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Human Development Traps and Economic Growth

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Abstract

Human capabilities play an important part in the emergence from stagnation to modern economic growth. Historical and macroeconomic studies show substantial effects for nutrition and health on income levels and on rates of growth, implying long-term divergence of incomes. Cross-country examination of the joint dynamics of the life expectancy and income shows that emergence from stagnation continues to this day, marked by barriers to basic human development and to productivity. These observations are explained by a model in which human development interacts with technological change and is characterized by a sequence of market failures. These dynamic, intergenerational, human development traps make economic evidence for an economy-wide, intergenerational, low human capital trap consistent with this model. The effects found for early child development on the acquisition of education, and therefore on adult income, are commensurate with the historical and macroeconomic magnitudes mentioned above.

Resumen

Las capacidades humanas juegan un papel importante en la salida del estancamiento al crecimiento económico. Diversos estudios macroeconómicos e históricos muestran que nutrición y salud bajas conllevan niveles y tasas de crecimiento del ingreso sustancialmente disminuidas implicando y una divergencia de largo plazo de los ingresos. Un examen comparativo de la dinámica conjunta de esperanza de vida e ingreso entre los países del mundo muestra que el panorama actual se caracteriza por una salida del estancamiento estratificada, marcada por barreras al desarrollo humano básico y a la productividad. Estas observaciones pueden explicarse por medio de un modelo en el cual el cambio tecnológico interactúa con el desarrollo humano, que a su vez es caracterizado por una secuencia de fallas de mercado. Esta dinámica intergeneracional de trampas de desarrollo humano, provocan que el crecimiento económico sea lento, estratificado y transicional. Un estudio macroeconómico sobre México encuentra evidencia para trampas intergeneracionales de bajo capital humano que afectan la economía en su conjunto. El desarrollo humano temprano tiene importantes efectos en la adquisición de la educación, y por lo tanto sobre el ingreso, que son conmensurables con las magnitudes históricas y macroeconómicas ya mencionadas.

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Human capabilities play an important part in the emergence from stagnation to modern economic growth. Historical and macroeconomic studies show substantial effects for nutrition and health on income levels and on rates of growth, implying long-term divergence of incomes. Cross-country examination of the joint dynamics of life expectancy and income shows that a stratified emergence from stagnation continues to this day, marked by barriers to basic human development and to productivity. These observations are explained by a model in which human development interacts with technological change and is characterized by a sequence of market failures. These dynamic, intergenerational, human development traps make economic growth slow, stratified and transitional. A microeconomic study on Mexico finds evidence for an economy-wide, intergenerational, low human capital trap consistent with this model. The effects found for early child development on the acquisition of education, and therefore on adult income, are commensurate with the historical and macroeconomic magnitudes mentioned above.

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Introduction[1]

Modern economic history is characterized by a tremendous development in human capabilities that plays and important part in long-term economic growth. The extent of this improvement in human well-being has only been ascertained recently. Population-wide improvements in health status over the last two hundred years amount to qualitative improvements beyond what was thought possible contemporaneously or even recently. Life expectancy in developed countries has risen from 40 to 80 years, stature has risen between 12 and 17cm, and weight has almost doubled.[2] Even today we find it hard to believe that our children could expect to live to 100.[3] Together with these achievements, there have been tremendous rises in human capabilities associated with education and probably cognitive development. At the economy-wide level, increased health and life expectancy raise the returns for all types of investment. This leads to faster capital accumulation and triggers the tremendous explosion in knowledge and technology.

These discoveries lead to a more dynamic conception of human development than was current just one or two decades ago. Human capabilities increase with the income, technology and social organization of the society of birth. The intergenerational nature of human development, and the slow rate of transition that market failures in human capital investment impose, take on an important role. Indeed, the first question in a dynamic conception of human development is: what happened in human history that led from a millenary period of stagnation to these achievements linked to modern economic growth?

To answer this question, it is necessary to think of thresholds, multiple steady states and prolonged transitions. For example, Galor and Weil (2000), accounting also for the demographic transition, describe stagnation as a Malthusian steady state with low incentives for human capital accumulation, in which slow technological change leads to population growth without a resulting equilibrium rise in per capita income. A slow increase in the rate of technological change eventually makes this steady state unstable. The economy transits through a Post-Malthusian period to modern economic growth, a steady state with high human capital and low population growth. More recent explanations argue instead that slow technological change

[1] This article is written as a chapter for the book *Health and Economic Growth: Findings and Policy Implications*, edited by Guillem López-Casasnovas, Berta Rivera and Luis Currais.

[2] Specifically, average stature rose from 164 to 181 cm in Holland between 1860 and 2002 and from 161 to 173 cm in France and Norway between 1705 and 1975. Weight rose from 46 to 73 kg in Norway and France between1705 and 1975. Life expectancy rose from 41 to 78 years in England between 1841 and 1998; and from 29 to 60 years in India between 1930 and 1990. Schooling rose from 2.3 to more than 11 years in England between 1800 and the 1980's. (Fogel, 2002; Cervellati, Matteo and Uwe Sunde, 2003.)

[3] Life expectancy for older people has continued increasing in the last years without any apparent slowdown.

eventually triggers a transition from an equilibrium with low life expectancy to one with higher life expectancy in which skills and knowledge making economic growth possible accumulate (Cervellati and Sunde, 2002; Mayer-Foulkes, 2003a). Another explanation invokes the search for appropriate institutions, with success leading to a transition from stagnation to growth (Kremer, Onatski and Stock, 2001). Lucas (2000) argues that the exit from the stagnation and subsequent convergence to modern economy growth will account for much of what will be observed in the 21st Century.

Since some countries developed before others, a second question posed by a dynamic conception of human development is, what happened in stagnant countries once the leading countries developed? Has the multiple steady state structure persisted? Has a new one appeared? How does human development interact with economic growth?

This chapter begins by reviewing historical and macroeconomic evidence on the magnitude of role of nutrition and health in long-term economic growth. Then, it makes use of research results from several papers by the author to address these questions, in two parts. The first part gives macroeconomic evidence that prolonged transitions involving first, human development barriers in nutrition and health, and second, barriers to productivity growth, continue to occur in the present-day. The second part discusses theoretical models for these human development barriers and turns to microeconomic evidence for the role of health in human development, including evidence for present-day low human accumulation traps.

The theoretical finding shows that human development can be thought to be subject to a sequence of market failures. These give rise to dynamic poverty traps under which long-term cross-country growth is characterized by stratification and transition. The microeconomic finding supports the presence of human capital accumulation barriers or traps involving ninety percent of the Mexican population, consistently with the theoretical model. The intergenerational impact of early child development on adult education, and therefore on adult income, has a magnitude commensurate with the one found for the long-term historic and macroeconomic impact of nutrition and health on economic growth.

The role of health in long-term and cross-country growth

It was Fogel's Nobel Prize winning work that first brought out the extent of long-term changes in nutrition and health and their importance for long-term economic growth. Using 19th century data on weight, stature and mortality, Fogel (1991, 1992, 1994a, 1994b, 2002, Fogel and Wimmer, 1992) were able to establish that weight and stature have undergone secular increases of such a magnitude that they bring into question current standard tables of normalcy in height and weight. By setting up caloric national accounts, Fogel estimated that one third of economic growth in Great Britain over two centuries was due to increases in the work delivered by the human machine. These findings constituted a challenge: if nutrition, or alternatively a broad conception of health including nutrition, plays such an important long-term role, what is the role of health in economic growth today? Through what mechanisms? Further historical evidence of the importance of health for economic growth was provided by Arora (2001). Using 62 health-related time series for nine advanced economies over the last 100-125 years, Arora finds that in the cointegrated relation between health and income, innovations in health lead to economic growth, and not viceversa. These variables account for between 26% and 40% of total income growth.

A series of macroeconomic cross-country studies also mostly found evidence for a significant impact of life expectancy on economic growth (Barro 1991; Barro and Lee 1994; Barro and Sala-i-Martin 1995; Barro 1996; Bhargava, Jamison, Lau, and Murray 2000, Easterly and Levine 1997; Gallup and Sachs 2000; Sachs and Warner 1995, 1997. Caselli, Esquivel, and Lefort (1996) are a notable exception). The impact of health on income is an important policy issue that has motivated research at the World Health (1999a, 2001) and Pan American (Mayer et. al., 2001) Organizations. The first set of studies finds that the burden of disease has a very substantial impact on poverty, strongly affecting development and economic growth through a diverse set of channels. In the second set of studies, important twenty-five to thirty year long-term impacts of life expectancy on economic growth are found, using panels on the Mexican states (Mayer-Foulkes, 2001a) and Latin American countries (Mayer-Foulkes, 2001b). Their cumulative impact also adds up to about one third of economic growth. By studying the productivity gains associated with stature rises in Korea and Norway, Weil (2001) arrives at similar magnitudes for the contribution of health to economic growth.

None of these studies, however, is designed to distinguish if there are qualitative differences in how health affects growth across countries. In a careful panel study of growth effects taking account of heterogeneity, endogenity and reverse causality, Bhargava (2001) finds that adult survival rates lead to growth in low-income countries. This is consistent with a recent study by Arcand (2001) on the role of nutrition in growth. This study finds evidence for a low nutrition trap in the form of a low group of countries not experiencing convergence for which nutrition is important for growth, and a high group experiencing convergence for which nutrition does not contribute to growth. Both are also consistent with the global divergence found in Mayer-Foulkes (2002c), in which countries with low life expectancy are also experiencing low rates of growth, only just beginning to emerge from stagnation.

Turning to the dynamics of life expectancy rather than income, for which many more countries have data, leads to a remarkable finding (Mayer-Foulkes, 2003c).[4] The cross country distribution of life expectancy is clearly twin peaked in both 1962 and 1997 (Figures 1.1, 1.2). But half of the countries in the lower peak shifted to the upper peak within this period of time. Thus three groups of countries

[4] We use the World Bank data base. The balanced 5-yearly life expectancy panel for 1962-1997 contains 159 countries.

can be defined; those remaining in a lower peak, those changing to the higher peak, and those in the higher peak throughout. The lower group has semi-stagnant life expectancy. The higher group has high and improving life expectancy, while the middle group can be though to be in a rapid transition from semi-stagnant, low life expectancy, to high life expectancy. Each of these groups can be shown to be β-conditionally convergent. The phase diagram for life expectancy dynamics between 1962 and 1997 (Figure 3.1 without the coloring) forms an inverted U pattern corresponding perfectly with transition dynamics from a low to a high equilibrium with a high transition rate in between. At low levels of life expectancy, growth can be high or low, at medium levels of life expectancy improvement follows a high, transitional rate, and at high levels the negative gradient of convergence to a high equilibrium level becomes apparent. Thus the dynamics of stagnation to growth continued to be present in human development during the latter part of the 20th century.

What about income per capita*?* When we examine the cross-country phase diagram of economic growth, is convergence apparent? Or, is there evidence for emergence from stagnation to growth? Is there additional stratification? It will become apparent that an answer to these questions is established more clearly by using the cross-country information contained in both income and life expectancy.

In asking whether there are complex dynamics in cross-country income (or income and life expectancy), what we are asking is if a characteristic shape or functional relation can be detected in the phase diagram (or diagrams). Thus an appropriate method is to cluster the data points in the phase diagrams, to detect any shape that may be present.

In "Global Divergence", Mayer-Foulkes (2002c) carries this out in two ways. The first uses an algorithm for fuzzy clustering (Bezdeck, Ehrlich and Full, 1984; Zimmermann, 1996). This has the advantage, compared to hard clustering, of producing unique results. A parameter yielding a low level of fuzziness is used, because countries are usually though of as belonging wholly to a single dynamic of economic growth. The second uses a hard clustering technique.

The fuzzy clustering is performed separately into two up to nine clusters, and is performed using life expectancy and income data both separately and jointly.[5] The cluster centers lie in every case on an inverted U shape (Figure 2.1). As noted above, this shape describes the emergence in life expectancy from a low to a high equilibrium. In the case of income, however, the expected shape for the emergence from stagnation to growth, as described in general terms for example by Lucas (2002), is an inverted U with a somewhat higher right leg representing a positive steady state rate of growth. We find that the income cluster centers lie on the first

[5] The sample used for fuzzy clustering consists of 104 non ex-socialist non-petroleum-dependent countries for which a balanced sample in both income and life expectancy data is available. The data used for the clustering algorithm is average log level and average period growth for income and life expectancy. The fuzziness parameter *m* is set at 1.5. The results are reported in a forthcoming version of the article.

half of such an inverted U, representing a transition for income in which the initial divergence has not been mitigated by convergence. When five or more clusters are used, though, an additional group of countries undergoing an especially fast transition is detected, which does converge to higher income countries. Further subdivision does not uncover additional features in the phase diagram (Figure 2.2).

The second clustering approach separates the phase diagram into five groups, but uses a hard regression-clustering technique taking advantage of a wider set of countries for which either the income or the life expectancy data are complete.[6] The choice of five groups is used because it is the smallest number of clusters for which the main features of the phase diagram appear, as we just saw, and because it allows the subdivision of the higher life expectancy group mentioned above (Mayer-Foulkes, 2003c) into developed, fast-growing and undeveloped countries. The resulting phase diagrams are shown in Figures 3.1, 3.2, and the corresponding trajectory diagrams are Figures 4.1 and 4.2.

Again, Figure 3.1 shows the emergence from stagnant life expectancy to high life expectancy. In the case of income, a portion of the initial, increasing branch of an inverted U representing the emergence from stagnation to growth is visible in Figure 3.2, consisting of Groups 1, 3, 4 and 5. This phase diagram has as an additional feature the exceptionally fast transition of Group 2. Looking at Figure 4.2, though, it is apparent that Group 3 is growing slower than Group1, while Group 2 is bridging the gap between Groups 3 and 1. Thus we have evidence for three steady states here: development (Group 1), semi-development (Group 3) and semi-stagnation (Group 5), with Groups 2 and 4 following transitional paths between them. We can conclude descriptively that: 1) in the present day, Group 5, the bottom tier of countries, is semi-stagnant rather than stagnant, presenting improvements in life expectancy. Average income has decreased, however, probably due to catastrophes involving war and AIDS. 2) Countries that recently emerged from semi-stagnation appear to have overcome a barrier, and fairly rapidly achieved substantial levels of life expectancy and medium levels of income, reaching a state of semi-development. 3) Countries that reached full development during the period, such as some of the Asian tigers, Spain and Portugal, experienced a further fast transition, appearing to overcome a high productivity barrier.

This evidence supports the view that the process of emergence from stagnation to modern growth, which lies at the origin of the great divergence, continues to this day. However, further stratification has emerged. The observed large-scale steady states do not only correspond to stagnation (or semi-stagnation) and sustained modern growth (or development). A further steady state, semi-development, has appeared in between.

The following three recent models give a technological explanation for such a stratification. Howitt and Mayer-Foulkes (2002) show that if R&D is distinguished

[6] The sample used for the hard regression clustering algorithm consists of 126 non ex-socialist non-petroleum-dependent countries for which either a balanced sample for income (108 countries) or life expectancy (121 countries) is available.

from implementation, three convergence clubs can arise, corresponding to R&D, implementation and semi-stagnation (a steady state growing at a lower rate than the leading edge technology). Acemoglu, Aghion and Zilibotti (2002) show that institutional problems can keep a group of countries away from the frontier, thus explaining the stratification of the growing economies. Aghion, Howitt and Mayer-Foulkes (2003) construct another three club model in which credit constraints cause a lower group of countries to stagnate and a middle group of countries to grow with constrained innovation and lower income. Meanwhile, the higher group is not credit constrained and leads technological growth. The paper further presents empirical evidence for the presence of this cross-country classification of convergence according to credit indicators.

Other explanations for the different long-term growth performance across countries are based on institutional differences between countries that lead to different incentives for human capital accumulation and technological change. For example, Engerman and Sokoloff (2002) argue that initial inequality due to different historical, geographic and cultural conditions put Latin America on a path with more inequality and worse institutions than the U.S., and therefore have followed a lower development trajectory. As mentioned before, Kremer, Onatski and Stock (2001) model the emergence from stagnation in terms of success in the search for appropriate institutions.

Summarizing, in this section evidence has been presented showing that nutrition and health improvements contribute to both levels of economic growth and, at lower incomes, to rates of economic growth. At lower levels, lack of nutrition and health thus prevent the emergence from stagnation or semi-stagnation. Econometric techniques that can distinguish qualitatively between different patterns of growth show that the emergence from stagnation to modern growth continues today in both human development and income. Once certain critical levels of health have been reached, further progress has taken place rather rapidly to a state of semi-development characterized by high life expectancy but only medium income and education. There is thus evidence for barriers to human development, whose possible reasons will be explored below. Similarly, countries that have achieved full development have tended to do so in rapid transitions, appearing to overcome barriers to high productivity. These surely involve human capital accumulation in the form of skills and knowledge and institutional change fostering efficient economics and equality.

Some theory and microeconomics of human development barriers

Over the last two centuries, the great leaps in human development have occurred selectively across countries. While some countries have accumulated human and physical capital and knowledge, others have remained almost stagnant or experienced only a medium level of growth. The convergence predicted by models with perfect markets has not occurred. The question therefore arises: what has prevented economic growth? Why have some countries remained stagnant? Why have others achieved only a medium level of growth? Why are some countries so poor while others are so rich?

Explanations of growth based on perfect market models are left with no alternative but to appeal to institutional and cultural differences between countries – the model parameters – to fit the data. However, the social infrastructure these allude to is also endogenous. It is hard to believe that institutional, cultural and social barriers would be able to successfully resist market and social pressures for human well-being and economic productivity, unless they were buttressed by strong economic forces, such as market failures, holding back convergence and creating deficient equilibria.[7]

The main explanations that have been proposed for slow human development involve market failures in human capital investment. Other kinds of human development barriers that could occur may involve problems in other aspects of the economy, such as the availability of employment ensuring the widespread availability of food (Sen, 1999), adequate institutions ensuring the sufficient supply of public health goods, and sufficient levels and quality of urbanization to lower the costs of sanitation and health, a process which may have significant fixed costs and requires sufficiently equitable institutions.

In the previous section, macroeconomic evidence was presented for the presence of human development barriers to growth. Also, historical and macroeconomic evidence was given for the important role of nutrition and health in long-term economic growth. In this section I focus on theoretical explanations for these barriers based on market failures. These models are intergenerational by nature, and account for failures in human capital accumulation including nutrition and health. I propose a model giving rise to a dynamic low human capital trap that slows growth and induces stratification and transition. Then I give microeconomic evidence for economy-wide failures in health and education investment in Mexico which are consistent with the model and whose magnitude is commensurate with the long-term effects of health on economic growth.

Theoretical models for human development barriers

Several kinds of barriers to human capital accumulation have been modeled theoretically. At low levels of income, the efficiency theory of wages addresses the possibility of a low labor productivity trap due to low nutrition (e.g. Leibenstein, 1957; Mazumdar, 1959; Mirlees, 1975; Stiglitz, 1976; Bliss and Stern, 1981; Dasgupta and Ray, 1984, 1986; Dasgupta, 1991). Econometric evidence for this theory has documented substantial effects of nutrition on labor productivity (for surveys see Barlow, 1979; Martorell and Arrayave, 1984; Strauss, 1985; Srinivasan, 1992; Behrman and Deolalikar, 1988). In later stages, when education became

[7] Of course, an economic trap may have institutional ingredients.

important, Galor and Zeira (1993) modeled low schooling traps. They showed that increasing returns in skill acquisition may lead to multiple equilibria in the presence of credit constraints to human capital accumulation. Under these conditions the distribution of human capital is an important determinant of the pattern of economic development (Galor and Tsiddon, 1997). In relation to education, Azariadis and Drazen (1990) show that increasing social returns to scale in the accumulation of human capital may also lead to multiple equilibria. Educational market failures are also present in developed countries. Durlauf (1996) and Benabou (1996) show that neighborhood choice in the U.S. according to the availability of quality education may lead to persistent income inequality. Recent models include the role of education and health. Galor and Mayer-Foulkes (2002) show that threshold requirements in nutrition and health for the acquisition of education may lead to persistent educational inequality at both low and high levels of education. Unequal distribution of social capital and inequalities in early child nurture and stimulation could also be involved in low human capital accumulation traps. These may be deficient in families with low levels of income and education and unavailable through the school system (Van Der Gaag, 2002).

These and other theoretical models, and the empirical work around them, lead to proposing a stylized fact, that *human development is subject to a sequence of market failures as the process of development proceeds*. As each new generation is born, society's current wealth, technology and institutional endowment allow children of well-to-do families to achieve some higher level of human capabilities and knowledge. Children of poorer families will only achieve a lower level of nutrition, health and education, because of the presence, for example, of a credit constraint. One generation later, more wealth, technology and institutional capacity may have been achieved, based on the new generation's human capital. However, unequal human capital investment will occur again, at a somewhat higher level and for perhaps somewhat different reasons. The distribution of nutrition, health, education and income will be characterized by a *dynamic trap* in which poorer families cannot converge to richer families, even though their income rises with time. This model, characterizing the relation between human development and economic growth, is proposed in Mayer-Foulkes (2003a). During the period through which human development occurs, stratification and transition characterize cross-country economic growth. When some further market failure is introduced, growth dynamics are further stratified. Credit constraints or knowledge barriers for technological change, as well as multiple institutional steady states (in which the low equilibrium is characterized by an unequal distribution in which the rich hold power and do not invest in public goods for the human development of the poor) are examples of such barriers. In these models, three steady states with two transitional trajectories can arise, consistently with the empirical findings in Figures 4.1 and 4.2.[8]

[8] The model can also explain Lynn and Vanhanen's (2002) findings on the cross-country correlation between wealth and IQ.

Nutrition, health and economic growth: microeconomic evidence

The inclusion of nutrition and health investment in an integral conception of human capital has led to a body of empirical research documenting their role. Research has included the study of such indicators as height, weight and the Body Mass Index, and their relation with nutrition, morbidity and mortality.

Schultz (1997) and others have developed the econometric tools necessary to deal with the problems of endogeneity and heterogeneity that abound in this area of study. It is now well established that nutrition and health contribute to labor productivity (e.g. Schultz, 1992, 1997, 1999; Thomas, Schoeni and Strauss, 1997; Strauss and Thomas, 1998; Savedoff and Schultz, 2000). Knaul (2000) obtains similar results using the age of menarche as a health indicator. However, the magnitudes found for the effects of health on productivity in theses studies are smaller than the magnitudes found in historical and macroeconomic studies.

The effects of health and nutrition on education have been documented in some detail in an attempt to detect specific links which may be addressed cost-effectively (World Bank, 1993). Temporary hunger, malnutrition, parasite load, micronutrient deficiencies, infections and untreated sensory impairment are significantly related to worsened general conceptual, cognitive and performance indicators, problem solving, mental agility and capacity, absenteeism, under enrollment, and attrition. According to Levinger (1992), 42.8% of the children under 5 in 21 Latin American countries show moderate and severe stunting, a clear sign of malnutrition that is likely to be associated with poorer educational performance.

Stature is known to be determined early in life and is a predictor of life-long health and longevity (Schürch and Scrimshaw, 1987; Steckel, 1995). This has led to a focus on early child development, the combination of physical, mental and social development in the early years of life. The biological mechanisms through which these interconnections occur, and their impact on for school performance, intelligence quotients, improvements in practical reasoning, eye and hand coordination, hearing and speech, reading readiness and for the crucial rapid development of the brain have been documented in detail (Van der Gaag, 2002). Early child development is also thought to require major attention in developed countries such as Canada.[9]

A related line of inquiry is the investigation of the *gradient* of adult health with respect to income. Disentangling the underlying causal channels has presented a major challenge to microeconomic research. Recent work by Case, Lubotsky and Paxson (2002) finds that important causal mechanisms may occur through the impact of household wealth on childhood health, which in turn affects adult income

[9] The Government of Canada has been providing CAN$2.2 billion over five years, beginning in 2001-2002, to help provincial and territorial governments improve and expand early childhood development programs and services (see http://socialunion.gc.ca/ecd_e.html).

and health.[10] This result is strengthened and corroborated in a later, long-term study on a cohort of British children born in 1958 (Case, Fertig and Paxson, 2003). It is found, “controlling for parents’ incomes, educations and social status, that children who experience poor health have significantly lower educational attainment, and significantly poorer health and lower earnings on average as adults”.

These findings emphasize the importance of child nutrition and health as a focal point for the intergenerational transmission of wealth. Parental health, education and income all impinge upon the realization of their children's capabilities, and these in turn determine their future, health, education and therefore income. One of the main channels through which parental endowments affects their children's future performance is through its cumulative and successive impact on the children's nutrition, health, cognitive development, motor skills, and hence on their schooling performance (and other learning) and young adult health. This mechanism matches the poverty trap modeled by Galor and Mayer-Foulkes (2002).[11] Is it possible to find evidence for an actual poverty trap?

In a recent paper, Mayer-Foulkes (2003b) uses data from a Mexican health survey, ENSA 2000, including educational and income indicators to find evidence for just such a trap. First, Mincerian econometric estimates including health as indicated by stature, schooling and experience, show that adult human capital has increasing returns in Mexico.[12] Some of the literature on the subject argues that these may result from recent pro-market reforms such as NAFTA (De Ferranti et al, 2003, Chapter 3; Hanson and Harrison, 1995; Revenga, 1995; Tan and Batra, 1997; Cragg and Epelbaum, 1996; Robertson, 2000; Scott, 2003). Second, probit estimates show that childhood nutrition and health (also indicated by stature), as well as parental education, have substantial and possibly increasing returns in the acquisition of education, as measured by school permanence. This finding parallels the one mentioned above for the role of childhood health as a determinant of the adult health gradient along income (Case, Lubotsky and Paxson, 2001; Case, Fertig and Paxson, 2003).

Together, these results establish the presence of the following ingredients for a dynamic or static poverty trap. Increasing returns to education in adult income (see Figure 5). Substantial and possibly increasing returns to children’s health in the acquisition of education (see Tables 1 and 2). Increasing returns to parental education in the acquisition of education. Transmission from parental wealth, health and education to the health and education of their young. These increasing returns hold at educational levels above those achieved by most of the population.

By appealing to theory it is not hard to argue, in the presence of unrealized investment opportunities, that some or all of the following market failures must be present. Imperfect parenting: parents unavailable, malnourished, unhealthy or

[10] This article was awarded the 11th Annual Kenneth J. Arrow Award for Best Paper in Health Economics.

[11] This can also be thought of as a dynamic trap at a certain stage of human development.

[12] See Zamudio (1999), Mayer-Foulkes and Stabridis (2003) for similar findings.

unknowledgeable. Credit constraints, or the impossibility to acquire: nutrition, health, education and complementary inputs to education such as capital, social capital, or early child development. Uncertainty or lack of information on the benefits of early child development: nutrition, health and education. Excessive impatience due to poverty. Unavailability of necessary public goods in health or education.

Thus, ninety percent of the population in Mexico is unable to invest optimally in human capital. The presence of market failures slows the intergenerational dynamics of human capital accumulation, causing at least a prolonged transition. If the failures are strong enough, then multiple steady states, and therefore a static or dynamic poverty trap, may arise. To test for this possibility, Mayer-Foulkes (2003b) also conducts a transition matrix analysis for the intergenerational dynamics of schooling. The results support the presence of a barrier to education at 9 years of schooling (see Figures 6.1 and 6.3). Further, a numerical policy experiment shows that a 5 cm average increase in stature (which South Korea achieved in one generation) would overcome this barrier and lead to higher levels of education (see Figures 6.2 and 6.4).[13] This shows that the early child development deficit measured by low statures has substantial effects that are commensurate with the long-term effects of nutrition and health on economic growth found in historical and macroeconomic studies.

Summarizing, this section has motivated the presence of a sequence of market failures in the process of human development, and has outlined a model in which these market failures make economic growth slower, stratified and transitional. Then, microeconomic evidence supporting the model has been presented for the case of Mexico. Early child development is found to be an important channel through which nutrition and health affect economic growth.

Conclusions

Human capabilities have increased substantially in the last two centuries, mainly thanks to improved nutrition and health. This plays an important part in the emergence from stagnation to modern economic growth. Contemporary macroeconomic studies find that health indicators have substantial effects on levels of income and, for poorer countries, on their rates of growth. Moreover, we show that the emergence from stagnation to modern growth continues to occur by examining the cross-country dynamics of life expectancy. When the dynamics of income and life expectancy are examined jointly, further stratification is found. Firstly, where the basic barriers to human development have been overcome, life expectancy has risen fairly rapidly and a state of semi-development has been achieved. Secondly, countries that have achieved full development have done so

[13] The numerical experiment uses the coefficients in Table 2.

through rapid transitions from semi-development, apparently overcoming barriers to high productivity.

Theoretical explanations for barriers to human development involve market failures due to increasing returns to nutrition, to education, credit constraints, threshold nutrition requirements for achieving higher levels of education, and other mechanisms involving societal provision of basic goods and services. Because of its intergenerational nature, the process of human development is characterized by a sequence of market failures at different stages of development. In turn, human development depends upon and facilitates economic growth, technological change and institutional development. Thus, a dynamic human development trap slows down economic growth. Consequently, economic growth across countries is characterized by stratification and transition.

Microeconomic evidence for the effects of health on labor productivity has been weak. Instead, it has been found (in developed countries) that an important component of the correlation between adult income and health is explained by an intergenerational mechanism: the impact of child health, itself determined by family endowments, on future adult health, education and income.

In a study on Mexico, microeconomic evidence is found for an economy-wide intergenerational human capital accumulation trap. Ninety percent of the population is unable to invest optimally in education, which presents increasing returns. Moreover, early child development, as measured by stature, is found to have an important impact on school permanence. An intergenerational transition analysis for education gives evidence for a barrier at nine years of education, which would be overcome given a 5 cm rise in stature, an increase that was achieved in a generation in Korea.

The intergenerational nature and market failures of human capital accumulation lie at the core of the process of human development. Policies aimed at achieving long-term growth must include a focus on the intergenerational dynamics of human capital accumulation.

References

Acemoglu, D., Aghion, P., and F. Zilibotti (2002). "Distance to Frontier, Selection, and Economic Growth", *NBER Working Paper* 9066.

Aghion, P., Howitt P., and Mayer-Foulkes D. (2003). "The role of credit constraints in (Non)convergence: A Schumpeterian approach, mimeo.

Arcand, Jean-Louis, (2001), "Undernourishment and Economic Growth", in The State of Food and Agriculture 2001, Food and Agriculture Organization of The United Nations, Rome, 2001.

Arora, S. (2001). "Health Human Productivity and Long-Term Economic Growth", *Journal of Economic History*; Vol. 61 No. 3 (Sept).

Azariadis and Drazen (1990). "Threshold Externalities in Economic Development." *Quarterly Journal of Economics*, May, 5 (105), 501-526.

Barlow, R. (1979). "Health and economic development : a theoretical and empirical review". Human Capital and Development 1: 45-75.

Barro, R. (1991): "Economic Growth in a Cross Section of Countries," *Quarterly Journal of Economics,* 106(2): 407-43.

Barro, R. (1996): "Health and Economic Growth," Mimeo.

Barro, R. and Becker, G. (1989): "Fertility Choice in a Model of Economic Growth," *Econometrica,* 57 (2): 481-501.

Barro, R. and Lee, J. (1994): "Losers and Winners in Economic Growth," in *Proceedings of the World Bank Annual Conference on Development Economics, 1993: Supplement to The World Bank Economic Review and The World Bank Research Observer.* Bruno, Michael Pleskovic, Boris, eds., Washington, D.C.: World Bank. pp 267-97.

Barro, R. and Sala-I-Martin, X. (1995): *Economic Growth.* New York: McGraw-Hill.

Becker, Gary S. and Murphy, Kevin M. (1990). "Human Capital, Fertility, and Economic Growth", *Journal of Political Economy*, 1990, vol. 98, No. 5.

Behrman, J. and Deolalikar, A. (1988). "Health and nutrition". In H. Chenery and T.N. Srinivasan (eds.). Handbook of Development Economics, vol. 3A. Amsterdam : North Holland.

Benabou, Roland (1996). "Equity and Efficiency in human capital investment: the local connection." *Review of Economic Studies*.

Bezdeck, J.C, Ehrlich, R., Full, W.. "FCM:Fuzzy CMeans Algorithm", *Computers and Geosdence*, 1984.

Bhargava, A. (2001). "Modeling the Effects of Health on Economic Growth", *Journal of Health Economics*, May, 20(3): 423-40.

Bhargava, A., Jamison, D., Lau, L., and Murray, C. (2000): "Modeling the Effects of Health on Economic Growth," mimeo.

Bliss, C. and Stern, N. (1981). "Productivity wages and nutrition". Journal of Development Economics 5.

Caselli, F., Esquivel, G., and Lefort, F. (1996): "Reopening the Convergence Debate: A New Look at the Cross-Country Growth Empirics," *Journal of Economic Growth,* 1: 363-389.

Cervellati, M. and Sunde, U. (2002). "Human Capital Formation, Life Expectancy and the Process of Economic Development", mimeo.

Cragg, Michael I. and Epelbaum, Mario, (1996). "Why Has Wage Dispersion Grown in Mexico? Is It the Incidence of Reforms or the Growing Demand for Skills?" *Journal of Development Economics*, 51, pp. 99–116.

Dasgupta, P. (1991). "Nutrition, Non-Convexities and Redistributive Policies", The Economic Journal, Vol. 101-404, Jan., 22-26.

Dasgupta, P. and Ray, D. (1984). "Inequality, malnutrition and unemployment: a critique of the market mechanism". Stanford IMSS Technical Report, December.

Dasgupta, P. and Ray, D. (1986). "Inequality as a Determinant of Malnutrition and Unemployment: Theory", The Economic Journal, Vol. 96-384, Dec., 1011-1034.

De Ferranti, D., Perry, G., Gill, I., Guasch, J., Maloney, W., Sánchez-Páramo, C. and Schady, N. (2003), *Closing the Gap in Education and Technology*, World Bank Latin American and Caribbean Studies, World Bank, Washington. D.C.

Durlauf, S. (1996). "A theory of persistent income inequality." Journal of Economic Growth, 1, 75-94.

Easterly, W. and Levine, R. (1997): "Africa's Growth Tragedy: Policies and Ethnic Divisions," *Quarterly Journal of Economics*, 112(4): 1203-50.

Engerman, S. and Sokoloff, K. (2002), "Factor Endowment, Inequality, and Paths of Development among New World Economies", *NBER working paper* 9259

Fogel, R. W. (1991). "New Sources and New Techniques for the Study of Secular Trends in Nutritional Status, Health, Mortality, and the Process of Aging", *National Bureau of Economic Research Working Paper Series on Historical Factors and Long Run Growth*: 26, May.

Fogel, R. W. (1994a). "Economic Growth, Population Theory, and Physiology: The Bearing of Long-Term Processes on the Making of Economic Policy", *American Economic Review*, vol. 84 (3), pp. 369-395.

Fogel, R. W. (1994b). "The Relevance of Malthus for the Study of Mortality Today: Long Run Influences on Health, Morality, Labour Force Participation, and Population Growth", Lindahl Kiessling, Kerstin; Landberg, Hans, eds. *Population, economic development, and the environment*. Oxford and New York: Oxford University Press, pages 231-84.

Fogel, R. W. (2002). "Nutrition, Physiological Capital, and Economic Growth", *Pan American Health Organization and Inter-American Development Bank*, available at http://www.paho.org/English/HDP/HDD/fogel.pdf

Fogel, R. W.; Wimmer, L. T. (1992). "Early Indicators of Later Work Levels, Disease, and Death", *National Bureau of Economic Research Working Paper Series on Historical Factors in Long Run Growth*: 38, June.

Gallup, J. and Sachs, J. (2000): "The Economic Burden of Malaria," Working Paper No. 52, Center for International Development, Harvard University.

Galor Oded and David Weil (2000). "Population, Technology and Growth: From Malthusian Stagnation to the Demographic Transition and Beyond," *American Economic Review*, 90, 806-828.

Galor, O. and Mayer-Foulkes, D. (2002). "Food for Thought: Basic Needs and Persistent Educational Inequality," mimeo.

Galor, O. and Zeira, J. (1993). "Income Distribution and Macroeconomics*." Review of Economic Studies*, pp. 35-53.

Galor, O., and D. Tsiddon(1997). "The distribution of human capital and economic growth." *Journal of Economic Growth*, March, pp. 93-124.

Hanson, Gordon H. and Harrison, Ann, (1995). "Trade, Technology and Wage Inequality in Mexico." *National Bureau of Economic Research*, NBER Working Paper 5110, Cambridge, Massachusetts.

Howitt, P. and Mayer-Foulkes, D. (2002). "R&D, Implementation and Stagnation: A Schumpeterian Theory of Convergence Clubs", NBER working paper 9104, available at http://papers.nber.org/papers/w9104.pdf.

Knaul, Felicia.(2000). "Health, Nutrition and Wages: Age at Menarche and Earnings in Mexico". In W. Savedoff and TP Schultz ed. *Wealth from Health: Linking Social Investments to Earnings in Latin America*. Inter-American Development Bank, Washington DC.

Kremer, M, Onatski, A. and Stock, J., (2001). "Searching for Prosperity." *National Bureau of Economic Research*, Working Paper 8250, (April).

Leibenstein, H. (1957). Economic Backwardness and Economic Growth. New York, USA: Wiley.

Levinger, Beryl (1994), *Nutrition, health and education for all*, Education Development Center, UNDP, 1994, 73, New York (available at http://www.edc.org/INT/NHEA/index.html).

Lucas, Robert E., Jr. (2000). "Some Macroeconomics for the 21st Century." *Journal of Economic Perspectives*, 14, 1 pp. 159-168.

Lynn, R. and Vanhanen, T. (2002). *IQ and the Wealth of Nations*, Praeger Publishers, USA

Martorell, R. and Arroyave, G. (1984). "Malnutrition, work output, and energy need". Paper presented at the International Union of Biological Sciences Symposium on Variation in Working Capacity in Tropical Populations.

Mayer-Foulkes and Stabridis-Arana (2003). "Estimaciones de los Retornos Privados a la Escolaridad y Cálculo Del PIB Educativo para México", mimeo.

Mayer-Foulkes, D. (2001a). "The Long-Term Impact of Health on Economic Growth in Mexico, 1950-1995", *Journal of International Development*, 13(1), pp. 123-126.

Mayer-Foulkes, D. (2001b). "The Long-Term Impact of Health on Economic Growth in Latin America", *World Development*, 29(6) pp. 1025-1033.

Mayer-Foulkes, D. (2002). "On the Long-Term Reciprocal Impact of Health and Income: Mexico 1950-1995", *Trimestre Económico*, 274, Abril-Junio.

Mayer-Foulkes, D. (2002c). "Global Divergence," Silver Medal in Growth, Inequality and Poverty category of Global Development Awards at Cairo annual Conference of Global Development Network, 2003, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=335140.

Mayer-Foulkes, D. (2003a). "Human Development and Economic Growth: From Stagnation to Stratified and Transitional Growth".

Mayer-Foulkes, D. (2003b). "Market Failures in Health and Education Investment for the Young, Mexico 2000," mimeo.

Mayer-Foulkes, D. (2003c). "Convergence Clubs in Cross-Country Life Expectancy Dynamics", in *Perspectives on Growth and Poverty*, Rolph van der Hoeven and Antony Shorrocks (editors), United Nations University Press, 2003, pp. 144-171.

Mayer-Foulkes, D.; Mora, H.; Cermeño, R., Barona, A.B., Duryea, S. (2001). "Health, Growth, and Income Distribution in Latin America and the Caribbean: A Study of Determinants and Regional and Local Behavior", in Investment in Health, Social and Economic Returns, *Pan American Health Organization Scientific and Technical Publication* No. 582.

Mazumdar, D. (1959). "The marginal productivity theory of wages and disguised unemployment". Review of Economic Studies 26: 190-197.

Mirrlees, J. (1975). "A pure theory of underdeveloped economies". In Reynolds, L. (ed.). Agriculture in Development Theory. New Haven, USA: Yale University Press.

Revenga, Ana, (1995). "Employment and Wage Effects of Trade Liberalization: The Case of Mexican Manufacturing." *World Bank, Latin America and the Caribbean Region*, Country Department 2, Policy Research Working Paper 1524. Washington, D.C.

Robertson, Raymond. (2000). *Trade Liberalization and Wage Inequality: Lessons from the Mexican Experience.* Macalester College, St. Paul, Minn.

Sachs, J. and Warner, A. (1995): "Economic Reform and the Process of Global Integration," *Brookings Papers on Economic Activity*, 1: 1–118.

Sachs, J. and Warner, A. (1997): "Sources of Slow Growth in African Economies," *Journal of African Economies.* 6(3): 335-76.

Savedoff, W.D., and Schultz, T.P. (eds) (2000). *Wealth from Health: Linking Social Investments to Earnings in Latin America*, Inter-American Development Bank: Washington.

Schultz, T.P. (1992). "The Role of Education and Human Capital in Economic Development: An Empirical Assessment", *Yale Economic Growth Center Discussion Papers* No.670.

Schultz, T.P. (1997). "Assessing the Productive Benefits of Nutrition and Health: An Integrated Human Capital Approach", *Journal of Econometrics*, 77(1):141-58.

Schultz, T.P. (1999). "Health and Schooling Investments in Africa", *Journal of Economic Perspectives*, 13(3):67-88.

Schürch, B. and Scrimshaw, N.S., eds.(1987). "Effects of chronic energy deficiency on stature, work capacity and productivity", *International Dietary Energy Consultancy Group*, Lausanne.

Scott, John (2003). "Poverty and Inequality", in *Strengthening the North American Community: NAFTA at Ten*, Sidney Weintraub (ed.), 2003.

Sen, A. (1999). *Development as Freedom*. New York: Alfred A. Knopf.

Srinivasan, T.N. (1992). "Undernutrition: concepts, measurement and policy implications". In S. Osmani (ed.). Nutrition and Poverty. Oxford, UK: Clarendon Press. pp. 103-109.

Steckel, R. (1995). "Stature and the Standard of Living", *Journal of Economic Literature*, 33(4):1903-40.

Stiglitz, J.E. (1976). "The efficiency wage hypothesis, surplus labor, and the distribution of income in LDCs". Oxford Economic Papers, New Series 28: 185-207.

Strauss, J. (1985). "The impact of improved nutrition in labor productivity and human resource development: an economic perspective". Economic Growth Center Discussion Paper No. 494, Yale University.

Strauss, J., and Thomas, D. (1998). "Health, Nutrition, and Economic Development". *Journal of Economic Literature*, 36(2):766-817.

Tan, Hong and Batra, Geeta. (1997). "Technology and Firm Size-Wage Differentials in Colombia, Mexico, and Taiwan (China)." *World Bank Economic Review*, 11(1), pp. 59–83.

Thomas, D.; Schoeni, R.F., and Strauss, J. (1997). "Parental Investments in Schooling: Gender and Household Resource Allocation in Urban Brazil", *RAND Labor and Population Program*, Working Paper.

Van Der Gaag (2002). "From Child Development to Human Development" in *From Early Child Development to Human Development: Investing in Our Children's Future*, Young, Mary Eming, Ed., Education Sector, Human Development Network, World Bank, Washington, D.C., available at http://www.worldbank.org/children/ECDtoHumanDevelopment.pdf.

Weil, David N., (2001). "Accounting for the Effect of Health on Economic Growth", mimeo.

World Bank (1993), *World Development Report 1993: Investing in Health.* Washington D.C., The World Bank.

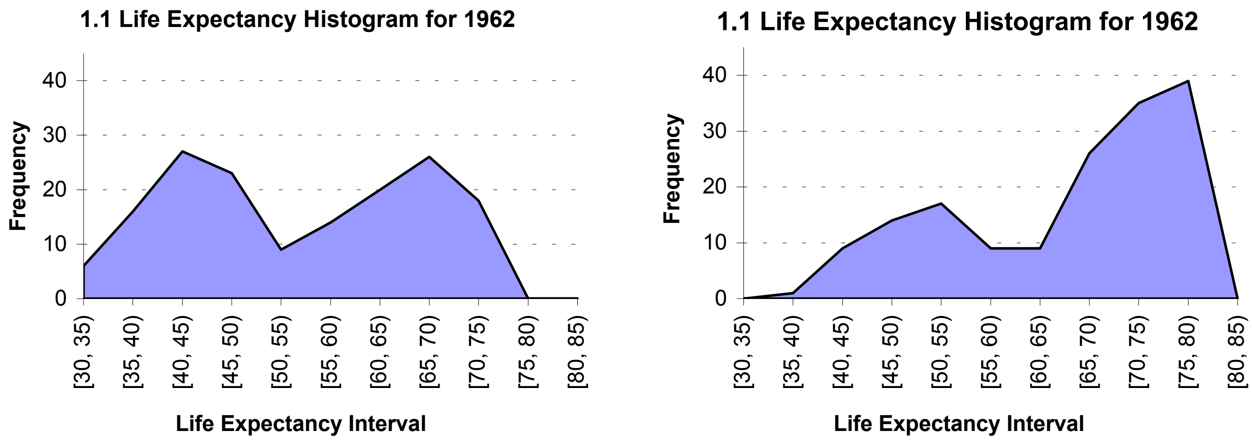
World Health Organization (1999a). WHO on health and economic productivity *Population and Development Review*, 25 (2).

World Health Organization (2001). *Macroeconomics and Health: Investing in Health for Economic Development.* Report of the Commission on Macroeconomics and Health, Chaired by Jeffrey Sachs.

Zamudio, Andrés (1999). "Educación y distribución condicional del ingreso: una aplicación de regresión cuantil", CIDE, *Documento de Trabajo DE 163*.

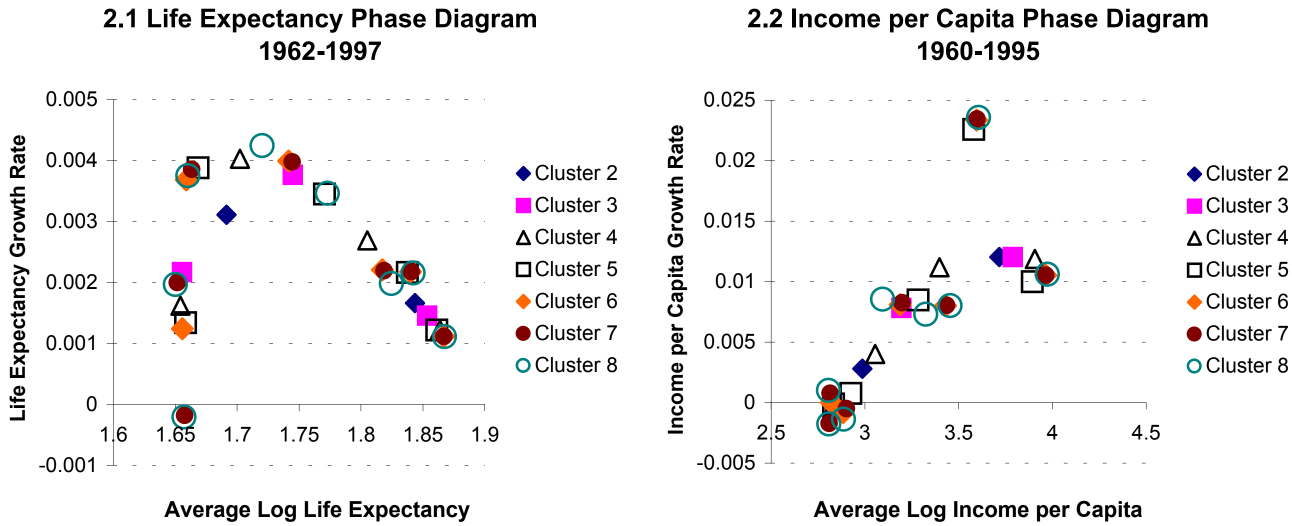
Zimmermann, H.J. (1996). *Fuzzy Set Theory - and Its Applications*. Kluwer Academic Publishers, Massachusetts.

Figure 1. Cross-Country Life Expectancy Histograms
(159 countries)



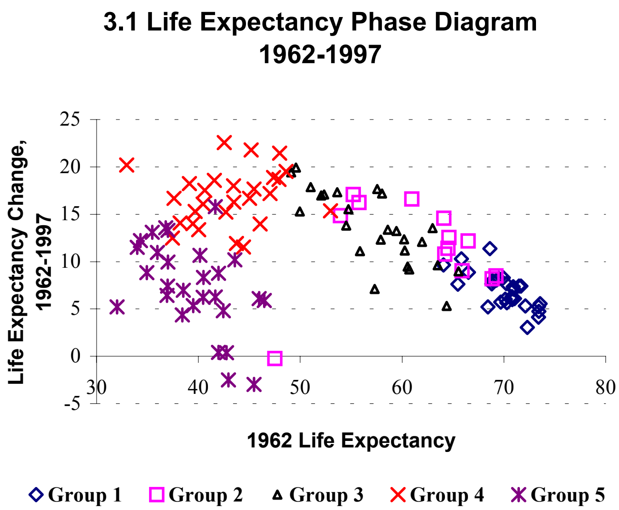
Source: Mayer-Foulkes, D. (2002b)

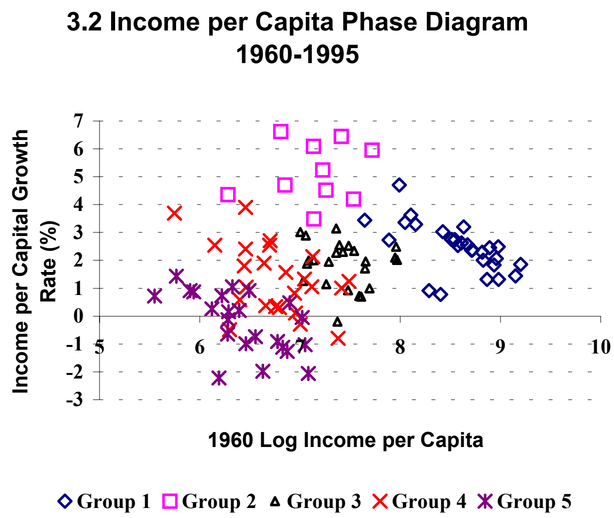
Figure 2. Cluster Centers of Joint Income per Capita and Life Expectancy Fuzzy Clusterings (into 2 to 8 Clusters)



Source: Mayer-Foulkes, D. (2002c)

Figure 3. Hard Joint Regression Clustering of Income per Capita and Life Expectancy Trajectories

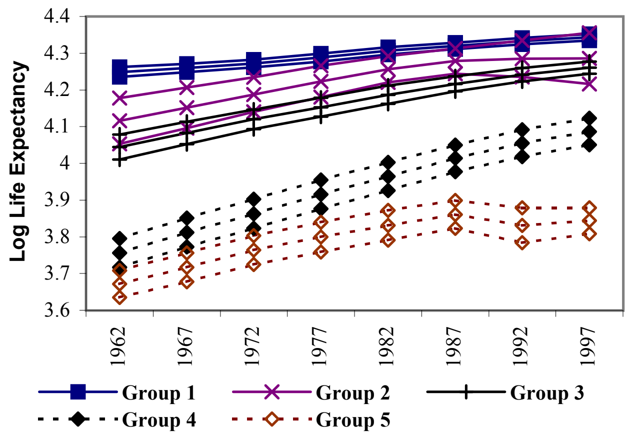




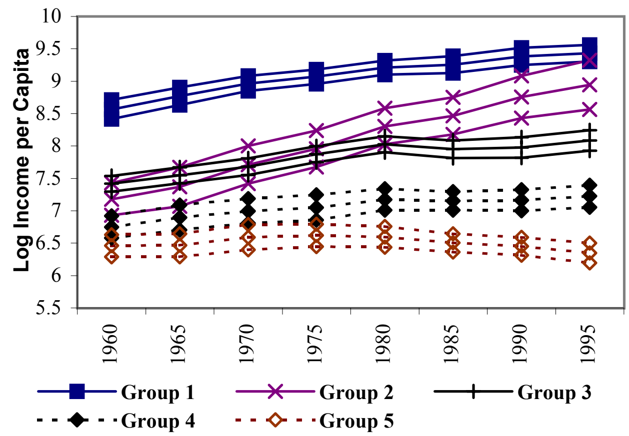
Source: Mayer-Foulkes, D. (2002c)

Figure 4. Average Income per Capita and Life Expectancy Trajectories for the Five Groups in the Hard Joint Regression Clustering
(Three Standard Deviation Corridors)

4.1 Life Expectancy, 1962-1997

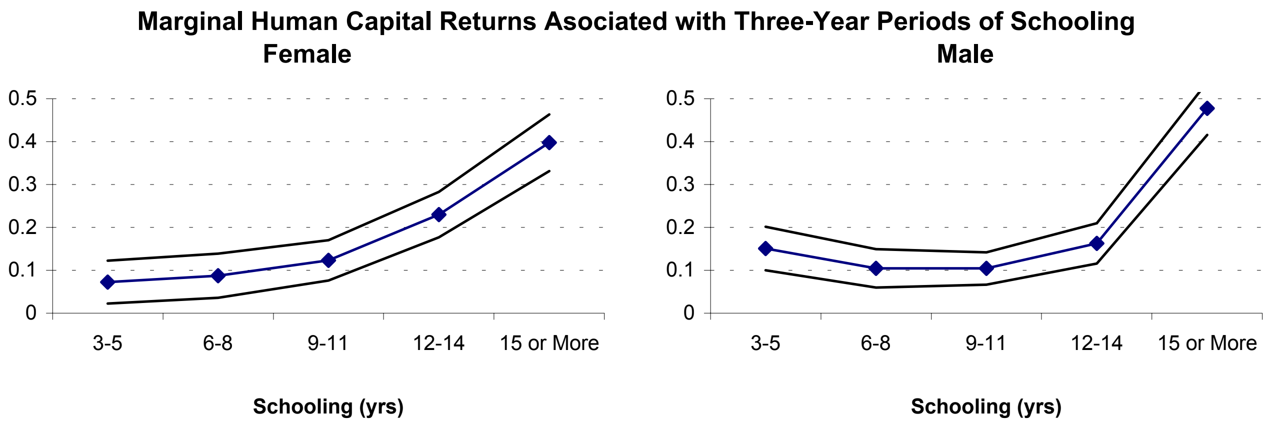


4.2 Income per Capita, 1960-1995



Source: Mayer-Foulkes, D. (2002c)

Figure 5. Human Capital Marginal Returns for Adult Income by Educational Level
(Two Standard Deviation Corridors for OLS coefficients)

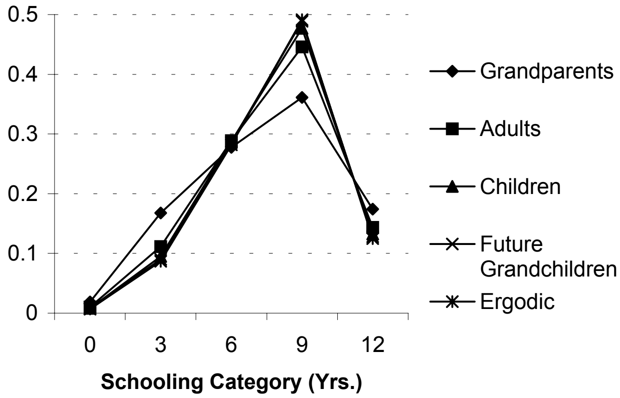


Source: Mayer-Foulkes, D. (2003b)

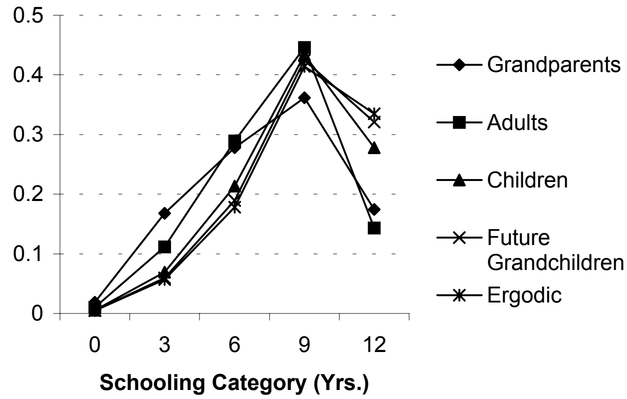
Figure 6. Distribution of Educational Levels According to Transition Matrix Analysis

Women

6.1 Extrapolating From Current Transition



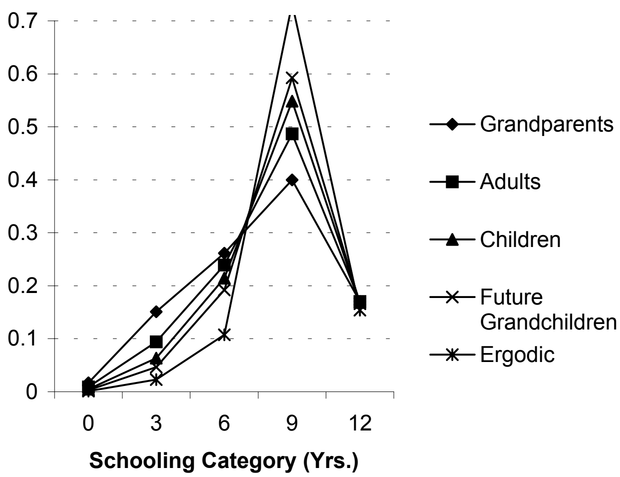
6.2 Increasing Education Probability According to a 5 cm Increase in Stature



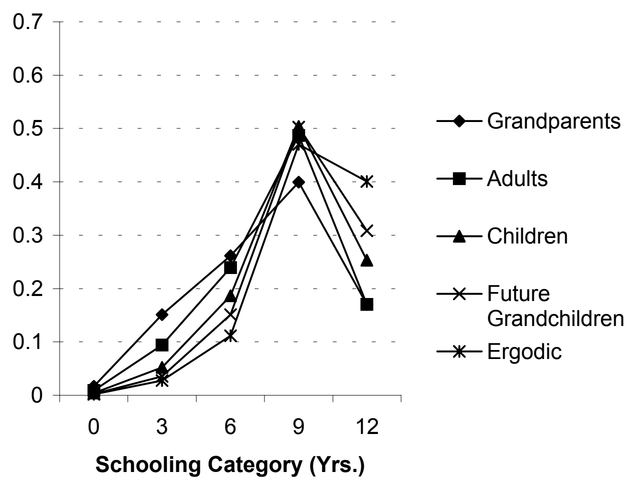
Source: Mayer-Foulkes, D., (2003b)

Men

6.3 Extrapolating From Current Transition



6.4 Increasing Education Probability According to a 5 cm Increase in Stature



Source: Mayer-Foulkes, D., (2003b)

Table 1. Mean Marginal Probabilities Associated with 1 cm Stature Increase in Probit Estimates for School Permanence

Estimate:	Lower to Higher Primary	Primary to Lower Secondary	Lower to Higher Secondary	Higher Secondary to Tertiary
Male	*0.042*	**0.042**	**0.039**	0
Female	0.039	*0.038*	**0.073**	0
Joint	**0.0001899**	**0.0548546**	**0.1204284**	0.0550147

(1% Confidence in Bold, 10% Confidence in Italics)

Source: Mayer-Foulkes, D. (2003b)

Note: In joint regression for deciding to go beyond 15 yrs of schooling, stature above 154.86 predicts decision perfectly.

Table 2. Mean Marginal Probabilities Associated with 1 cm Stature Increase in Probit Estimates for School Permanence by Gender and Household Head Schooling

	Female			**Male**		
Household Head Schooling	**Lower to Higher Primary**	**Primary to Lower Secondary**	**Lower to Higher Secondary**	**Lower to Higher Primary**	**Primary to Lower Secondary**	**Lower to Higher Secondary**
1 - 3	0.026	0.029	0.056	0.032	0.035	0.026
4 - 6	0.025	0.028	0.055	0.030	0.033	0.031
7 - 9	0.017	0.023	0.057	0.020	0.027	0.032
10 - 12	0.011	0.019	0.055	0.013	0.013	0.030
> 12	0.004	0.010	0.031	0.005	0.008	0.016

Source: Mayer-Foulkes, D. (2003b)

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