

Mainstream Critiques of Economic Growth: A Heterodox View

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I. Introduction

Mainstream critics of economic growth take it for granted that growth is desirable, but must be weighed against welfare considerations surrounding income distribution and various forms of market failure. However, these critics of growth are in agreement in one respect – that economic growth is itself an unproblematic concept¹.

The phrase ‘economic growth’, as commonly employed, merely indicates the rate of increase in national income, an accounting measure originally created as a diagnostic tool for calculating total expenditure to aid in the regulation of business cycles. But these national accounts, in a confused way, are also considered to be representations of national *income*, and have thus acquired other roles - they are, in per capita form, measures of levels of economic welfare over time and between nations, and are used as indicators of a nation’s overall economic power or capacity.

The focus of this paper will upon the last presumption cited above, namely that the growth rate in national income (‘economic growth’, in common parlance) can be used as a measure of the growth in a nation’s overall economic power or capacity. For Joseph Stiglitz, ‘...growth increases *supply* ... [and] should in theory, make [choices between alternatives] less painful’ (Stiglitz, 2005; italics added).

There are a host of ways, however, in which growth in national income is an imprecise or even inaccurate measure of changes in national economic power or capacity: many growth-oriented decisions (e.g. motorway construction) preclude alternatives (public transport) in the future; increased expenditure on health and education does not concomitantly raise the value of the stock of human assets if

¹ See, for instance IMF (2006), a special issue devoted to ‘understanding growth’, in which ‘growth’ is identified with changes in per capita GDP without contestation.

used inefficiently. In a more fundamental sense, the argument here will follow on from the ecological movement's pioneering insight that standard measures of national 'income' violate even orthodox conceptions of economic income, the latter being linked to the accretion or diminution of the stock of assets of the entity under consideration. In the ecological context, the national accounts fail by not incorporating the depreciation of the natural environment into the income calculation. The critique here will emphasise that increases in national income poorly represent increases or decreases in the stock of *human* assets and therefore do not give an accurate notion of the trajectory of a nation's economic capacity:

1. There are significant positive external effects to educational improvement (largely pushed to one side by the 'human capital' literature): many of the benefits to society of improved education will therefore register in conventional national income calculations only with a substantial lag. Lags will also appear because of inter-generational effects and the residual *in situ* advantages of established economic powers (Auerbach, 2005c).

2. Much of what appears as 'consumption' by poor people in the national accounts is in fact expenditure to maintain human assets, a key component of a nation's economic power or capacity and therefore central to an appropriate economic growth calculation.

3. These considerations partially account for the 'miraculous' emergence of Japan and South Korea as great economic powers and suggest why conventional growth rate calculations are a poor guide to future economic development.

If the perspective presented here is valid, it gives the lie to the notion that education and poverty alleviation are 'luxuries' to be afforded when economic growth gives a society the capacity to finance them. Rather, they are key aspects of economic growth, appropriately calculated.

II. A Brief Aside on Economic Welfare: Against 'Happiness'

I wish to set aside in this paper considerations of economic welfare. One reason for so doing is that the literature has recently degenerated into a discussion of 'happiness' in society (see Layard, 2005), a topic which has recently entered into public discourse. In its present form, it is unworthy of serious consideration. Do we really need to turn to J. Bentham and to pollsters asking people 'are you happy' to launch a critique of contemporary forms of gross materialism? Historically, 'happiness' is a residual consideration² in judging a society, compared to a range of other criteria, such as:

a. *What kind of people is the society producing?* As far back as the ancient Hebrews and Greeks, societies have implicitly been judged by the quality of the individuals they produce. But if we use Layard's 'happiness' criterion for judging societies, it is impossible to cast any negative judgement on a culture whose contentment is induced by narcotics or drugs (see Layard, p.114; ch.13); in the U.S., half of its nominally well educated population shockingly gives Creationist responses when queried about the origins of humankind (Sceptical Inquirer, 2005) – but who are we to criticise, as long as they're happy!

b. *Quality of governance.* From Confucius and others, we learn to focus our welfare judgements of a society on its quality of governance. What then does one say about the Nigerian case, the 'happiest' country in the world (BBC News, 2005), but among the most corrupt (Transparency International, 2005)?

c. *The treatment of the less well off; freedom.* A society's treatment of its poor has historically been an intrinsic criterion for judging its quality, whether or not it makes the society 'happy' (for a modern treatment, see Rawls, 1971). In a

² The identification of Buddhism with the notion that 'the aim of life is happiness' (Layard 2005, p.189) is simplistic. The fact that the Buddha's disciples lived 'with a gazelle's mind' (i.e. in light-hearted way) was taken as an indication that they had absorbed the full significance of the Buddha's teachings, rather than it being an end in itself: a morose attitude to life would be a hindrance to the realisation of Truth (Rahula, 1996, p. 189).

similar way, the level of freedom³ in a society does not need to be legitimated by its possible correlation to an affirmative response to the question: 'Are you happy?'

d. *Stewardship of tradition, the earth.* The latter, it seems, is a pre Neolithic value. Do we rank it highly merely because nature yields us contentment, or because it is central to our survival (see Diamond, 2005)?

We will largely abandon welfare issues at this point in order to focus on the question – how can we properly measure the growth in a nation's economic power or capacity?

³ Sen (1999) successfully demonstrates the falsity of the distinction between substantively juridical ('negative') and economic ('positive') freedom, an artefact of the Cold War (see Berlin, 1969). Sen's failure to clarify that this is indeed the central contribution of his book is perhaps an unfortunate by-product of High Table politeness.

III. Economic Growth and Economic Income

Introduction

There are good economic reasons to question conventional approaches to economic growth and its measurement, and many of these caveats well correspond to a range of 'intuitive' critiques of economic growth as the quintessential measure of material progress. Indeed, the very phrase 'economic growth' is problematic. It poses an analogy with a natural function, such as the growth of a tree, when in fact, as commonly employed, the phrase is invariably used to indicate the rate of increase in an accounting relationship, namely national income.

The national income accounts serve multiple purposes. As originally conceived they were a diagnostic tool for the regulation of business cycles in the form of a measure of total expenditure in the economy. But these national accounts, in a confused way, have also taken on other roles: they are, in *per capita* form, taken as measures of levels of economic welfare over time and between nations, and are used as indicators of a nation's overall economic power or capacity.

National income is defined by an accounting identity in which expenditure on current goods and services is equal to current income.⁴ The national income accounts in their present form have their origins in the interwar period as a tool in the implementation of Keynesian policies to regulate business cycles. The Keynesian theory replaced an earlier metaphoric image of unemployment as being due to the presence of gunk in the water pipes (e.g. a trade union) which prevented the smooth clearing of the labour market. Instead, unemployment

⁴ In principle, it is possible that a measure of economic growth will be satisfactory even if there are problems with our measurement of national income: the late Professor Alec Nove's famous 'law of equal cheating' suggests that if the same flaws emerge every year in a national income measure and remain at the same magnitude, they will not affect our growth rate measures. In the discussion here, however, we shall remain aware of the difference between the problems in the measurement of levels of national income and rates of change of this magnitude, but will largely presume that the problems in the evaluation of these two measures are intimately related.

from a Keynesian perspective was seen to be a question of too little steam (i.e. aggregate demand) being produced to get the engine to go at full capacity. National income served as the Keynesian measure of this steam pressure. As so measured, it is inappropriate as an indicator of the economic welfare⁵ or economic power of a nation.

The critique here focuses on the use of the growth rate in national income as an indicator of a nation's enhancement in its overall economic power or capacity to choose between alternatives⁶. The appropriate tool for a consideration of the development of a nation's economic power is the concept of 'economic income'. This seemingly esoteric and academic concept has a ready translation into political discourse. Thus, in an article in the **Times** of London, Anatole Kaletsky (2004) laments the fact that a supposed 'golden age' of high economic growth whose foundations were built during the Thatcher era is being threatened in recent years by a relentless rise in public spending and government employment. But if these higher levels of expenditure on physical infrastructure (railways, etc.), education and provision for the National Health Service have merely compensated in a minimal way for shortfalls in necessary social expenditure in the pre 1997 era, then growth in that supposed golden age has been, to use my president's syntax, over exaggerated from the perspective of economic income.

Our focus here will be on how the growth of a nation's economic power or capacity is ill-measured by the standard economic growth measure, with special attention being directed to the mismeasurement of the growth of *human* assets attendant on the literature on the growth of human capital⁷. The discussion here will largely concentrate on growth in Britain and other rich countries; in partial mitigation of an absence of attention to the particularly acute problems of poor

⁵ The only exception here is the extent to which the growth rate in national income is correlated with levels of employment; this question is beyond the scope of this paper.

⁶ The Human Development Index of the UN modifies the national income measure by appending variables which affect both the welfare and economic power of nations in a manner which is simultaneously incongruous and efficacious (see Auerbach, 2005a).

⁷ For reasons to be clarified below, economic income, as opposed to conventional measures, is best linked to the growth in *potential* rather than actualised increases in assets.

countries, I offer Dr Marx's observation: 'The country that is more developed industrially only shows, to the less developed, the image of its own future' (Marx, 1867, p.1).

Distortions emanating from the standard economic growth measure by deviating from economic income: distribution and irreversibilities

Standard growth rates are illusory if one believes that a correct approach to growth of a nation's economic power or capacity is to be found, not through the conventional measure (the growth rate in national income) but by using the concept of 'economic income'. A rich literature exists in this area (see Parker and Harcourt, 1969, especially pp. 3-29), with all approaches converging on notions which link income to accretions to net assets. The only explicit or real life manifestation of this conceptualisation is to be found for the firm, where an attempt is made, unlike in the case of nations, to keep a record of the change in the value of its assets, which must then be reconciled with its income statement.⁸ (Hicks's famous definition makes income the maximum amount that an individual can consume in a given time period and still expect to be as well off at the end as at the beginning.)

A host of conceptual issues are posed here, such as the question of whether $K_2 - K_1$ (the difference in the value of assets at the beginning and the end of the period) is to be approached from the perspective of expectations, as opposed to the 'actual' values of $K_2 - K_1$, and the difficulties of giving an objective measure to the notion that the capital stock is left intact (corresponding to Hicks's notion that the individual can expect to be as well off at the end as at the beginning of the period). Without trying to minimise the many differences between such luminaries as Fisher, Pigou, Hayek and Hicks, I will put these questions to one side until some of them surface again in the latter part of this paper.

⁸ A simple arithmetic example can be seen in the Appendix.

It is not surprising that environmental campaigners have used this framework to criticise national income measures for making no deductions for the running down of a society's natural resources which are common property (e.g. the atmosphere in the context of global warming) - key elements of its collective 'capital stock'. They argue that, if national income measures are to be used as indicators of economic power, national income calculations must be modified to take into consideration the deterioration in the natural environment with, for instance, appropriate deductions for increased pollution of the air and water (see Anderson, 1991; a perspective from economists and others may be found in Arrow, *et al.*, 2004). In this paper, however, the emphasis will be on how an inadequate consideration of the accretion of *human* assets can lead to an incorrect calculation of the trajectory of economic capacity.

There are four important ways in which the economic income perspective sheds light on the inadequacies of standard approaches to economic growth:

1. The above-mentioned ecological critique surrounding common property resources.
2. The relationship between economic growth and income distribution.
3. The problem of economic irreversibilities.
4. Human assets and external effects.

There is a rich literature on point 1) above; in this section, I give a brief discussion of points 2) and 3)⁹ and deal extensively with point 4).

National accounts, implicitly embodying the subjective conceptualisation of consumption embodied in mainstream economic theory, find it difficult to incorporate the notion, usually linked with Marx, that the greater part of consumption for the poorer section of a population is for the 'reproduction of its

⁹ This material is largely derived from Auerbach (2005b).

labour power' rather than true consumption¹⁰. Thus, existing national income accounting methodology can make no adjustments for the 'accelerated depreciation' of the stock of human assets such as that which took place in Britain during the early phases of the Industrial Revolution, both in physical and in educational terms (on the latter, see Cipolla, 1969, chapter 3; Nicholas, 1990). As a result, periods of intense development in industry and agriculture will overestimate any reasonable calculations of the true growth in national economic income if there is an accompanying deterioration in the 'human capital stock'. Using this perspective, it then becomes evident that movements in the distribution of income are not solely concerned with issues of morality. Let us, for instance, postulate an economic strategy for an increase in the growth rate in an economy based on increasing the rate of saving by redistributing income from the poor to the rich (e.g. the Thatcher strategy of the 1980s, or the strategic vision which has often been attributed to the IMF). Let us presume that the world works just as the model here suggests, so that income going to the rich is saved and then re-invested. The problem with this strategy of re-allocating resources from the poor to the rich in order to promote economic growth is that these very movements in the distribution of income may well neutralise or reverse any beneficial effects of this strategy, if income is correctly measured. Strategies that reduce the income of the poor in order to promote the expansion of *physical* capital may in fact inhibit the capital maintenance of the family and cause a depreciation in the nation's stock of *human* assets. Even though this expenditure is measured as 'consumption' in the national accounts, the resources devoted to bread for a poor person, or for the heating for her house, or for the health and education of her children are for the maintenance of the human assets of her and her family.¹¹ For poor people, maldistribution can mean not reduced 'consumption', but a wasting away of 'human assets'. Policies which overlook the realities of maldistribution may have consequences which not only affect the

¹⁰ Recent discussions deal with this question in the context of the meaning and measurement of poverty: see Townsend (1979) and Sen (1981).

¹¹ Thus the influence of income distribution on human capital formation is not, as suggested in UNCTAD, 1997, p.68, solely due to its effect upon the ability of individuals to invest in education.

'happiness' of members of society, but its whole future development.¹² The hysteresis effect of unemployment is of a similar kind: long term unemployment as a device for macroeconomic stabilisation runs the risk of deteriorating skills on the part of the unemployed population – a running down of their stock of human assets (for a survey, see Røed, 1997).

In more positive terms, rapid growth among the Asian 'tigers' was accompanied not only by a distinctive rise in levels of educational attainment but by the maintenance of a limited dispersion between the incomes of the rich and poor during the crucial periods of their respective transitions from poverty to wealth. These factors – rapid growth, a commitment to education and a narrow gap between rich and poor - may well be interconnected: the raising of educational standards contributes to economic development, as variously measured, and also promotes the narrowing of the skills gap in society. This narrowing of the skills gap reduces income inequality. In the opposite direction, societies that limit the gap between rich and poor make it possible for the poor to raise their levels of educational attainment and also give an incentive to do so, by promoting upward social mobility. Thus, raising educational standards promotes both economic growth and the narrowing of income inequality, and in the opposite direction, a low level of income inequality itself promotes the likelihood of rising educational standards¹³.

¹² This issue is discussed in the context of developing countries in Strauss and Thomas, 1998, though it is relevant as well in the context of rich nations. The redistributive policies of the Asian 'tigers' prior to 'take-off' seem important prerequisites of their subsequent success, and have generated a rethinking of the traditional presumption of a positive association between inequality and growth. The rethinking (e.g. Aghion and Garcia-Penalosa, 1999) touches only obliquely on the question of human assets. Galor and Moav, 2004, however, posit a link between income equality and human capital accumulation due to the presence of physiological constraints at an individual level that impose diminishing returns on the latter process.

¹³ See Amsden, 1992 for the case of South Korea; UNCTAD, 1997, p.70 notes the cases of a number of developing countries with egalitarian land distribution that have experienced slow growth and indicates that this failure was due to the absence of concomitant policies concerning skill acquisition and education.

The problem of irreversibilities means that decisions made today restrict choices in the future, so that growth rates emanating from those decisions do not necessarily correspond to greater economic capacity in the form of enhanced choice. Thus, rises in measured national income may not correspond to increases in economic power – in society's potential to make alternative decisions in the future. It is a central consideration in the context of the natural environment that many decisions are irreversible, or at least very difficult to reverse. Societies may also abort the inter-generational transmission of skills and knowledge. It is for instance, a typical concomitant of the process of economic development and urbanization that many folk traditions in music, art and literature will die out.

In a more material context, a prominent example of irreversibility can be seen in the decision to move in the direction of a car oriented society, a tale told vividly in the case of Los Angeles in the film 'Who Framed Roger Rabbit?'. The evil gang involved in framing our eponymous hero for a crime he did not commit were involved in a conspiracy to rid Los Angeles of trams (this is all taking place in the 1940s) for the sake of the oil companies. The wry subtext of the film is that, of course, in real life the villains succeeded. In fact, the story told in the film closely paralleled what actually happened in a host of US cities (I am speaking here about what happened to the trams, and not the business about the rabbit).

These decisions on public transport had little to do with the economist's textbook picture of the individual consumer choosing between goods. A social decision had to be made to remove trams, buy up rights of way for highways and to zone residential living conditions to low density, car-oriented living. In many of these cases, there is not much room for marginal decisions - either the environment is optimised for the car or it remains suitable for public transport. There is no obvious mechanism by which these decisions can be sorted out by the invisible hand of the marketplace.

The public transport issue also illustrates the irreversible aspect of many decisions of this kind. Decisions made in one generation, by whatever means, may well exclude alternatives forever. Many European cities are fortunate in the fact that they are too old and too cramped for them to have been completely destroyed to accommodate the car. In the US, New York City partially survived the vandal Robert Moses for this reason, as he tore up neighbourhoods and dislocated populations to accommodate his absurd notion that a densely packed city of eight million people could be oriented around the car as a normal mode of transport. The battle goes on, however. A highly publicised report by management consultants has claimed that economic growth in Britain was being severely hampered by planning restrictions on the building of hypermarkets which will only be accessible by car (Accessible Retail, 2002).

In newer cities, once the move has taken place towards a car-oriented, low density environment, the shift seems irreversible. It is hard not to feel a certain sense of *Schadenfreude* for the feeble attempts of present day Los Angeles to introduce elements of public transport, now that it is choking on its car pollution: it is hard to believe that the present day low density environment of the city can ever accommodate anything other than a peripheral public transport system. Duany *et al.* (2000) suggests that there is a vast potential market in the US for people-oriented living environments, as opposed to those prevalent, which are constructed to accommodate the car. But any movements in this direction must confront the cumulative history of urban and suburban sprawl. The 'locking in' effect that takes place when an environment is re-structured for the car is one important reason why the US has exceptionally high levels of energy use per unit of national income compared with other countries. The intransigence of US political leaders in international discussions concerning energy reduction in the context of global warming is at least partially linked to these kinds of structural rigidities.

IV. Human Assets and External Effects

*You can't make chicken salad out of chicken feathers.*¹⁴

The Human Capital Literature and Human Assets

There is, of course, an enormous literature attempting to show a link between education¹⁵ and national income. The theoretical essence of the literature can be summed up simply (Becker, 1992): increases in educational attainment can be treated as an investment which individuals undertake. The costs are the explicit funds put forth to pay for education, and the opportunity cost of the income foregone by undergoing the educational process. The benefits for the individual may be measured by the future stream of enhanced earnings incumbent on the investment; the gross social returns may be calculated simply by aggregating the enhanced earning streams of individuals.

It is upon the latter proposition that I wish to focus here. The human capital literature is thus suggesting, as a first approximation at least, that there are no positive external benefits to the education of a society's population¹⁶, an approach sharply in contrast both with the one taken here and that to be found in the literature on the 'new' economic growth. There would seem to be two implicit, but related justifications to support this extraordinary proposition. First, at an empirical level, this presumption greatly simplifies the problems of estimating the effects on society of enhanced education: its effects can be observed simply by measuring the rises in income consequent on education through the employment career of individuals; secondly, at a conceptual level, the

¹⁴ This quotation is attributed to baseball manager Joe Kuhel when his team came in last.

¹⁵ The maintenance and accretion of human assets is, of course concerned with many other issues besides education, such as housing health care, working conditions and unemployment. We will be largely following here the focus on education to be found in the human capital literature.

¹⁶ As a matter of public policy, such a presumption limits the justification for aid to education from a traditional economics perspective (in the presence of imperfections in the market for human capital) to questions of income distribution. Galor and Moav (2004), however, posit a link between income equality and human capital accumulation due to the presence of physiological constraints at an individual level that impose diminishing returns on the latter process.

measurement of the social effects of education is simplified to an aggregation of its effects on individuals. In such a context, *movements in national income might track, with reasonable accuracy, the effects of accretions in human assets to movements in economic income* in the same way that other investments in the economy, e.g. the purchase by a firm of a lathe, are, it is presumed, correctly reflected.

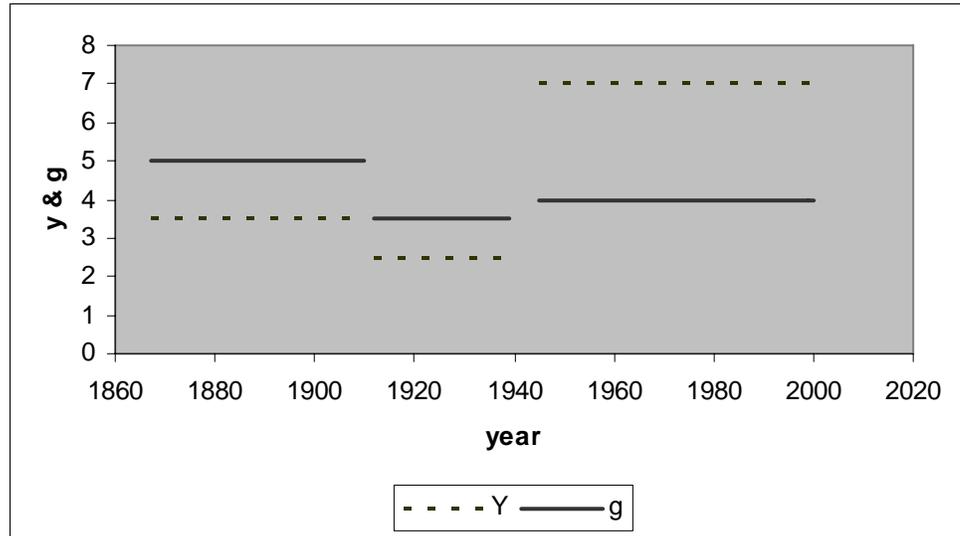
Contrarily, I suggest here that, in the presence of positive external effects to enhanced education:

1. the effects of enhanced education on economic income are vastly underestimated by seeing its effects on the trajectory of the incomes of individuals;
2. the effects of the timing and diffusion of enhanced education through society are likely to be far more complex than postulated in the standard approach, with 'lags' and possibly a far longer term trajectory for the effects of education.

I summarise these notions in the graph below¹⁷; I will return to considering it in more detail later.

¹⁷ The approach taken here has clear affinities with the 'diffusionist' approach to education and growth in the economic history literature (see Tortella, 1990, p.10-11) and to aspects of the 'new' economic growth literature (Lucas, 1988). The latter connection will be discussed below.

Japan: Growth History



- y = growth rate in national income
- g = growth rate in economic income

In surveys of the literature, the issues mooted here are treated as peripheral matters. Thus, in Temple (2001), barely two pages are devoted to the question of human capital externalities (pp.78-9); such a limited commitment, however, fits awkwardly with his assertion that the presence of difficulties in fully capturing the benefits of research and development (i.e. that there are spill-over effects to the augmentation of human knowledge) is ‘uncontroversial’ (pp.60-2; 93). Other studies, if broad-based, put the issue to one side (Blundell, *et al.* 2001) or approach the question from a limited perspective (Moretti, 1998).

A Few Rationales for Human Asset Externalities

In a survey of the literature on formal education and economic development Sianesi and Van Reenen, 2003 make a distinction between a labour economics literature showing substantial monetary returns to investment in education by individuals (linked to the ‘human capital’ literature of Becker, 1994), and a macroeconomic literature which attempts to measure the returns to society as a whole of investment in education, including any external or ‘spillover’ effects, which are presumed to be largely of a positive kind. A cause-effect relationship

between education and economic growth may, of course, be questioned: education, from one perspective, may be thought of as an investment or even a luxury consumed in greater quantities as a society grows richer. In their review focusing on the macroeconomic literature, Sianesi and Van Reenen conclude that there is indubitably an independent effect emanating from education, the main issue being whether this effect is manifest on the level or the rate of growth of national income. The latter distinction, they concede, makes little difference in most practical applications. (A smaller body of literature, concentrating on the relationship between economic growth and various conceptions of social capital and social infrastructure, will be briefly considered below.)

There are great difficulties in verifying empirically and measuring the external effects of improvements in formal education: these difficulties have resulted in an absence in the literature of any clear outline or categorisation of possible spillovers¹⁸. But some attempt to enumerate the external effects likely to emerge from educational improvement is imperative, not only to give plausibility to the macroeconomic results which verify empirically the presence of such effects in a general way, but to highlight the reasons why, as is suggested below, the effects of educational improvement are likely to be manifest only with a long lags. Plausible examples of external effects are as follows:¹⁹

1. Improvements in communication skills. Improvements in individuals' communication skills (e.g. language literacy), when manifested outside the sphere of employment, yield unremunerated gains to society as a whole. Such improvements are analogous to the positive externalities inherent in purchasing a telephone in 1930: the value of everybody else's telephone is increased. The more literate and more numerate the consumer, the more articulate they are, presumably, in communicating, in verbal and written form, their wants to producers. An enhancement of communication skills thus lowers the 'costs of

¹⁸ The discussion of 'spillovers' in Sianesi and Van Reenen, 2003 is very brief, and in Temple, 2001, barely two pages are devoted to the question of human capital externalities (pp.78-79).

¹⁹ The external effects discussed here are limited to those of a strictly 'economic', or productive nature.

search' on the part of consumers, which promotes market efficiency. Improvements in knowledge by consumers in particular areas can enhance the monitoring of product quality.²⁰

2. Emulation. Much new learning is communicated by imitating a master of an art (de Waal, 2001), and these 'lessons' may take place even when they are involuntary on the part of the master. Noam Chomsky points out that language acquisition takes place on the part of children even in societies in which communication with adults is discouraged or forbidden. Leading economies are likely to possess a disproportionately large number of firms and individuals worthy of emulation who can be observed at first hand.

3. Spill-over effects from accretions to knowledge which are general or which have 'fuzzy' boundaries. The more basic and fundamental ('general') are any accretions to knowledge, the more difficult it is for the individual to capture the full value of that knowledge (e.g. Newton's laws or Maxwell's equations). In a more modest context, improvements in knowledge and skill in one sector of economic activity may yield positive benefits in another when the boundaries between these activities are unclear: it proved difficult for Xerox to appropriate the full value of their innovations in software (much of which was harvested by Apple and Microsoft), perhaps because their perspective was delimited to the domain of office copiers. This phenomenon may help to account for the continued presence of industrial 'clusters' (e.g. 'Silicon Valley'), in which closely related and complementary products are produced within a restricted region.²¹ Technological spillovers of this kind have been singularly emphasised in discussions of education and economic growth due, undoubtedly to the role they play in the 'new economic growth' literature. As, over time, the ratio of science to craft-based knowledge rises, the rate of diffusion of new ideas will tend to accelerate, since scientific, as opposed to craft-based ideas are inherently more replicable

²⁰ The enhanced ability of French and Italian consumers to monitor food quality compared with other groups in Europe (e.g. the British) raises the problem of knowledge not due explicitly to education, and the spectre of possible deterioration of certain 'traditional' skills in the modern world.

²¹ Lucas (1988, pp.35-39) makes a similar point in the context of cities.

and less embodied in the skills of individuals (Auerbach, 1988, ch. 9)²²; the larger the cohort of individuals capable of monitoring these increments to knowledge, the greater the possibility of spill-over effects (Nelson and Wright, 1992). Appropriate levels of education are thus crucial not only for the development of new ideas, but for the assimilation and appropriation of already existing knowledge, a role perhaps of especial importance for developing countries.

4. Raising society's 'productivity' as a parent. The exceptional efforts made in Japan from the late nineteenth century to educate the whole of their population, including women, was based on the presumption of the spill-over effects attendant on the upbringing of children by educated mothers²³. In the context of inter-generational transfers of knowledge Lucas, 1988, p.39 suggests that '...human capital accumulation is a *social* activity, involving *groups* of people in a way that has no counterpart in the accumulation of physical capital' (emphasis in original).

5. Inherently interactive effects. A grand catch-all category: there are a range of human activities outside the sphere of employment in which improvements in the skills of individuals will have positive spill-over effects in society due to their inherently interactive nature. For instance, improvements in one's skill in driving a car will generate social benefits beyond those which accrue to the individual doing the driving.

Trajectories of Economic Development

What emerges from the discussion of economic income in Part I and the discussion of externalities in human asset accretion here is a perspective on the trajectory (and implicitly the causes) of economic growth. If we return to the graph of Japanese growth, note that the truly 'heroic' process of growth in economic income took place from the period subsequent to the Meiji Restoration of 1867, the most important component of which was linked to accretions to

²² The relative importance of craft-based and *in situ* knowledge (see below) helps to account for the apparently insignificant influence of broad-based education in the early industrial revolution (see Mitch, 1990).

²³ On the importance of female literacy for economic development, see Dasgupta, 1993.

human assets from the massive programme of education undertaken (Hanley, 1990); conventionally measured growth in the period leading up to World War II was negatively affected by interwar stagnation, though educational advancement continued apace; post war growth then emerges less as a miracle than as a realisation of past accretions of economic potential.

The trajectory of economic income is thus quite different from one emerging from conventional measures:

1. Overall growth rates are smoother across time periods for economic income than for conventional measures;
2. the growth rates achieved are unlikely ever to reach the fanciful rates which sometimes emerge on conventional measures: does anyone really believe that recent growth rates in national income of 9.5 per cent in China represent a true growth in potential, i.e. that a society can double its overall economic capacity in less than seven years?
3. rapid growth in economic income associated with accretions to human assets are likely to manifest themselves in conventional growth rates only with long lags.

A cause-effect relationship between education and economic growth may, of course be questioned: education, from one perspective, may be thought of as a luxury consumed in greater quantities as a society grows richer. 'Hard' statistical demonstrations of the existence of these long lags are difficult to formulate: it may be of interest that one study shows only a weak association between literacy and income for 20 European countries in 1850, but a much higher one between literacy in 1850 and income in 1970 (Sandberg, 1982; see also Easterlin, 1991). Most readers will find it plausible that the central roles played by the US and Germany in the late nineteenth century 'second industrial revolution' had as support the exceptional commitment to public education to be found in these countries (Lindert, 2004, chs 5 and 6); the emergence of the Netherlands and,

especially Sweden²⁴ as rich countries in the latter part of the twentieth century after long apparent stagnation is widely attributed to the growing relative importance in the contemporary world of these countries' accumulation of human and social capital. On the latter question (to be discussed below), the 'miraculous' economic resurgence of post war (West) Germany has been taken as an indication that even massive destruction of the physical²⁵ and human capital (i.e. five million young men) can be overcome when that mysterious entity, 'social capital', is preserved.

In concrete terms, lags in the growth process will be present simply because of the time needed for inter-generational effects to manifest themselves (Lucas, 1988, p.19); not recognised in the growth literature, however, is the likelihood that the spillovers from education will be dispersed with a lag through a 'multiplier' effect (e.g. the process of emulation of those individuals with newly acquired skills will take time). Furthermore, the aforementioned 'clustering' effects of improvements in education may involve delays, as complementary aspects of the development process, such as an enhancement in the levels of health and nutrition, may be required; concomitant development of physical infrastructure (most obvious in the case of libraries and scientific equipment) may be necessary, and these physical improvements may have to reach a level of 'critical mass' before we can observe concrete changes in people's lives. In the obverse direction, fears have recently been expressed that the decline in the US manufacturing base could result in a loss of the minimal capacity necessary to engender the traditionally productive interaction between skills in the manufacturing sector and those linked to research and development (PCAST, 2004)²⁶.

²⁴ There is some controversy surrounding the traditional view that Sweden was an exceptionally poor European country in the mid nineteenth century (Nilsson and Pettersson, 1990).

²⁵ Armstrong, *et al.*, 1991, claim that the extent of this physical destruction has been somewhat exaggerated.

²⁶ The relationship between scientific specialisation and manufacturing production is explored empirically in Laursen and Salter, 2005.

V. Problems

There are many good reasons to be suspicious of the thesis brought forth here. One is a perfectly good *ad hominem* critique: a teacher in a university can hardly claim to be disinterested when postulating a pervasive presence of positive external effects for education. There are many other issues, however, some of which relate to the thesis itself, and others which are linked to its empirical representation.

1. The dark side of education. There have, of course, always been critics of the need for generalised education, or even literacy: the poor would learn to despise their lot in life, leading to a servant problem or even incendiary and revolutionary sentiments on the part of the rabble. Perhaps more contemporaneously relevant is the concern of a king's counsel in eighteenth century France (presumably a follower of Turgot) worried about the over-production of priests and lawyers – unproductive labourers (Cipolla, 1969, p.65). At other times, there have been claims of an 'over-production' of various sorts – of Italian engineers in the early twentieth century (Guagnini, 1993b) and university graduates in general in late twentieth century US (Freeman, 1976). I address below some of the conceptual issues surrounding this notion of 'overproduction'. The current fashion for an emphasis on practical, applied and 'relevant' education merely exacerbates the putty-clay aspects of irreversibility in the accretion of knowledge by individuals and is likely to make them less flexible in response to changing economic and social conditions.

2. Measurement issues. There are major problems in the measurement even of illiteracy²⁷ (Cipolla, chapter 1); *a fortiori* the difficulties in calculating accretions to human assets are enormous (Wößmann, 2003). Conceptually, the most fundamental distinction is between measures of 'input' (e.g. years of schooling) and 'output' (most commonly accretions to individual incomes).

²⁷ Was the blues singer Robert Johnson 'illiterate'? In the formal sense he undoubtedly was, even though his refined and poetic use of language has made a good deal of money for others, if not for him.

3. Long term cultural knowledge. As suggested in footnote 18 above, the enhanced ability of French and Italian consumers to monitor food quality compared with other groups in Europe (e.g. the British) raises the problem of knowledge not due explicitly to education, but linked rather to some notion of 'tradition'. Troublesome in this context is the apparent fact that states which were on the front ranks of school education in the late nineteenth century (e.g. Prussia, Sweden, the US) had earlier been pioneers in eliminating illiteracy. In this context, the focus in this paper must be linked to the empirical, Popperian assertion that the differences in human asset stocks between societies can be largely explained in terms of visible, concrete policy actions taken in these societies at various historical moments and not to 'age old' distinctions between societies linked to 'culture' or racial differences.

4. Expectations: potential and actualised wealth. One of the problems posed in Part I surrounding the notion of 'economic income' is whether $K_2 - K_1$ (the difference in the value of assets at the beginning and the end of the period) is to be approached from the perspective of expectations, as opposed to the 'actual' values of $K_2 - K_1$. The controversy concerning this distinction in the 1930s was undoubtedly focused on the problems of macroeconomic realisation. Here, however, I choose to deal with the question of the valuation of assets from a problem which emerged in, perhaps, a particularly acute form in the context of the former Soviet economy – what value is one to place on a tonne of steel which is used to make a tractor, which is then shipped to a collective or state farm, which then remains idle and serves no part in the production of grain?²⁸

It is precisely this problem which is passed over in standard approaches. In orthodox growth theory, old and new, growth is explained by the effect of factors – unskilled labour, human capital, capital equipment – with the implicit

²⁸ Much of the material below is lifted from Auerbach and Skott (1995). Some felicitous details (emanating from Professor Skott) have been omitted.

presumption that these factors are being used efficiently. This approach implies that a whole set of problems surrounding how best to organise resources is assumed away. It is implicitly presumed that the competitive process – ‘the market’ – has solved these problems by weeding out inefficient practices and producers. But countries may perform well economically because their industries operate with less efficiency than in other countries. A model which does not go beyond the presumption of full efficiency cannot even address this possibility. By construction, it must be blind to those organisational and institutional factors that could influence the degree of productive efficiency.

Turning to the evaluation of human assets, consider the case of a developing country which seems to get low ‘returns’ in terms of economic growth on its investment in education. A critical question, most especially if we are to generalise this experience to other countries at comparable levels of development, is as follows: is this failure an intrinsic aspect (i.e. in terms of the nation’s ‘production function’) of the inability of a country at this level of development to absorb or make use of educated individuals, or are these individuals being used inefficiently because of corruption, race or caste discrimination? If the low productivity in the country is rooted in such factors, rather than being an intrinsic aspect of the level of development, it may not be useful to generalise this experience as a ‘law’, widely applicable to other countries.

We have the obverse problem in dealing with the spectacular successes achieved in economic growth in a set of newly industrialising ‘countries’ (Hong Kong, Singapore South Korea and Taiwan) from 1966 to 1991 in the context of a famous study of this phenomenon. Thus, Young (1995) accounts statistically for these levels of growth by rises in participation rates (most especially by women), investment to GDP ratios, improving levels of education and intersectoral transfers of labour from agriculture to, largely, manufacturing. Once these factors are accounted for, there is nothing exceptional in the performance of

these economies in terms of the growth rates in productivity, either in the whole economy or in manufacturing. Neoclassical growth theory, he claims, can well explain most of the difference between the performance of these and other post war economies (p. 675).

Has anything of interest really been explained here? We are told that improving educational attainment in these economies contributed one per cent per annum additional growth in labour input in each of these economies. But especially in the larger economies of Taiwan and South Korea, we have witnessed a gigantic social transformation of the population – from rural to urban and from agriculture to manufacturing. Can we simply take for granted that the economy and society would successfully absorb and re-allocate this enormous movement of people successfully? Could the rise in worker participation and the efficacious transfer of people have taken place without the major ‘investment in human assets’ represented by public policies promoting income redistribution and, especially, the substantial investment in schooling?²⁹

The question remains whether the contribution of the broad commitment to education in these countries can be calculated, as Young does, in terms of its separable contribution, or whether it had ‘spillover’ effects facilitating the increased participation of, especially, women and the general mobility and flexibility of labour, including the intersectoral transfers of labour from agriculture to manufacturing. Public policy acts promoting the growth of human assets may well have permitted these economies to operate closer to the ‘frontier’ of their possibilities and were thus necessary prerequisites of the exceptional growth rates attained. The theoretical and statistical presumption (implicit in Young’s estimation technique) that we are always on the frontier of a production

²⁹ The important role of state action in this context is discussed in Rodrik (1997).

function³⁰ possibly obscures, rather than enlightens, one of the most remarkable social and economic transformations of modern times.

VI. Conclusions: Testing, Testing

There is some affinity between the approach taken here and that to be found in models of the 'new' economic growth theory, especially Lucas (1988), with its emphasis on the positive external effects to human capital accumulation. Indeed, Lucas has suggested, as part of a critique of standard neo-classical theory that 'By assigning so great a role to "technology" as a source of growth, the theory is obliged to assign correspondingly minor roles to everything else, and so has little ability to account for the wide diversity in growth rates we observe' (p.15). But since his model, like others in its class, presumes the economy is always operating on its efficiency frontier, the ways in which human capital accumulation (and its external effects) might facilitate an economy *moving* in the direction of its frontier, as in the case of the 'Asian Tigers' above, is precluded in principle. Even in the context of technological change itself, the skills needed for the commercial adaptation of technology – the extraction of the full value of new technology to the 'frontier' - appear to be broad-based, including facility in production, marketing and finance, rather than being an exclusive focus on R&D work (Nelson and Wright, 1992). Thus, in a model like that of Lucas, a one-sided focus on technology as a source of growth is almost inevitable, since a range of uses of human knowledge that might make the economy more efficient with its *existent* state of technology are excluded by competitive equilibrium assumptions.

A second aspect of the new growth literature is that the presence of external effects to the accumulation of human knowledge is still treated as an exceptional event. Thus, for Lucas (pp.35-39), cities, are conurbations embodying exceptionally high levels of such human externalities: the differential rents

³⁰ The question quickly enters into the realm of metaphysics: can one define a meaningful *ex ante* best-practice production function, as opposed to an *ex post* listing of inputs and outputs, and claim that, empirically, the changes in inputs tend to be associated with more or less predictable changes in output?

attached to living in those cities can be used potentially as measures of the value of these externalities: the external effects of human capital accumulation are seen as exceptional, distinguishable and therefore measurable. For Lucas, as for Becker, the gains to human asset accumulation accrue predominantly to individuals rather than being pervasive in society, as postulated here. If, however, these effects are indeed pervasive, then most especially with the forms of communication available in the modern age, they will be widely cast in spatial terms and clustered in unlikely places. A one-sided search for external effects to human asset accumulation in city rents might be appropriate for a study of Mesopotamia, but seems irrelevant to the contemporary period.

But the retention of the individualist perspective on human capital accumulation means that there are manifest gaps to be filled in accounting for the 'social' and its role in economic growth and development. One literature, that on 'social capital', has focused on the question of trust, and has produced research, for instance, attempting to find a correlation between the levels of 'trust' in the population emerging from interview data in various countries and economic growth (Temple, 2001, pp. 81-88). Less feeble, and more in keeping with neo-classical methodology is the emerging literature on 'social infrastructure.' The proximate motivation for the need to produce this literature is that capital per head and educational levels do not adequately account for differences in labour productivity between nations in statistical tests (Hall and Jones, 1999). The overall problem, however, is far deeper: in the context of individualist neoclassical methodology, external effects incumbent upon accretions to human assets are, and must be, exceptional events. Therefore, an additional force, that 'mysterious' entity, social capital, has to be invoked to begin to explain events such as the post war German revival in the context of not only physical, but human destruction. More generally, a concept relating to the development of social capital is needed to help account for the vast expansion of social spending by the state in all growing economies since the eighteenth century (Lindert,

2004), unless we choose to view this expansion as a purely predatory development³¹.

The most striking form that this concept of social infrastructure has taken in the literature, however, is far from mysterious and strongly neo-classical: successful societies create rules, situations and institutions that encourage entrepreneurs to pursue productive activities rather than rent seeking (e.g. crime) (Baumol, 1990). Thus, the social infrastructure in the late nineteenth century US encouraged Thomas Alva Edison to become an inventor rather than a bank robber. If I seem to make light of this useful notion here, it is because of the tardiness with which 'society' has entered into the considerations of economists, and how, when it did, it took the familiar, rather narrow neo-classical form of an individual's response to rewards and punishments.

Finally, I suggest that economists should be modest in their claims to grand narrative solutions to problems. The more grandiose claims of economists, such that 'we know' that exogenous technological change accounts for 90 per cent of all economic growth, have now passed into history. Perhaps when dealing with issues of such manifold complexity as the effects on society of accretions to human knowledge - issues that in fact encompass the most basic questions surrounding human and societal development - we should satisfy ourselves with more modest narratives – 'stories' - that disinterested people can take seriously.

³¹ A view of state activity as purely predatory is approached in Shleifer and Vishny (1998).

Bibliography

- Accessible Retail (2002) **Research Report 2001-2002** [accessibleretail.co.uk].
- Aghion, P., Caroli, E, Garcia-Penalosa, C. (1999) 'Inequality and Economic Growth: the Perspective of the New Growth Theories' **Journal of Economic Literature** 37(4), Dec.: 1615-1660.
- Altschuld, R. (2003) 'US Science Education: the View from a Practicing Scientist' **Review of Policy Research** 20(4) Dec.: 635-645.
- Amsden, A. (1992) **Asia's Next Giant: South Korea and Late Industrialization** Oxford: Oxford University Press.
- Anderson, V. (1991) **Alternative Economic Indicators** London: Routledge.
- Armstrong, P., Glyn, A. and Harrison, J. (1991) **Capitalism Since 1945** Oxford: Blackwell.
- Arrow, K, Dasgupta, P., Goulder, L. Daily, G., Erlich, P., Heal, G. Levin, S., Mäler, K., Schneider, S., Starret, D., Walker, B. (2004) 'Are We Consuming Too Much?' **Journal of Economic Perspectives** 18(3) Summer: 147-172.
- Auerbach, P. (1988) **Competition** Oxford: Basil Blackwell.
- Auerbach, P. (2005a) 'Economic Development, Technological Change, and Growth' **Encyclopedia of Social Measurement** 1 Elsevier: 733-740.
- Auerbach, P. (2005b) 'The Discourse of "Economic Growth" and British Social Democracy'. Paper for the conference **Rethinking Social Democracy** Swansea 31 March – 2 April 2005.
- Auerbach, Paul (2005c) 'Learning and Economic Development' **Kingston University Economics Discussion Papers** 2005/6 September.
- Auerbach, P. and Skott, P. (1995) 'Michael Porter's Inquiry into the Nature and Causes of the Wealth of Nations – A Challenge to Neoclassical Economics' in Groenewegen, J., Pitelis, C. Sjöstrand, S-E. (eds) **On Economic Institutions Theory and Applications** Aldershot: Edward Elgar.
- Baumol, W. (1990) 'Entrepreneurship: Productive, Unproductive and Destructive' **Journal of Political Economy** 98 (5) October:893-921.
- BBC News (2005) 'Nigeria Tops Happiness Survey' accessed at

<http://newsvote.bbc.co.uk/mpapps/pagetools/print/news.bbc.co.uk/1/hi/world/africa/3...> on 24/05/2006.

Becker, G. (1994) **Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education** Chicago: University of Chicago Press; original publication: 1964.

Berlin, I. (1969) **Four Essays On Liberty** Oxford: Oxford University Press.

Blundell, R. Dearden, L. and Sianesi, B. (2001) 'Estimating the Returns to Education: Models, Methods and Results'. Paper presented at the RS Social Statistics Section, 27TH February.

Cipolla, C. (1969) **Literacy and Development in the West** Harmondsworth: Pelican.

Dasgupta, P. (1993) **An Inquiry into Poverty and Destitution** Oxford: Clarendon Press.

de Waal, F. (2001) **The Ape and the Sushi Master** N.Y.: Basic Books.

Diamond, J. (2005) **Collapse** Harmondsworth: Penguin.

Duany, A., Plater-Zyberk, E. and Speck, J. (2000) **Suburban Nation** The Rise of Sprawl and the Decline of the American Dream New York: North Point Press).

Easterlin, R. 1981. Why isn't the whole world developed? **Journal of Economic History**, vol. XLI, no. 1, March

Economist (2005) 'Ever Higher Society, Ever Higher to Ascend' 1 January:34-36.

Endario, P. and Einhorn, B. (2005) 'Outsourcing Innovation' **Business Week** 21 March; 46-53.

Fox, R. and Guagnini, A. (eds) (1993) **Education, Technology and Industrial Performance in Europe, 1850-1939** Cambridge: Cambridge University Press.

Freeman, R. (1976) **The Overeducated American** New York: Academic Press.

Galor, O. and Moav, O. (2004) 'From Physical to Human Capital Accumulation: Inequality and the Process of Development' **Review of Economic Studies** 71:1001-1026.

Goldin, C. and Katz, L. (2001) 'The Legacy of U.S. Educational Leadership: Notes on Distribution and Economic Growth in the 20th Century' **American Economic Review** 91(2) May:18-23.

Guagnini, A. (1993a) 'Worlds Apart: Academic Instruction and Professional Qualifications in the Training of Mechanical Engineers in England, 1850-1914' in Fox and Guagnini (eds) (1993), pp.16-41.

Guagnini, A. (1993b) 'Academic Qualifications and Professional Functions in the Development of Italian Engineering Schools, 1859 -1914' in Fox and Guagnini (eds) (1993), pp. 171-195.

Hall, R. and Jones, C. (1999) 'Why Do Some Countries Produce So Much More Output per Worker than Others?' **Quarterly Journal of Economics** 114 February: 83-116.

Hanley, S. 'The Relationship of Education and Economic Growth: the Case of Japan', in Tortella (ed.) (1990), pp. 69-87.

IMF (International Monetary Fund) (2006) **Finance & Development**, 43(1), March.

Kaletsky, A. (2004) 'Dark Clouds Gather Above Our Golden Pillars of Growth' **The Times (London)** 16 Nov.:56.

Laursen, L. and Salter, A. 2005. The fruits of intellectual production: economic and scientific specialisation among OECD countries, **Cambridge Journal of Economics**, 29, pp.289-308

Layard, R. (2005) **Happiness Lessons From A New Science** London: Allen Lane.

Lindert, P. (2004) **Growing Public: Social Spending and Economic Growth Since the Eighteenth Century** Volume I Cambridge: Cambridge University Press.

Lucas, R. (1988) 'On the Mechanisms of Economic Development' **Journal of Monetary Economics** 22: 3-42.

Mathias, P. (1979) **The Transformation of England** London: Methuen.

Marx, K. (1867) **Capital** Volume 1 Preface to the first German edition, as cited in [marxists.org/archive/marx/works/1867-c1/p1.htm].

Mervis, J. (2003) 'Scientific Workforce: Down for the Count?' **Science Magazine** 16 May. As reproduced at <http://nextwave.sciencemag.org/cgi/content/full/2003/05/21/2?template=msp>

- Mitch, D. (1990) 'Education and Economic Growth: Another Axiom of Indispensibility? From Human Capital to Human Capabilities', in Tortella (ed.) (1990), pp.29-45.
- Moretti, E. (1998) 'Social Returns to Education and Human Capital Externalities: Evidence from Cities' Centre for Labour Economics UC Berkley Working Paper.
- Nelson, R. and Wright, G. (1992) 'The Rise and Fall of American Technological Leadership: the Postwar era in Historical Perspective' **Journal of Economic Literature** XXX (December):1931-1964.
- Nicholas, S. 'Literacy and the Industrial Revolution' in Tortella (ed.) (1990), pp. 47-68.
- Nilsson, A. and Perttersson, L. 'Some Hypotheses Regarding Education and Economic Growth in Sweden During the First Half of the Nineteenth Century' in Torella, G. (ed.) (1990), pp. 209-222.
- Parker, R.H. and Harcourt, G.C. (eds) (1969) **Readings in the Concept and Measurement of Income** Cambridge: Cambridge University Press, with an introduction by the editors, pp. 1-30.
- PCAST, 2004. The President's Council of Advisors on Science and Technology **Report on Information Technology, Manufacturing and Competitiveness**, January, located at <http://www.ostp.gov/PCAST/pcast.html>
- PISA (2004) 'Messages from PISA 2000 and 'Learning From Tomorrow's World: First Results From PISA 2003' OECD [pisa.oecd.org].
- Porter, M. (1990) **The Competitive Advantage of Nations** London: Macmillan.
- Rahula, W. (1996) **What the Buddha Taught** Sri Lanka: Buddhist Cultural Centre, second edition of 1967.
- Rawls, J. (1971) **A Theory of Justice** Cambridge, MA: Belknap Press.
- Rodrik, D. (1997) 'The "Paradoxes" of the Successful State' **European Economic Review** 41: 411-442.
- Røed, K. (1997) 'Hysteresis in Unemployment' **Journal of Economic Surveys** 11(4):389-418.
- Sandberg, L. (1982) 'Ignorance, Poverty and Economic Backwardness in the Early Stages of European Industrialization' Variations on Alexander

Gerschenkron's Grand Theme' **Journal of European Economic History** 11: 675-698.

Sceptical Inquirer (2005) 'Harris Poll Explores Beliefs about Evolution, Creationism and Intelligent Design' 29 (6) November/December, pp. 56-58, citing Harris Poll (2005) 'Number 52' 6 July 2005.

Sen, A. (1981) **Poverty and Famines: An Essay on Entitlement and Deprivation** Oxford: Clarendon Press.

Sen, Amartya (1999) **Development As Freedom** Oxford: Oxford University Press.

Shleifer, A. and Vishny, R. (1998) **The Grabbing Hand** Cambridge, Mass.: Harvard University Press.

Stiglitz, J. (2005) 'The Ethical Economist'. Review of Friedman, Benjamin (2005) **The Moral Consequences of Economic Growth**, Knopf, in *Foreign Affairs*, November/December.

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

Temple, J. (2001) 'Growth Effects of Education and Social Capital in the OECD Countries' **OECD Economic Studies** No.33/II: 57-101.

Tortella, G. (ed.) (1990a) **Education and Economic Development Since the Industrial Revolution** Valencia: Generalitat Valenciana.

Tortella, G. (1990b) 'Education and Economic Development Since the Industrial Revolution: A Summary Report (The Less Developed Countries)' in Tortella, G. (ed.) (1990), pp.3-13.

Townsend, P. **Poverty in the United Kingdom** Harmondsworth: Penguin.

Transparency International (2005) **Corruption Perceptions Index** at http://www.transparency.org/layout/set/print/policy_research/surveys_indices/cpi, accessed on 24/05/2006.

Wößmann, L. (2003) 'Specifying Human Capital' **Journal of Economic Surveys** 17(3): 239-270.

Young, A. (1995) 'The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience' **Quarterly Journal of Economics** August: 641-680.

Appendix

In order to clarify the concept of economic income, we will use the case of a firm, since unlike both individuals and nations, firms make some attempt to measure the value of their capital³². We are in a simple world, with no inflation and zero interest rates. The firm's annual revenue, net of wages and materials – its cash flow - is £150,000 a year if it runs its fixed capital for eight hours a day, and £225,000, or 50% more, if it runs the fixed capital for 12 hours a day. The purchase price of the capital good is £1.2 million. This machine will last for ten years if it is run for eight hours a day, and this is considered to be 'normal practice' for this particular capital good. If, however, the capital good were to be run for 12 hours a day, it would last for only five years.

We can thus compare the net revenues of the two regimes (Table 1):

Table 1

	<u>Year 1</u>	<u>Year 2....Year 5</u>	<u>Year 6.....Year 10</u>
Net revenue (thousands of £) [8 hour day]	£150	£150 £150	£150 £150

	<u>Year 1</u>	<u>Year 2....Year 5</u>	<u>Year 6.....Year 10</u>
Net revenue (thousands of £) [12 hour day]	£225	£225 £225	? ?

Clearly, running the capital good for 12 hours a day is advantageous from the point of view of net revenue compared with the 8 hour day regime.

Let us now calculate economic income or profit. To make this calculation, we must account for the deterioration in the capital stock under each regime. For the 8 hour day regime, we calculate the deterioration of the capital stock on the basis of its normal life of 10 years. Thus, for our capital good costing £1.2 million, we would deduct, using so-called straight line depreciation, £120 thousand a year (one-tenth of the value of the capital good) from net revenues each year. This will yield an economic income or profit of £30 thousand each year. And this number is indeed a true calculation of our economic income, if we go back to our definition: we can consume £30 thousand each year and not cause a deterioration in our capital stock, since at the same time we will be putting away £120 thousand every year for 10 years, and this restriction in our consumption will pay for our new capital good, priced at £1.2 million, at the beginning of year 11 (Table 2).

³² This example follows from Auerbach (2005c).

Table 2

	<u>Year 1</u>	<u>Year 2....Year 5</u>	<u>Year 6.....Year 10</u>
Net revenue (thousands of £) [8 hour day; the capital good lasts 10 years]	£150	£150 £150	£150 £150
<u>minus</u>			
accounting depreciation charge [10 year basis]	£120	£120 £120	£120 £120
economic income	£30	£30 £30	£30 £30

By contrast, let us calculate this firm's economic income if the capital were to be run for 12 hours a day. First, we assume that the firm mechanically calculates its 'economic income' under the delusion that the capital good will last 10 years, when indeed it will only last for five. The firm will find itself living in a fool's paradise. For the first five years, the 12 hour regime seems to outperform the 8 hour regime, with an apparent economic income of £105 thousand a year, as opposed to £30 thousand for the 8 hour regime. But then, at the beginning of year 6, we have to buy a new machine at £1.2 million, and our depreciation fund has only accumulated half of that sum, that is to say £600 thousand (£120 thousand a year times five years) (Table 3).

Table 3

	<u>Year 1</u>	<u>Year 2....Year 5</u>	<u>Year 6.....Year 10</u>
Net revenue (thousands of £) [12 hour day; the capital good lasts 5 years]	£225	£225 £225	£225 £225
<u>minus</u>			
accounting depreciation charge [10 year basis]	£120	£120 £120	£120 £120
'economic income'	£105	£105 £105	? ?

[falsely calculated]

There is a shortfall of £600,000 at the beginning of year 6. Clearly, this mechanical or inappropriate calculation of the depreciation of the capital stock can lead to disastrous estimates of the true level of economic income.

If, in this simple case, the depreciation had been calculated in a realistic fashion, then economic income calculations would have served much better as an indication of the true economic health of the firm. For the 8 hour day regime, our calculations are already satisfactory, yielding a true economic income of £30 thousand a year. For the 12 hour day, in order to calculate the depreciation of the capital stock in a realistic fashion, we must subtract £240 thousand, and not £120 thousand from net revenue each year, because our capital good will only last five, and not ten years. The true estimate of economic income shows a *loss* of £15 thousand a year under the 12 hour regime and therefore indicates that this regime is not sustainable. The very regime that had looked so attractive in terms of net revenues and in terms of economic income when falsely calculated simply ceases to exist, as is indicated by the dashes after year 5. It is in this context that we suggest that the argument made in Kaletsky (2004) is fallacious (Table 4).

Table 4

	<u>Year 1</u>	<u>Year 2....Year 5</u>	<u>Year 6.....Year 10</u>
Net revenue (thousands of £) [12 hour day; the capital good lasts 5 years]	£225	£225 £225	- -
<u>minus</u>			
accounting depreciation charge [5 year basis]	£240	£240 £240	- -
economic income	(£15)	(£15) (£15)	- -