convergence is a function of the traditional growth model, with government and trade, additions may still be sub-par. Even economists who support removing governmental ‘fettters’ concede that it may not be enough or necessary for growth (Hoff and Stiglitz, 2001). In fact, trade and the removal government barriers may induce further accumulated disparity, reflecting path dependency.

### *Human Capital*

Some theorists argue it is not trade but the human capital factor that is missing from Solow’s original model which explains the discrepancy between the model and the real world phenomena. Initial differences in human and social capital are believed to lead to ‘lumpiness’ in the market and therefore foster increasing returns systems (Adelman and Morris, 1997). In a study of 98 countries between 1960-1985 Barrow (1991) found that growth was positively related to initial human capital and political stability. Likewise the *Chicago School* purported that human capital was a strong enough driver to move a country from a low to a high steady state (Adelman and Morris, 1997).

The idea that there is more than one steady state which countries may converge to has birthed the idea of ‘growth clubs.’ Quah (1996) found that one key to determining which steady state (growth club) a country approached (joined) is human capacity.

By including initial human capital into the traditional growth model some economists are recognizing not only that there are endogenous drivers to growth but that history matters. This idea falls clearly in line with the most fundamental aspect of cumulative causation, and outside the traditional convergence theory based solely on capital, labor and technology. As, Barrow (1991) states, the idea that poor countries have greater growth

rates is inconsistent with the evidence, and the rare exception is due to human capital endowment.

### *Distribution Effects*

The effects of resource, capital or income distribution have also been studied recently as a mechanism for the failure of convergence. At the macro level, developing countries are often caught in poverty traps due to distributional issues. Where developing countries outnumber developed countries by a factor of 10 it is truly a buyers market, and therefore any unevenness in seller production capacity in *time 1*, would lead to further distribution spread in *time 2*. As Hoff and Stiglitz (2001) point out distribution issues affect incentives, investments and therefore affect market outcomes.

At the micro level Benabou (1994) modeled how small wealth differences in family incomes led to community stratification which in turn led to poverty traps for families on the low income end of the spectrum. In a similar vein Banerjee and Newman (1993) showed that with a large enough initial distribution gap inequalities, among families in this case, can persist across generations indefinitely. In the context of the global situation, developing countries experiencing Malthusian population growth, with low levels of physical and human capital get caught in poverty traps (Adelman and Morris, 1997), and could be considered *distributionally* challenged. Whether their challenge is attracting investment, training workers or adapting to technology their status today affects their place tomorrow.

The effects of initial distribution are certainly encompassed by the ideas of cumulative causation, and the more neoclassical models try to incorporate distributional effects the further they stray from traditional growth theory.

## **V CONVERGING THEORIES?**

Put simply by Hoff and Stiglitz (2001), by ignoring distributional issues, historical experience and institutions, neoclassical growth theory fails to capture the true essence of development economics. But with the new growth models we see economists either



modifying Solow's work or creating new models which incorporate the influence of governments, and human capacity. Moving away from the simple causal model, that convergence is the 'would be' result of capital investment and technology, new theories are at least conceptually recognizing the effects of cumulative causation.

The models showing multiple steady states, growth clubs or 'twin peakedness' (when there is both high and low steady state of convergence (Quah, 1996)) seem to be a fusing of the two ideas. And although the convergence of national economies has not been realized, it seems as though a convergence of divergent theories is occurring with neoclassical growth models slowly adopting the idea of increasing returns and historical influence. We have moved from a generally accepted view that considered only capital and the removal of market barriers to drive convergence to the clear understanding that the economic 'ecosystem' (history, institutions, human capital, luck) plays a major role in the outcome of national markets and therefore the global market place (Hoff and Stiglitz 2001).

## **V DO THEORIES MATTER?**

From the above discussion I believe that I have answered the initial question that these two initially disparate ideas are indeed converging. The knock on question is does this have any significance in the real world? Below I argue that yes the foundations and directions these theories are heading have real significance for global poverty and economic growth.

With his keen economic insight Gandhi concluded that convergence of national economies was an impossibility for three reasons. First, the developed world depended on 'backward' economies (developing countries) for raw materials and surplus disposal. Second, the level of investment needed to bring poor countries to an affluent middle was prohibitive (Das, 1979). Thirdly, Gandhi (1925) pointed to the fact that there were certain ecological limits to growth. All of these conclusions have since been argued and supported in the mainstream literature. We have seen the first idea ring true in the Northern market driven deforestation of the Amazon (Geist, 2002). The second idea has

been noted by the World Bank, and studies have shown that even when investment is high, much of the financial capital gets sucked back out of the economy to shareholders of multinational corporations (Barlow and Clark, 2002). Gandhi's third point has become the foundation of the, meta-paradigm, transdiscipline *Ecological Economics*<sup>2</sup>. His last point is typified by work like that of Wackernagel (2002) and Rees with the Ecological Footprint Analysis suggesting that we have already grown beyond the carrying capacity of the Earth.

The three points of Gandhi provide a poignant platform from which to argue that the theoretical economic framework we chose to operate from (growth models or cumulative causation) has a real significance in addressing the real world problem of poverty and economic growth.

Even if new growth models are beginning to encompass such ideas as institutions, and human capacity they are still linked to economic growth and technology as keys to development. These operatives are in conflict with Gandhi's third point and much of what Ecological Economists argue. Also, the prescription of economic growth leans heavily on technology and technological transfer, and it has been shown that even between adjacent villages in the developing world information networks are weak mechanisms to count on (Hoff and Stiglitz, 2001). Finally, the fact that investment into the developing world is lower than needed and lumpy, means that the focus on technology and growth may be a misplaced use of vital and limited funds.

In spite of the fact that some new growth models are incorporating more 'fuzzy' variables and social mechanisms does not allay their theoretical foundations. And these foundations based on Solow's work are what is still driving global policy. The prescriptions of the WB and IMF to liberalize economies, and free developing markets are based on these neoclassical underpinnings of growth models. This agenda has been pushed so far that economic contagions are the new global fear. Last January the IMF

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<sup>2</sup> Gandhi's work in this area has been of little note in Ecological Economics. The possible foundational work of the discipline as found in Gandhi's writings is one I plan to investigate. At a later date of course.

admitted that some of their policies maybe cause regional instability in developing economies (Prasad and Rogoff, 2003), but although this admittance seems like a step in the right direction, the report goes on to say that the major factor is still national governments. This position seems very tenuous since national economic policy is directed by Bank and Fund economists in Washington.

On the other hand, cumulative causation does not have a foundation based on growth. In fact, conceptually it is simply a method to understand what is happening on the macro and micro levels, not a prescriptive prediction of convergence. This is the key difference between the two theories and the one that has the most relevance to understanding the divergence of economies. By focusing on ‘factors’ in general, the theory does not limit itself to ideas of growth and variables often associated with growth. Studies focusing cumulative effects do not start off from an equation to operationalize like their growth theory counterparts, and although they often are modeled they are not limited to this technique. This allows these studies to fold in numerous causal mechanisms, and to not assume that given the right policies (or no policies) growth will lead to convergence.

So, although the divergent theories may be converging, their theoretical foundations remain distant, and this is where policy finds its springboard. The 50 years following growth ‘medicine’ for inequality has produced questionable results. I tie up the discussion leaving the theoretical and focusing on some real world consequences of following growth theory assumptions.

## **VI CONCLUSION: THE REAL WORLD**

The strategies used now to address the global poverty issue basically follow the ideas knows as the ‘Washington Consensus,’ such as opening and liberalizing economies, focus on capital intensive activities, increasing technology use and creating export driven economies. These policies can be rationalized in light of growth theories, but would be much harder to emplaced if the ideas of cumulative causation were taken into account. Particularly because growth theory models ‘work’ everywhere, where if analysis was

sensitive to the ideas of cumulative causation then prescriptions would be context specific, and start from the idea that initial conditions do indeed matter.

Recent analysis of the East Asian economies shows that countries which did not follow the Washington Consensus were more successful. Examples are Japan and Korea. In 1950, they were much like their developing neighbors, but their policies of government investment, protected markets, and high expenditures on human capital were the key reasons these are now developed countries (Adelman and Morris, 1997). This move would likely not have occurred if the classical growth recommendations were followed, but by acknowledging the importance of initial conditions development economists can benefit from these successes.

In the past 50 years roughly following the prescriptions of growth theory the income spread across nations at best decelerated, and in reality there is little difference in the global distribution of wealth (across countries) from 1950 to now (Bourguignon and Morrisson, 2002). This is a remarkable fact since the Gross World Product has gone from less than \$5 trillion in 1950 to around \$47 trillion in 2002 (Global Policy Institute, 2003).

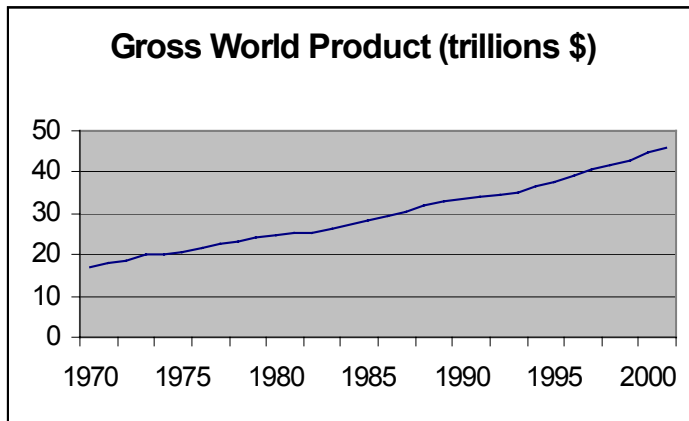


Figure 3. Growth of GWP since 1970.

Figure 3 Shows GWP growth since 1970.

Adelman and Morris (1997) contend that economic growth has at best been stalled in developing countries since 1981 and has likely decreased. With a tenfold increase in global growth over the past 50 years and no change in the global distribution of wealth it is likely time that we question not only the results of growth theory, but its foundations as well. Even early on it was noted that development (capital intensity) led to raises in

modern sector wages, but a country's average income did not rise (Das, 1979). Growth provides some winners, but losers as well. By taking a more holistic look at a developing economy and understanding the general mechanisms which lead to cumulative effects perhaps we would see more development in the needed areas not just global growth. As Herman Daly (1990) puts it, "an economy can ...develop without growing, or grow without developing." Globally we seem to be growing without developing, and it is highly likely that the assumptions, execution and implementation of the ideas encapsulated in 'growth theory' are driving this.

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