

**“Globalisation, Convergence and the Case for Openness
in Developing Countries: What Do We Learn from Open
Economy Growth Theory and Empirics?”**

Matthias Lutz

CSGR Working Paper No. 72/01

May 2001

THE UNIVERSITY OF
WARWICK



E · S · R · C
ECONOMIC
& SOCIAL
RESEARCH
COUNCIL

Globalisation, Convergence and the Case for Openness in Developing Countries: What Do We Learn from Open Economy Growth Theory and Empirics?¹

Matthias Lutz

University of St Gallen

CSGR Working Paper No. 72/01

May 2001

Abstract

This paper critically assesses the current policy consensus that greater integration into the world economy is beneficial for poor countries. It examines both the theoretical basis and recent empirical studies on the link between openness and economic performance. Although ‘new’ endogenous growth theory is often used to highlight the dynamic gains from economic integration, there is a surprising amount of ambiguity. The only unambiguous case for greater openness and economic integration comes from open-economy extensions of the ‘old’ neo-classical growth model. The empirical evidence remains ambiguous too. The final verdict, for instance, on the empirical link between growth and trade liberalisation is still open. More direct studies on technology diffusion, while providing evidence at the aggregate level, fail to pinpoint precise mechanisms. Microeconomic studies find that exporting activities do not seem to make firms more efficient, and foreign direct investment does not raise diffusion of knowledge to developing country firms. We are thus left with the conclusion that the potential benefits of greater openness and, by implication, increased globalisation for developing countries are frequently overstated.

Keywords: Globalisation, Openness, Growth Theory, Convergence

Address for correspondence;

Institute of Economics, University of St. Gallen,

Dufourstrasse 48, 9000 St. Gallen, Switzerland,

Tel. +41 71 224 2303,

Fax +41 71 224 2646,

Email: matthias.lutz@unisg.ch

¹ *Acknowledgements*

I want to thank the *Centre for the Study of Globalisation and Regionalisation* (CSGR) at the University of Warwick for its hospitality and financial support during my stay during Spring 2000. While at the Centre, I benefited from and greatly enjoyed discussions with several individual members of staff. The paper has also benefited from the comments received during a research seminar at the CSGR in May 2000, and criticisms and suggestions made by Elisabeth Allgower and Friedrich Sell.

1. Introduction

One of the longest running debates in Development Economics concerns the potential costs and benefits of greater openness. Today there appears to be widespread agreement, at least as far as general policy advice on trade liberalisation goes, that greater openness is beneficial for developing countries. As an example, consider the following quote from the *Financial Times*² (12 April 2000):

Happily, it is *clear* that the poor benefit from growth. Happily too, growth itself is helped along by ... openness to trade.

This paper discusses the link between openness, growth and convergence between poor and rich countries. The question is whether the current policy consensus³ on the benefits of greater openness is supported by theoretical and empirical economic research.

One purpose of this survey is gain a better understanding to what extent poor countries are likely to benefit from globalisation. While there are various definitions of globalisation in the literature⁴, one key aspect is greater integration of the world economy. This implies a heightened level of international economic exchange, i.e. trade in goods and services and factor flows. There is, of course, a conceptual difference between greater openness due to economic liberalisation, and an increased degree of interaction with the world economy as a result of reductions in transportation and communication costs. However, the final outcome is independent of whether barriers are natural or artificial: a reduction in either leads to an increase in international exchange.

² Martin Wolf commenting on the protests against the IMF and World Bank during their Spring 2000 Meeting in Washington, D.C. (12 April 2000). He concludes that “the activists are not just wrong. Hoping to help, they intend to remove the only effective medicine for mass poverty”. Here are two further quotes which reflect the consensus view: “...trade liberalisation offers the only known way to escape from the ever-slowning growth rates of developing countries. (Krueger, 1998, p. 1514); “... openness to trade helps developing countries catch up with the rich ones, and ... the poor generally benefit from the faster growth that trade liberalisation brings.” (Mike Moore, director general of the WTO, in the *Financial Times*, 19 June 2000).

³ Historically, the current consensus is rather unusual. ‘Structuralist’ views in the 1950s and 1960s argued that government intervention, including controls on trade and capital flows, was essential. There were also fears that the gains from interaction with the richer countries were weighed against the poor countries, for instance because of a secular decline in the terms of trade. As a consequence, most developing countries were following inward-oriented strategies until at least the 1970s.

⁴ Scholte (2000) highlights five notions of ‘globalisation’: internationalisation, liberalisation, universalisation, modernisation and superterritoriality. I will follow Rodrik (2000) in this paper by equating globalisation with “international economic integration”.

This equivalence between greater openness and globalisation as defined in the preceding paragraph can be easily seen as follows. Let the domestic price of an imported good, P_M , in a small open economy be given by

$$P_M = (1 + t_M)(1 + c)P_M^w \quad t_M, c \geq 0, \quad (1)$$

where P_M^w denotes the world market price, t_M the import tariff rate (or quota-equivalent tariff rate), and c is transport cost measured as a fraction of the total price. The domestic price of an export good can be defined similarly as

$$P_X = \frac{(1 - t_X)}{(1 + c)}P_X^w \quad t_X, c \geq 0. \quad (2)$$

where P_X^w is the world market price and t_X the export tax. Equations (1) and (2) show that it is irrelevant whether (i) tariffs (or export taxes) are reduced as a result of trade liberalisation, or (ii) there is a reduction in transport costs in a more integrated world economy. In both cases we observe a tendency for domestic prices to get more in line with prices on the world market. In neo-classical trade theory this means an increase in domestic welfare.

The basic similarity between globalisation and increased openness is helpful as we do not have really have a detailed knowledge of the likely effects the ongoing process of globalisation is going to have on poor countries⁵. Rather than relying on speculative analysis, this paper therefore starts from the premise that we can use the relatively large literature on the question whether greater openness is good for developing countries to get at least a rough idea on the globalisation question. This requires a more detailed examination of the theoretical and empirical basis for the currently dominant view as exemplified by the opening quote. I will focus particularly on the question whether the academic literature really supports the current consensus.

As we will see, it is important to distinguish between static and dynamic effects of greater international exchange. The static arguments are well-known. In a first-best world greater international exchange raises equilibrium welfare in all participating countries. In a second-best

world, however, intervention in international exchange can be welfare improving. Nevertheless, these are only static effects. Research on economic integration, particularly on the European Single Market (see, for instance, Baldwin, 1989), has shown that the static gains may not be very large. As a consequence, the focus has shifted to an emphasis on dynamic gains⁶.

Since there is such a clear policy consensus at the moment, this survey assesses the extent to which the consensus is supported by the relevant economic theory and empirics. Specifically, can we be sure that there are no models and empirical results to suggest otherwise? As we will see, the case for greater openness and thus the likely effect of globalisation is much more ambiguous than it is often portrayed to be.

The theories discussed here all have in common that (i) they incorporate a process that generates long-term growth in per-capita income, and (ii) they are set in an open-economy framework. But because a lot of the recent work on economic growth has been set in a closed-economy, I use this as a benchmark in section 2. The open-economy extensions are covered in sections 3 and 4. The last two sections deal with empirical issues. In section 5 I provide an overview of convergence trends. Section 6 discusses the empirical literature on the benefits of openness for growth and convergence. Conclusions follow in the final section.

This survey is aimed at two types of readers. For the economist, it is distinct from previous surveys on empirical research (Edwards 1993, Rodriguez and Rodrik 1999) by paying explicit attention to the open-economy extensions of different growth theories. The other group of potential readers are non-economists. For those, I hope to provide a readable introduction to the way economists think about the process which drives long-run growth in open economies.

Before we move to the theoretical literature on growth and convergence, a caveat is in order. This paper takes a reductionist view on development by focusing purely on average income levels. There is clearly much more to development than growth in (imperfectly measured) average incomes⁷. However, income per capita happens to be the variable that the literature sur-

⁵ Due to space constraints I will not discuss the question (i) whether the current globalisation process constitutes a new phenomenon, and (ii) to what extent it has actually led to a more integrated world economy. Baldwin and Martin (1999) discuss the first, Frankel (2000) the second question.

⁶ In the words of one trade theorist: "... conventional gains from trade are small ... Most economists would look to the effects of trade on competition, on product variety, on rent-seeking and on innovation for the large gains from trade ... (Smith 1999, p. 150).

⁷ Not only does it ignore other aspects that affect the average person's welfare, but it also says nothing about distributional issues. In addition there are various measurement problems.

veyed in this paper focuses on, and it is the variable for which we have the most wide-ranging data, particularly over time.

2. Closed-economy growth theory and convergence

a. Basic model structure

Modern growth theory concentrates on two classes of models: the *neo-classical* (or *Solow*) model and *endogenous* (or *new*) *growth theory*. There is no need to provide any details here, as there are numerous excellent texts (including Barro and Sala-i-Martin 1995, Jones 1998, Aghion and Howitt 1998, and Solow 2000) that describe their main features. Figure 1 summarises the basic structure of the production process, which is common to most variants of both classes of models. In the long-run the rate of growth of per-capita output in country i , y_i ($= Y_i/L_i$) is in both classes of models equal to the rate of technical change or knowledge accumulation, a_i .

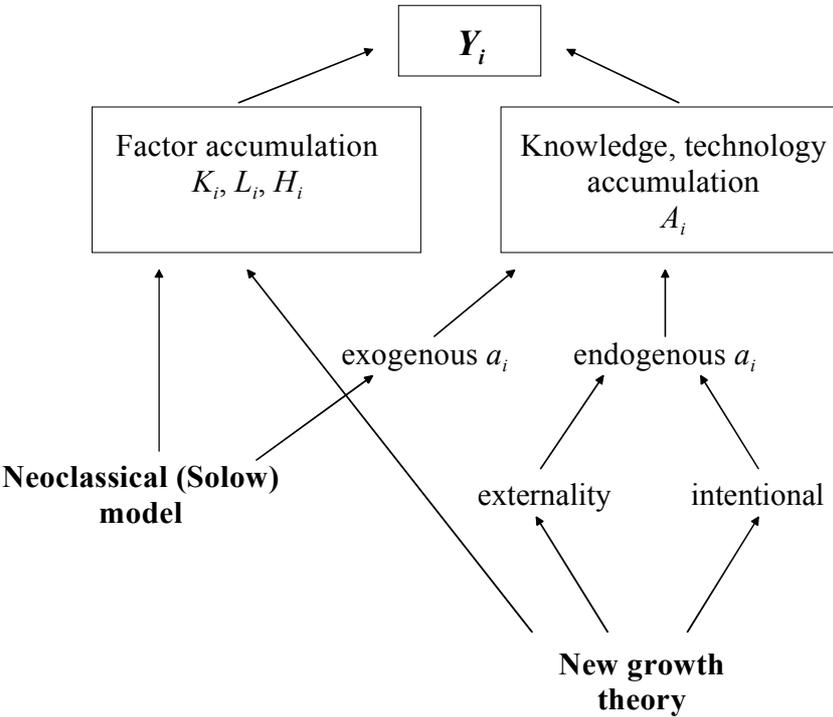


Figure 1: The basic structure of growth models

Notes: Y_i = Output, K_i = physical capital, L_i = labour, H_i = human capital, A_i = knowledge/technology, $a_i = \Delta A_i/A_i$, and i is a country subscript.

The key difference between the two classes of models is the exogeneity of the rate of technical change a_i in the neo-classical growth model. As a result, changes in underlying parameters have no impact on per-capita *growth* in the long run in this model. However, they can affect the long-run *level* of per capita output and thus lead to transitory changes in the growth rate during the transition to a new steady state. New growth theory, in contrast, endogenises a_i and thus the long-run rate of growth. This is achieved by either assuming that there are no longer diminishing returns to the factors accumulated endogenously (i.e. physical and human capital), or via an explicit modelling of the process that drives the rate of technical progress⁸.

b. *Implications for convergence*

There are many possible patterns of convergence and divergence between countries. A number of possibilities are shown in Figure 2. In both panels there are two countries, one with a high level (the ‘rich country’) and the other with a low level (the ‘poor country’) of per-capita income to start off with (i.e. at time period t_0). The main difference between the two panels is that in a) both countries grow at the same rate in long-run equilibrium (the solid lines), whereas in b) the poorer country grows more slowly in the steady-state. However, countries need not always be on their long-run steady-state growth paths, either because they have experienced a shock or because they are in the transition from an old to a new equilibrium path. Figure 2 shows a number of possible adjustment paths (the dashed curves) for the poor country. The growth path of the rich country (in grey) is taken as given in both panels.

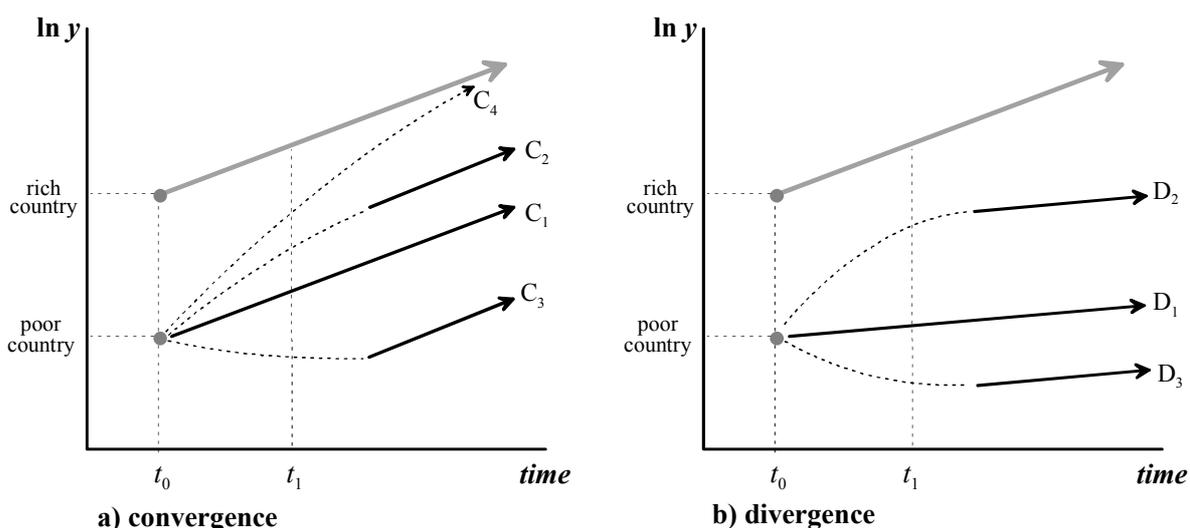


Figure 2: Patterns of Convergence and Divergence

Notes: The solid lines are steady-state (i.e. equilibrium) paths. The dashed lines depict transitory adjustment paths.

⁸ In this case technical progress takes the form of either (i) a rising *quantity* of specialised inputs, as in Romer (1990), or (ii) improvements in the *quality* of inputs or final products, as in Grossman and Helpman (1991) and Aghion and Howitt (1992).

It is often argued that neo-classical and endogenous growth theories have different implications for convergence. In the neo-classical growth model countries grow at the exogenously determined rate of technical progress. If one assumes that this exogenous rate of technical progress is identical across countries (I will discuss this assumption further in part c of this section), then all countries will share the same equilibrium growth rate in the long run. This is the case illustrated in panel a) where, irrespective of initial starting point and transition path, countries ‘converge’ to the same long run growth rate. In other words, their steady-state growth paths have the same slope.

Two forms of convergence are usually distinguished in the literature. ‘Absolute’ convergence occurs if two countries converge not only to the same growth rate, but also to the same growth path. This is depicted by adjustment path C_4 in panel a) where the poor country converges to the same growth path as the rich country in the long run. ‘Conditional’ convergence is weaker. Here countries have different paths in the long-run, as illustrated by the equilibrium paths denoted by C_1 , C_2 and C_3 . The vertical difference between these three steady-state paths (and of the course the rich country growth path) is due to differences in underlying parameters, such as savings rates and population growth. For instance, a country that saves a greater fraction of its income achieves a permanently higher income level in the neo-classical growth model. Convergence means in this case that countries reach their own equilibrium growth path in the long-run. Put differently, they do not remain permanently in a state of disequilibrium, but will also not converge ‘absolutely’ with each other.

To summarise, the main feature of the neo-classical growth model – assuming that the rate of technical progress is identical across countries – is that countries’ incomes *do not diverge in the long run*. However, there is the possibility that countries diverge in the short-run, as shown by the adjustment to growth path C_3 , and there may be permanent gaps between relative income *levels* in the long run.

Things are quite different in endogenous growth theory because there each country has its own idiosyncratic growth rate in the long run. In general, the long run growth rate will be a function of each country’s particular combination of technological and preference parameters. In many new growth models, for instance, an increase in the savings rate raises the long-run *growth rate* of per-capita income – in the neo-classical growth model this would only affect the long-run *level* of income. Thus, unless all underlying features of two economies are iden-

tical, they will grow at their own speed and, whatever their initial relative income levels, *diverge in the long run*. For instance, even if countries were alike in all parameters except for the initial capital stock, they would never converge.

The new growth theory scenario is depicted in panel b) of Figure 2. Here it is assumed that the poor economy generates a smaller growth rate than the rich country in the long run. There are three possible long-run growth paths, denoted by D_1 , D_2 and D_3 , in the diagram. They illustrate two things. First, the poor country may be on any given long-run growth *path*, even if the growth *rate* is identical in all three cases. Second, during the transition to a new growth path, the poor country may grow more quickly than the rich country, as illustrated by the adjustment to D_2 , even if it grows more slowly in the long-run.

c. Distinguishing between models

The differing predictions for long-run convergence of the two classes of growth theories have been the key point of departure for testing. There are numerous studies (a well-known example is Barro and Sala-i-Martin 1995) that test the convergence proposition for various international and regional data sets. A useful survey is provided by Quah and Durlauf (1999). The basic predictions that come out of the neo-classical model (with the assumption of a common rate of technical progress) are as follows. In the absolute convergence case an initially poorer country grows more quickly than an initially rich country (see adjustment path C_4 in panel a) of Figure 2). In the case of conditional convergence this is also true once one controls for the determinants of each country-specific growth path. So the standard approach is to regress the average per-capita growth rate on the initial level of per-capita income and the additional controls. A significant negative coefficient on initial income indicates that the data support the convergence hypothesis, and thus the neo-classical growth model.

Initially these tests were interpreted as tests for the two classes of growth models, but there are a number of reasons to question this approach, some practical, others theoretical. On the practical side it has to be realised that the typical data set that spans at most a few decades cannot really distinguish between the two types of predictions since they are essentially about the very long-run (Durlauf and Quah, 1999). Moreover, there are a number of conceptual and econometric problems in the implementation of the typical cross-section regressions on which the tests are based, as discussed in Temple (1999) and Quah (1999). A problem that has generated a lively debate is that the conditional convergence finding says little about whether the

underlying cross-country distribution of per-capita incomes has in fact narrowed or widened during the sample period. An early exponent of this criticism is Quah (1993).

One major conceptual problem relates directly to our interest in ‘openness’. As indicated earlier, the neo-classical growth model prediction of identical steady-state growth paths rests on the strong and untested assumption that the rate of technical change is common across countries. The basic argument is that even though technical progress is assumed exogenous, the non-rivalness of knowledge and ideas ensures that all countries have in principle access to the same technologies⁹. If one assumes that knowledge and technology flows are perfect, i.e. that there is instantaneous and costless diffusion, then all countries share the same technology frontier¹⁰.

This is, of course, an extreme open-economy assumption. If economies were truly closed, there would be no flows of technologies and ideas. In this case there is no mechanism in the model to ensure that countries grow at the same growth rate in the long-run, and thus we are in a world with country-specific long-run growth paths just as in the endogenous growth theory framework. Hence, in a world of closed-economies we cannot use the convergence issue to test the two classes of growth models.

However, the contradictions of the empirical cross-country convergence literature do not stop here, because what is really tested is a partially open-economy neo-classical model against a fully closed endogenous growth model. If one also allows for knowledge flows in endogenous growth theories then one could get convergence predictions that are similar to the neo-classical model. In addition, there is no reason to limit the open-economy assumption to knowledge flows. If one includes trade and/or capital flows, the predictions of both classes of models can change dramatically. These issues are discussed in sections 3 and 4.

Many of the problems relating to the convergence question also affect the more general question how to test which of the two model classes is more relevant in practice. Many cross-

⁹ The original neoclassical model by Robert Solow was formulated in a time-series context for an individual country. The key assumption was that technical progress is determined exogenously. To make it grow at a constant rate was purely a convenient simplification. It appears that when the neo-classical model was adopted to a cross-sectional context, the assumption of the same rate of technical progress at different points in time for a given country mutated into the much more questionable assumption of an identical rate across countries.

¹⁰ Although, due to differences in factor endowments and factor accumulation, they are unlikely to be using identical technologies.

country empirical studies on the determinants of economic growth thus do not explicitly distinguish between the two model classes. A recent summary of such work is Barro (1997).

More direct tests of endogenous growth theories face the difficulty that the underlying processes are not readily observed. As a consequence, there have been few studies only, leading to mixed results. Jones (1995), for instance, finds that while in many countries there have been permanent changes in the factors driving long-run growth according to endogenous growth theories (such as the number of scientists or R&D expenditure), no permanent increases in the growth rate have been observed. This suggests that one of the key predictions of many endogenous growth models is not supported by the data. In contrast, in a recent comparison of Taiwan with South Korea, Feenstra et al. (1999) find that an increase in export variety tends to raise productivity growth, as predicted in R&D driven endogenous growth models.

Another strand of empirical analysis tries to test the steady-state performance of the neo-classical growth model. The idea is to explain cross-country variations in income per-capita as a function of the underlying parameters determining the steady state in the neo-classical model. The pioneering example of this type of analysis is Mankiw et al. (1992). Their econometric results show that the neo-classical growth model appears to do very well in explaining cross-country variations in income levels. Klenow and Rodriguez-Clare (1997) and Hall and Taylor (1999) use a similar approach, but rather than estimate the steady-state condition they use a growth accounting methodology. Their results reveal that most of the variation in income per capita across countries remains unexplained, and is thus attributed to unobserved productivity differences¹¹. Similar findings have led Prescott (1998) to claim that what we really need is a theory of total productivity growth.

There are also conceptual problems. Jones (1999) and Solow (2000) point out that a major flaw of new growth theory is the existence of a razor's edge assumption that is implicitly included in all model variants. This assumption assures that the equilibrium growth rate in these models is constant, as opposed to an ever declining or increasing growth rate. Since this relates to the very process that generates growth endogenously, it raises doubts about the underlying credibility of these models.

¹¹ The difference in the two sets of studies are due to the fact that in regression-based estimation some of the (unobserved) productivity differences are attributed to factor inputs, since factor use and productivity are positively correlated. This leads to a standard omitted variable bias in the regression estimates.

In summary, a probably fair assessment is that no consensus view has so far emerged as to the superiority of one class of growth theories over the other. This has led some analysts to take an eclectic view. Jones (1998), for instance, argues that one way to reconcile theory with evidence is to use some variant of endogenous growth theory to explain the growth in the overall world economy, and a neo-classical type framework to explain cross-country differences in incomes per capita at any given point in time.

Whatever view one takes, what clearly emerges from both the theoretical and applied literature is the key role played by knowledge and technology. And, as Klenow and Rodriguez-Clare (1997), Prescott (1998) and Hall and Taylor (1999) indicate, there are major productivity differences across countries. This suggests that, contrary to the assumption implicit in many cross-country convergence studies, there is no instantaneous and costless flow of knowledge and technologies across countries.

The next two sections discuss how the predictions on convergence change when growth models are put in an open economy setting. The focus will be on three channels of interaction: capital flows, technology and knowledge flows, and trade. Migration will not be considered, since labour flows are today fairly insignificant due to immigration laws, especially when compared with the first great globalisation phase in the late 19th century. The significance of trade – in contrast to capital and knowledge/technology flows – is indirect, as it is not an input in the production process. Section 3 considers open-economy extensions of the neo-classical model, and section 4 discusses endogenous growth theory in an open-economy context.

3. Neo-classical growth theory in open economies

In the neo-classical framework the rate of growth is determined exogenously. In terms of Figure 2, the relevant part is panel a). The question of interest is therefore, if a poor country starts off on path C_1 , will ‘openness’ shift its equilibrium path up to C_2 , or maybe even make it converge with the rich country (C_4), or might it have a harmful effect by lowering the equilibrium path to something like C_3 ?

a. Capital flows

A fairly straightforward extension is to allow for capital flows. In this case investors in any country will move their savings to the country that offers the highest return¹². In the Solow model this is the country with the lowest per capita stock of capital. Since the latter will also have a lower income per capita, the standard prediction is that capital should flow from rich to poor countries and thus speed up convergence. With perfect capital mobility, convergence will be instantaneous, as the level of domestic savings becomes irrelevant in the determination of the domestic capital stock. Finally, the returns on capital should be equalised in equilibrium.

These predictions are at odds with the data for a number of reasons. First, the vast majority of capital flows are between the rich countries. Second, there is a high degree of correlation between investment and domestic savings, suggesting that capital markets are far from integrated. Third, returns are generally not equalised. One possible response is to argue that capital mobility is less than perfect in reality.

Another response is to assume that the return to capital is not just determined by the per-capita level of capital. This is the route taken by Barro et al. (1995) (BMS). They develop an open-economy version of the Solow model with human capital to explain why there might be slow convergence even with capital flows. In their model countries can borrow and lend abroad. However, potential borrowers can only obtain foreign loans to finance increases in the stock of *physical* capital. Because *human* capital accumulation has to be generated out of domestic savings (i.e. foregone consumption), this slows down the adjustment process to the steady state. BMS show that, with a number of realistic assumptions about the underlying parameters, one obtains convergence speeds roughly in line with the cross-country regression evidence.¹³

It is not clear how realistic BMS's approach is. For instance, there is a somewhat artificial distinction between the level of credit constraints affecting physical and human capital (Obstfeld and Rogoff, 1996). In practice it is neither possible to fully borrow against physical capital,

¹² An additional incentive for capital flows is international risk-sharing, which operates even when two countries are identical in all respects (such that average returns are equalised). Two countries will then benefit from capital market integration, as long as their risks are not perfectly correlated. In the neo-classical model this can lead to higher incomes, in endogenous growth models to a higher long run rate of growth. In all cases the beneficial effect applies to *both* countries. See Obstfeld and Rogoff (1996, Ch. 7) for a discussion.

nor is it impossible to borrow abroad to finance human capital accumulation. So perhaps a better approach is to allow for capital market imperfections or adjustment costs to generate delays in the convergence process. Empirically, as Gundlach (1999) demonstrates, the per-capita output growth rates on the way to the steady-state implied by the BMS model are much higher than what one observes in reality.

It is also important to note that the tendency for capital to flow from rich to poor countries depends on both countries sharing a common rate of underlying growth, i.e. rate of technical change. However, as was argued earlier, this is an additional open-economy assumption. If capital flows are the only form of interaction then the two countries will grow at different rates in the long run. In this case capital flows may increase the rate of conditional convergence, i.e. tendency for countries to return to their own steady-states path, but these long-run paths themselves may diverge. Moreover, capital may also flow in the ‘wrong’ direction, i.e. from poor to rich countries. Interestingly, as Gundlach (1999) shows, the BMS model is only compatible with actual rates of growth if one gives up exactly this one key assumption, i.e. if one allows the rate of technological progress to differ across countries.

Finally, it needs to be realised that when part of the domestic capital stock can be owned by foreigners, a distinction has to be made between GNP and GDP. If one compares a capital-importing poor country with a capital-exporting rich country, GDP per capita differences will understate the true differences in standard of living. Thus, the equalisation of domestic rates of return to capital does at best ensure conditional convergence in GDP. However, since part of the poor country’s output is now owned by rich country residents, there will be a permanent gap between their respective incomes per capita.

b. Technology and knowledge flows

As was discussed in section 2, what is normally considered the closed economy version of the neo-classical model in fact contains a strong open-economy assumption. This is that all countries have access to the same technologies and that knowledge flows are instantaneous and without costs. Without this assumption one can no longer predict that there will be a common long-run growth rate across countries in a closed-economy setting. Convergence, or better,

¹³ Similar results can be obtained in a model where public capital can only be accumulated domestically and in an overlapping generations model with credit market imperfections (Obstfeld and Rogoff 1996, Ch. 7).

non-divergence, would then be purely accidental. In the normal state of affairs countries should diverge if there are no technology or knowledge flows.

A recent model by Lucas (2000) illustrates this point very well. He simulates a model world economy in which all countries asymptotically grow at the same exogenous rate. However, countries move from an initial state of stagnation to modern growth at different points in time. We thus get a leader-follower situation. Whether a stagnating economy starts to grow depends stochastically on the income gap between the follower and the countries that have already started to grow. When it starts to grow, it grows more quickly than the leading countries until it has caught up. In the end all countries reach the same equilibrium level of income.¹⁴

Lucas's model is not intended to explain growth as such. What he shows is that one can get a situation where the world distribution of income initially widens before narrowing again just through the fact that some countries start to grow later than others. However, the result that all countries finally converge is due to the built-in assumption of perfect diffusion of technology and knowledge in the long-run, even if there are temporary delays for the lagging countries.

If diffusion is less than perfect, then we may get divergence between countries even if there is some exchange of technology and knowledge between countries. To illustrate this, consider again a stylised set of poor and rich countries. If the diffusion process takes the simple form $A_{poor} = \beta A_{rich}$ ($\beta \leq 1$), i.e. the level of knowledge and technology in poor countries is simply a constant fraction of that in rich countries, then both countries will grow at the same rate, since $a_{poor} = (\Delta A_{poor} / A_{poor}) = a_{rich}$. If, however, the diffusion process takes the form $A_{poor} = A_{rich}^\beta$, then the poor country grows more slowly than the rich country, since now $a_{poor} = \beta a_{rich} < a_{rich}$ unless β happens to be equal to one.

This simple example illustrates yet again that some very specific assumptions are needed to ensure that countries do not diverge in the neo-classical model, even when knowledge and technology are transmitted between countries. Given that the diffusion process is so important, it does merit further attention. There will be a more detailed discussion of a number of aspects in the context of endogenous growth theories in section 4, and in the survey of empirical work in section 6.

*c. Trade*¹⁵

Trade has often been viewed as a key channel for the transmission of knowledge and technology between countries. If this is indeed the role that trade plays, then clearly the more countries trade with each other the faster will be the rate of convergence between them. But trade may also perform a more subtle role, as shown in a recent paper by Ventura (1997) who analyses the neo-classical model for a small open economy.

The motivation for his paper comes from the observation, due to Young (1995), that the high post-war growth rates in the East Asian miracle economies were largely due to factor accumulation and not rapid productivity growth. This is difficult to square with the evidence, at least in the context of a closed-economy neo-classical growth model, since diminishing returns to capital would ensure that growth slows down fairly quickly. Of course, this is not what has been observed in East Asia where a number of countries, such as South Korea and Hong Kong, have grown very rapidly over a long period of time.

Ventura constructs a Ramsey model where integration into the world economy ensures that a weak form of factor price equalisation (FPE) holds. Although final goods are non-traded, there is trade in intermediate goods. Returns to capital are still diminishing, but now only at the global level. That is, world averages behave just like the closed economy. But as long as a given economy remains ‘small’, factor returns are exogenously given and thus independent of the domestic capital stock.

This has the surprising result that a change in the savings rate can have a permanent effect on growth, even in the context of the neo-classical model. The reason is that, as the capital stock rises, resources are moved into more capital intensive industries¹⁶. Normally this would lead to a fall in capital returns over time, but here FPE ensures that the value of the marginal product of capital remains unchanged.

In one sense, this open-economy extension transforms the neo-classical model into something very close to an endogenous growth model. This is also the key implication for our purposes. It means that a poor, small open economy can grow at a faster rate than the richer countries (at

¹⁴ One way to visualise the process is to think of a time-trial during a cycle-race, such as the *Tour de France*.

¹⁵ There is an interesting tension between neo-classical growth and trade theory. If countries converge to the same steady state, and thus have the same capital-labour ratio, there is little scope for trade. In the Heckscher-Ohlin model, the more factor ratios differ, the more scope there is for mutually beneficial trade.

least for some time) and thus catch up with them. Growth is export-led, and as the country becomes richer its production and exports become increasingly more capital-intensive. The Ventura model thus makes a very strong case for an outward-oriented growth strategy. In terms of Figure 2, panel a), trade can help a poor country onto growth path C_4 which means it will ultimately converge with the rich country.

d. Summary

All three types of open-economy extensions to the neo-classical growth model considered here have positive implications for convergence, and thus also for growth in a developing country. Poor countries benefit from greater integration into the world economy either through technology or capital imports, or indirectly via the possibility to export. Therefore, if one accepts the neo-classical growth theory framework, ‘openness’ is always beneficial. In fact, without the open-economy assumption of perfect knowledge and technology flows, there will be divergence even in the neo-classical model.

4. New growth theory in open economies

Open-economy extensions of new growth theory are less easily discussed than in the case of the neo-classical model. The main reason is that there are many different variants of endogenous growth models. There is no core model that could be extended step-by-step as in the previous section. There is also no easy way of selecting one variant over another. As was already indicated earlier, this is due to the fact that there is only limited scope for empirical testing of new growth models.

For these reasons I will first discuss a number of important questions that need to be asked of any specific open-economy new growth model in order to determine its potential effect on growth and convergence in a poor country. See also Barba Navaretti and Tarr (1999) for a discussion of these issues. Due to the current policy consensus I will take as the maintained hypothesis that ‘openness’ and economic integration are good for poor countries. The question then becomes: are there any models where this is not the case? The short answer is ‘yes’. This means that, in contrast to neo-classical growth theory, there is no unambiguous case for greater openness that can be derived from theory. In the second part of this section I will de-

¹⁶ This requires a sufficiently high elasticity of factor substitution.

scribe a number of such models. This helps us understand what the key mechanisms are that determine the potential benefit or harm of greater integration into the world economy.

A key feature of all new growth models is that the rate of technical progress is determined endogenously. This means that policies can alter the growth rate and not just the level of per-capita income, which makes them much more potent in the long-run than in the neo-classical model. Thus, depending on the specific model of the economy, policies regarding openness can have very powerful effects. Since increased globalisation acts in a similar fashion, i.e. as a parametric shift in an underlying fundamental, it has the same effects as policies that increase openness. Similarly, trade restrictions now have not only level but also growth effects. If the latter are negative, the case for free trade and greater integration is even stronger than in the neo-classical model. But if the growth effects are negative, they may potentially outweigh the static losses from trade restrictions.

a. *Some key issues*

The nature of convergence

The first question relates to the nature of convergence in these models. If openness does indeed lead to convergence, is it convergence in growth rates or convergence in levels? Convergence in growth rates is the natural outcome if the open-economy extension means that growth in technology/knowledge becomes a global phenomenon that affects all ‘open’ economies alike. In this case, the result is very similar to the neo-classical model. However, if the poorer countries’ growth rate is bounded from above by the leading country’s growth rate, initial differences will persist. In other words, convergence in levels requires that greater openness or globalisation leads to initially faster growth in poor countries.

Consequently, convergence in levels is a much stronger result. However, endogenous growth models usually have little to say about level differences. As soon as the growth rate becomes endogenous, ‘initial conditions’, such as the timing of a growth-enhancing policy, can lead to permanent gaps between countries. To obtain convergence in levels, one would have to include a ‘catching-up’ mechanism in the model, for instance via copying, that ensures that the poorer country is not permanently left behind.

The growth generating mechanism

There are some important differences with respect to the source of growth. Is a_i (i.e. country i 's rate of technical progress) endogenous because knowledge and technologies are generated intentionally, or are they the result of an externality? If it is created intentionally, does the new knowledge/technology come in form of blueprints, i.e. pure inventions which can be patented and then used by anyone willing to pay for a licence, or in form of specific intermediate inputs? If the result of external effects, is new knowledge/technology due to some specific form of learning-by-doing, or does the poorer country simply benefit from international knowledge diffusion?

The specific form that knowledge and technology accumulation takes is likely to determine the ease with which it can be transmitted from one country to another. Learning-by-doing, for instance, cannot be transmitted via 'knowledge flows' but is the result of economic activity. These issues also have implications for the types of 'openness' channels which are potentially most effective for developing countries.

The diffusion process

If knowledge and new technologies are transmitted from rich to poor countries via some form of diffusion, then it is necessary to know the precise channel. A very strong assumption about diffusion was discussed earlier in the context of the neo-classical model where the state of world knowledge is immediately and costlessly known to all countries. One is hard-pressed to think of a way this could work in practice. A very simple and relatively cheap diffusion process would be if all that mattered were to read product manuals and scientific journals. However, the history of scientific inventions and innovations shows that to get from an initial discovery to a marketable product can be a time and resource-intensive process.

What form of learning-by-doing?

If knowledge and expertise are generated through learning-by-doing, then it matters in which activity it takes place. Is it just production per se, or does it happen in specific industries? If the latter, are they more likely to be traded or non-traded goods sectors? And if traded, is it the export or the import-competing sector? These issues determine to what extent increased trade and openness stimulate or reduce learning-by-doing. If it is a function of the general level of economic activity, then the static gains from trade will be enhanced by dynamic gains. If learning-by-doing takes place in the non-traded sector, or the import competing sec-

tor, increased trade and specialisation on the export sector may actually have negative effects on long-term growth.

Foreign direct investment (FDI) may also play a special role if it generates learning-by-doing. In addition, it could raise the rate of knowledge diffusion. Again, however, this will depend on the type of FDI. Is it a manufacturing plant, a mining exploration or a hotel? Again, as with the other questions before, once one starts thinking about actual mechanisms that lead to better technology, knowledge or expertise, one can imagine situations in which greater openness could have potentially growth-reducing effects.

b. Some theoretical examples of harmful effects

Redding (1999)

Redding (1999) introduces endogenous productivity growth into a two-country Ricardian trade model with two sectors. Comparative advantage is endogenous, since productivity is assumed to depend on sector-specific learning-by-doing. Initial comparative advantage is thus a function of past production. Relative productivities in the two sectors depend on the allocation of labour, which is determined by consumption patterns. In autarky, both countries produce both goods, so their respective overall output growth rates will depend on a weighted average of productivity growth in the two sectors. Trade forces producers to specialise according to comparative advantage lines. If sectoral productivity growth rates differ, subsequent growth depends on the specialisation pattern.

When countries switch to free trade, this initially raises welfare because for a given wage more can be consumed of both goods in both countries. These are the standard static gains from trade. But dynamically there could be welfare losses if a country specialises in the sector where its productivity growth is lower. In this case selective trade and/or industrial policies could be welfare improving.

Redding shows that there are also some more subtle issues which affect the desirability of any policy intervention. First, the economy must have a *dynamic* comparative advantage in the sector that initially does not have a *static* comparative advantage. Second, for this reason protection only needs to be temporary, just as in the standard infant-industry case. Third, any trade intervention implies a static welfare loss that needs to be offset against the dynamic gains from intervention. The overall net benefit can therefore be positive or negative (and

partly depends on the discount rate). Fourth, consumers in the other country will also benefit from the intervention since they will as a result enjoy the benefits of increased productivity in the *dynamic* comparative advantage sector in the long run. Fifth, the usual second-best argument about the superiority of a production subsidy applies.

van de Klundert and Smulders (1996)

As in Redding (1999), this is a Ricardian model of trade with endogenous growth. There are two regions, North and South, which produce two types of goods, one an imperfectly competitive manufactured good, the other a standard homogeneous product. There are two sources of endogenous growth. Both take place in the manufactured goods sector. The first is learning-by-doing which is related to the level of production in this sector. The second is knowledge diffusion from the North, which is an increasing function of the productivity gap between the two countries.

The South starts off with an initial productivity disadvantage. Its manufactured goods are thus more expensive than in the North, and so it has a smaller share of the world market. However, although it can simultaneously benefit from knowledge diffusion, there is no guarantee that it will catch up with the North. The problem is that the benefits of knowledge diffusion and the rate of learning-by-doing depend on its market share in manufactured goods. If competition is tough and the rate of diffusion fairly low, there may be permanent divergence between the two regions. In this case a trade intervention that raises manufactured goods production in the South could be beneficial for growth and convergence in the region. As in Redding (1999), what is required is a short-term measure that temporarily creates an artificial comparative advantage in sectors with learning potential. The novelty of the van de Klundert and Smulders model is that it shows that the degree of competition in product markets also matters for convergence.

Core-periphery models

Krugman and Venables (1995) formalise the effects of globalisation on two regions (North and South) with two goods, a manufactured good and a homogeneous good. They address the question whether globalisation can lead to a core-periphery pattern. Globalisation in their model involves a reduction in transport costs. As in regional models this leads to agglomeration in the manufactured goods sector due to increasing returns to scale.

Initially there is no comparative advantage in either region. Transportation costs are so high that both regions are self-sufficient. When transport costs fall a little, there is some intra-industry trade in manufactures, but no specialisation yet. Then, as they fall further, linkage effects within the domestic industry imply that one region ends up with a larger manufacturing sector.

It now becomes even more attractive for other manufacturers to locate there (due to the benefits of backward linkages, i.e. a cheaper supply of inputs), and as a result a greater variety of (intermediate) goods is produced there. This lowers the cost of final goods production (this is a forward linkage) in this region. In other words, the region that has the initial advantage experiences a virtuous circle. Eventually, as transport costs drop further, the world economy organises itself into an industrialised core and a de-industrialised periphery.

The story does not stop here, though, because industrialisation in the core increases the demand for labour there. This, in turn, raises wages relative to the periphery. When transport costs fall even further, the importance of being close to markets and suppliers (i.e. the linkage effects) declines and the periphery offers potential producers a lower relative wage and thus a cost advantage. Finally, when the relative cost advantage is sufficiently large, manufacturers will start to relocate to the periphery. In other words, transport costs matter so little now that they no longer outweigh the wage advantage. When this happens, wages in North and South converge.

Krugman and Venables' model clearly illustrates how interaction can lead to uneven, even negative gains from greater integration into the global economy. However, their model is static in that there is no long run rate of growth. Baldwin et al. (1999) extend Krugman and Venables' model to a dynamic context and obtain a fairly similar story. A major difference in the dynamic model is that the South will not necessarily catch up with the North in the long run. The key assumption that generates convergence is that the South learns from the North's innovative activities. So it is not "trade openness per se" (p. 28), i.e. globalisation, that leads to convergence in the long run, but the fact that there is diffusion of knowledge from North to South.

Others

Other theoretical models where growth is endogenous but economic integration can have harmful effects for at least one country can be found in Young (1991), Grossman and Helpman (1991), Feenstra (1996), Aghion and Howitt (1998), Diao et al. (1999) and Rodriguez and Rodrik (1999).

c. Summary

There is no clear view that emerges from open-economy models with endogenous growth. This section has provided a somewhat biased view in favour of models where openness could have welfare-reducing effects. After all this was what it set out to do. It needs to be stressed that there is also a range of models with beneficial effects from greater integration and openness. Examples can be found in Baldwin (1989), Grossman and Helpman (1991), Rivera-Batiz and Romer (1991), Aghion and Howitt (1998), Goodfriend and McDermott (1998), Eichler (1999) and Baldwin and Forslid (2000).

In terms of our initial question, though, we have now encountered a number of reasonable models in which openness can have negative effects. This implies that the case for greater openness in developing countries, and by implication the promise of welfare gains due to increased globalisation, cannot be based on the endogenous growth framework. The perceived long-run benefits depend on particular assumptions, and it is equally possible to generate results that contradict the current policy consensus. In such cases it is of course standard procedure to resort to empirical tests. The problem with endogenous growth theories, as pointed out previously, is that there has been very little empirical testing to help us separate the more from the less relevant model variants. Unfortunately, the literature has been overwhelmingly theoretical both in closed and open-economy versions.

The factor that drives the different theoretical predictions in open-economy endogenous growth models is whether openness is associated with knowledge and technology flows. Feenstra (1996) concludes that, at a general level, convergence results in open-economy models of endogenous growth theory depend on the assumption that trade occurs simultaneously with the diffusion of knowledge. If there is no diffusion, trade can lead to a divergence of growth rates. This means that trade is not really the reason for convergence in these models.

One is left with the impression that the claims made by the proponents with respect to the dynamic benefits of greater openness are somewhat exaggerated and based on a selective view of the endogenous growth literature. There is neither a clear-cut theoretical case, nor empirical evidence to render any one model variant more credible than others.

5. Trends in convergence

This section provides some evidence on general trends in convergence between rich and poor countries. The emphasis is on what the growth literature calls σ -convergence. This focuses on changes in the distribution of cross-country incomes over time. There are many studies that provide detailed empirical evidence on convergence (e.g. Jones 1997, Pritchett 1997, Durlauf and Quah 1999, McGrattan and Schmitz 1999), so this section limits itself to a summary of the main facts. One novelty aspect is that the data set runs well into the 1990s.

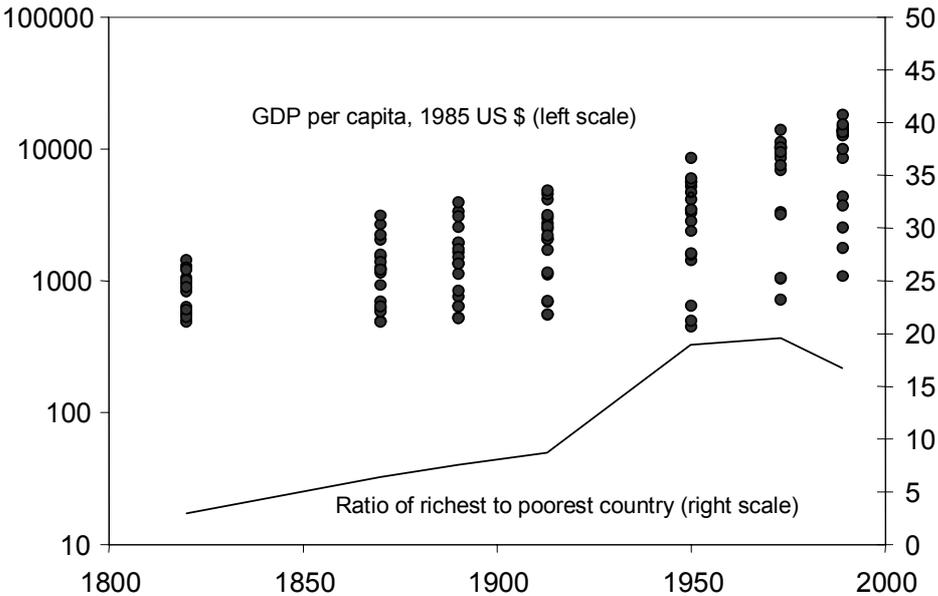


Figure 3: GDP per capita for 21 countries, 1820-1989.
 The data are from Maddison (1994). Source: McGrattan and Schmitz (1999).

One of the longest series of consistently estimated per capita incomes can be found in Maddison (1994). This data set covers a number of years during the 1820-1989 period. The drawback is that only 21 countries are included, most of them rich in today's terms¹⁷. Figure 3 (reproduced from McGrattan and Schmitz 1999, Fig. 4) illustrates that one can discern a long-term tendency for incomes to diverge for this group of countries. Interestingly, the steepest increase in the ratio of richest to poorest country occurred during the inter-war period, a period of reduced global integration, while the post-war period saw a certain degree of convergence, albeit small. The broad pattern thus lends support to the more positive views of globalisation and convergence.

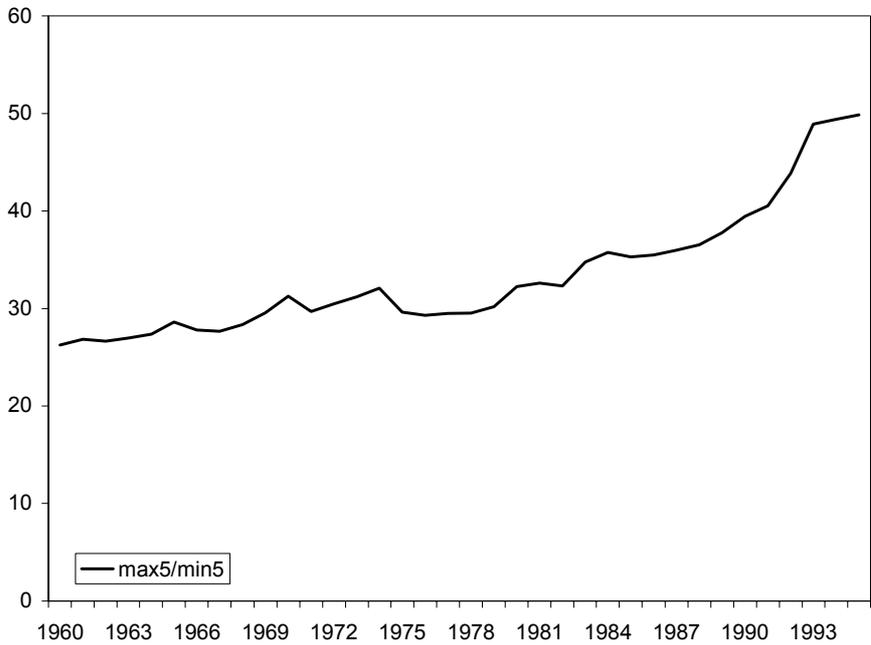


Figure 4: Relative GDP per capita, richest 5 versus poorest 5 countries

Sample size: 122 countries. Source: Global Development Network Growth Database (Easterly and Yu 2000),.

Data for a larger number of developing countries is only available for the post-war period. A data set recently made available is the Growth Database of the Global Development Network, gathered by Easterly and Yu (2000) of the World Bank. This has the advantage of including almost all of the 1990s. However, there is missing data for a variety of countries, and it is not clear whether the data used for the 1990s is strictly comparable to the earlier data based on the Penn World Tables.

¹⁷ The countries in the sample are Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Sweden, United Kingdom, Australia, United States, Czechoslovakia, Spain, Brazil, Mexico, China, In-

The next three figures are based on those countries in the sample that had continuous (purchasing power parity adjusted) GDP per capita data for the 1960-95 period. This leaves a subsample of 122 countries out of 212 in the overall sample. Figure 4 shows average GDP per capita for the five richest countries relative to the average for the five poorest countries for each year. There is a systematic tendency for the relative gap to widen during the 1960-95 period. The rate of divergence as indicated by the slope of the curve even appears to increase from the mid-1980s onwards. Note also that the increases in relative incomes shown here translate into even bigger increases in absolute differences (since overall there was positive growth during this period).

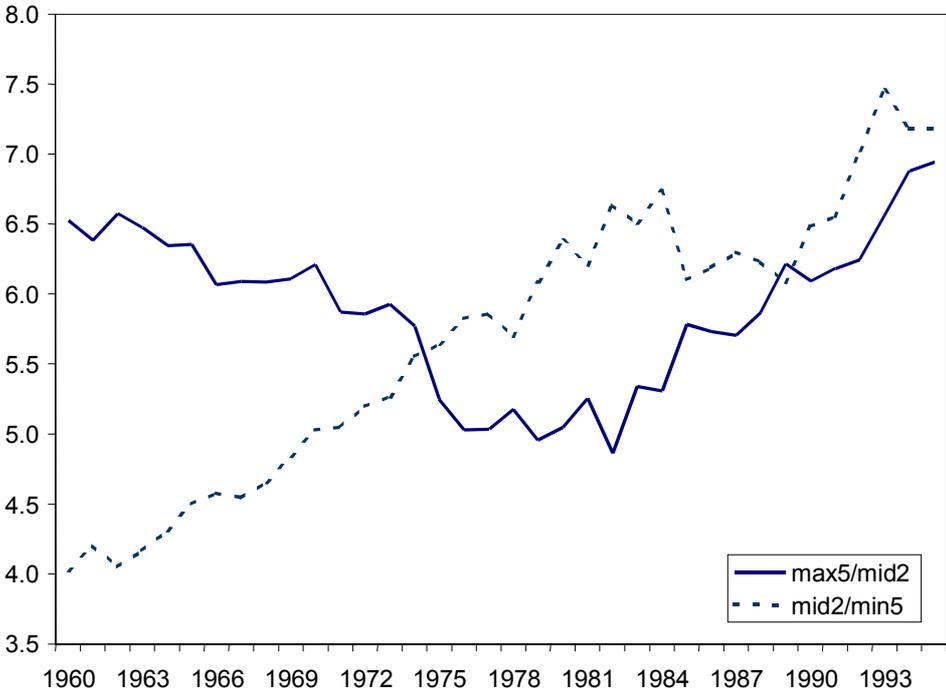


Figure 5: Relative GDP per capita: Decomposition

The figure plots relative GDP per capita of the richest five versus the middle two countries, and the middle two versus the poorest five countries. Same sample and source as Figure 4.

Figure 5 splits the overall relative income pattern into two components, the gap between the top and the centre, and the centre relative to the bottom of the distribution. The top and bottom ends are measured as before. The centre is the median income in the sample (here calculated as the average income of the two countries ranked in the middle of the distribution). This decomposition reveals that the main driving force behind the pattern observed in Figure 4 is the widening gap between middle and poor countries. Relative income between the rich-

dia, Indonesia, Japan.

est five and the middle two countries was similar at the beginning and end of the period. However, there were large changes in the middle of the sample period. Until the early 1980s the gap between middle and top narrowed substantially, but since then it has increased again. Since the early 1980s, i.e. since the start of the wide-spread adoption of more outward-oriented policies, and right through the recent increase in the degree of globalisation, there has been an increase in both ratios.

However, these are just relative rankings. Individual countries may in principle have moved up or down the overall distribution during the sample period. Apart from the central tendency and spread, the literature on convergence has thus also examined movements over time of individual countries within the distribution. This provides a different perspective on the changing distribution. The question is now: how likely is a country to have changed its relative position within the distribution during the sample period? For the countries that were initially poor this means whether they have managed to grow faster than the richer countries.

To provide an answer, the sample was split into three groups on the basis of their GDP per capita in 1960, i.e. the beginning of the sample period. As Figure 6 reveals, the countries that were poor have on average stayed relatively poor since their growth rates were the lowest across the entire period (with the exception of the 1980s where they grew more rapidly than the group of middle-ranking countries). In fact, their economic performance went from bad to worse, with negative growth rates on average during the first half of the 1990s. I have also included averages for the very recent 1995-98 period, but there are 18 countries missing, so these figures cannot be strictly compared to the earlier periods. Nevertheless, one gets a slightly more upbeat picture as the data reveal an increase in growth across all country groups. However, the relative pattern remains basically unchanged, with the initially poorest countries still growing more slowly than the rest.

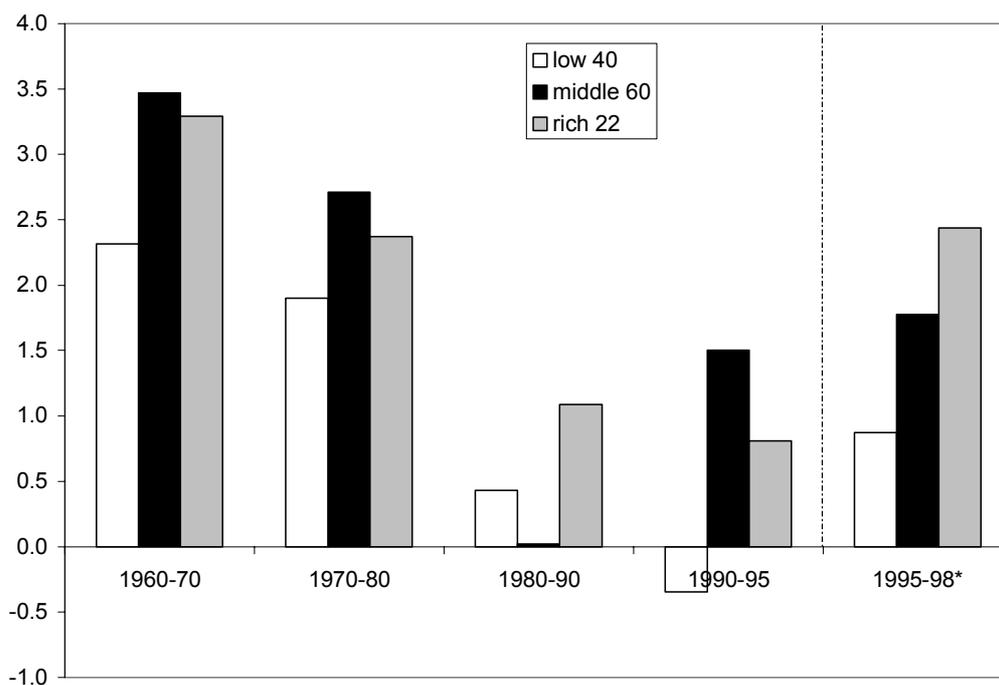


Figure 6: Average growth rates, GDP per capita

Country groupings according to 1960 GDP per capita. The * denotes that 18 countries are missing for the 1995-98 period. Otherwise same countries and source as Figure 4.

To sum up, Figures 3-6 tend to confirm a more general pattern highlighted in other studies. There is no evidence of convergence between rich and poor countries; if anything, we observe overall divergence. There appears to be some convergence between middle income and rich countries, but the later data reveal a reversal in this pattern¹⁸. The main conclusion to be drawn from this section is that poor countries seem to find it extremely difficult to raise their rates of growth to levels comparable to middle and high-income countries. All the evidence points to what Pritchett (1997) refers to as ‘divergence, big time’.

Can we use this evidence on past performance to answer the question on the likely pattern of convergence in the years to come and in particular the likely effect of globalisation? Probably not, unless we have an understanding of the underlying processes which drive these developments. So the next section considers the question whether there is a clear and robust empirical relationship between growth and openness.

¹⁸ Studies such as Quah (1996) find convergence between middle and high income countries but only use data up to 1985, and thus miss out on the pattern shown in Figure 3.

6. Evidence on openness and growth

The empirical relationship between trade openness and economic performance has been researched intensely. This section will be fairly brief, as there are two detailed surveys that summarise the empirical evidence. Edwards (1993) surveys the literature on trade orientation and growth up to the early 1990s. More recent studies are discussed in Rodriguez and Rodrik (1999).

In his survey Edwards discusses both country studies and cross-sectional analyses. He concludes that the current consensus on the benefits of trade liberalisation has mainly been informed by the former, in particular the positive experiences in East Asia and Chile during the 1980s¹⁹. According to Edwards, studies based on cross-country regressions have “been plagued by empirical and conceptual shortcomings” (p. 1389). Apart from econometric flaws, Edwards argues that the biggest problem has been the lack of a reliable measure of trade orientation. Levine and Renelt’s (1992) study on growth variables is a case in point. They report that there is no robust evidence between various measures of openness to trade and growth.

A recent, widely cited study on trade and growth which attempts to deal with the measurement problem is Sachs and Warner (1995). They develop a new measure of openness to trade which defines a country as closed if at least one of the following five conditions holds:

- non-tariff barriers in the mid-1970s covering 40% or more of trade;
- average tariff rates in the mid-1980s of 40% or more;
- a black market premium on the exchange rate in excess of 20% in either the 1970s or 1980s;
- a socialist economy;
- state monopoly on key exports.

Sachs and Warner show that there has been convergence between countries that are open according to their definition, but not among those that are closed. Similarly, in cross-country growth regressions they find that their openness measure is significantly and positively correlated with per-capita growth.

¹⁹ It is questionable to what extent the experience of the East Asian miracle economies can be generalised to today’s poor countries, many of which are in sub-Saharan Africa. Whalley (1999), for instance, argues that “to these countries the outward oriented strategies pursued in Korea and Taiwan since the 1960’s seem to be so far removed from their current situation as to be seemingly irrelevant.” (p. 5f)

However, their work has been criticised by Harrison and Hanson (1999) and Rodriguez and Rodrik (1999). One reason is that only the first two conditions above provide a direct indication of trade policy stance. The other three categories capture a much wider range of interventions and imbalances. This criticism is underlined by the fact that the correlations between the five categories are low. The 'state monopoly' variable is, for instance, much more closely correlated with a simple dummy for sub-Saharan African economies. In an earlier study, Pritchett (1996) examined another set of variables that are used to indicate trade policy stance and showed that they are practically uncorrelated with each other. It appears that the measurement problems remain unresolved, despite the Sachs-Warner variable²⁰.

This leads to the second reason for criticism. As Harrison and Hanson demonstrate, the positive growth effect of trade openness is not robust. In particular, both tariffs and quotas are insignificant on their own, and the Sachs and Warner results for the composite measure seem to be driven by the dummy for socialist economies. A similar result is obtained by Rodriguez and Rodrik in their extensive sensitivity analysis. They find that the Sachs and Warner results are mainly driven by the variables measuring the black market premium and the state monopoly on exports.

Rodriguez and Rodrik also examine a number of other recent studies. Again, the results are shown not to be robust under closer scrutiny, for instance because the coefficients are estimated too imprecisely to warrant an unambiguous answer. Thus, while there is no evidence suggesting that interference with trade is good for growth, there appears to be no robust evidence linking trade restrictions to a deterioration in growth rates. Despite suggestions to the contrary in some of the newer studies, Rodriguez and Rodrik come to the conclusion that

the nature of the empirical relationship between trade policy and economic growth remains very much an open question. The issue is far from having been settled on empirical grounds. (p. 4)

In a different study, Slaughter (1998) examines four multilateral trade liberalisation episodes. His interest is whether convergence rates between participating countries increase during lib-

²⁰ There are additional question marks over the Sachs and Warner measure. First, the cut-off points for the individual categories are completely arbitrary. Second, there are doubts about a number of the precise classification of countries (see Fischer in his comment on the Sachs and Warner paper, and Rodriguez and Rodrik 1999). Third, by only defining countries as open when the regime remained liberalised until the end of their sample period (1994), there has been a possible selection bias in that unsuccessful liberalisations episodes have been omitted by definition (this point was raised by Duesenberry in the discussion of the Sachs and Warner paper). Another selection bias is due to the fact that information on state marketing boards was only available for African economies that underwent structural adjustment programmes (Rodriguez and Rodrik, 1999); the variable was set to zero for all other countries.

eralisation periods. He uses a 'difference-in-difference' approach to deal with possible selection biases. This approach compares the degree of convergence among a) liberalising countries before and after trade liberalisation, with b) those of a non-liberalising control group of countries before and after the same period. Slaughter summarises his results as follows:

... trade liberalisation did not trigger convergence in any of the four cases. If anything, trade seems to have caused income divergence. (p.1)

A recent study that reaches more positive conclusions regarding the benefits of trade openness and globalisation is Frankel and Romer (1999). Choosing a somewhat different approach, they examine the relationship between the share of trade in GDP and income in a cross-section of countries in 1985. To deal with the potential endogeneity of the trade variable, they instrument it with a set of variables commonly used in the estimation of the gravity equation for trade flows. Their results indicate in a variety of specifications that there is a positive correlation between the trade share and income levels. However, some of the coefficients are not estimated very precisely. Their set-up does not allow them to distinguish between static and dynamic gains, i.e. between the two classes of growth models, but at least there appears to be a positive effect on the income level.

Irwin and Terviö (2000) apply the Frankel and Romer methodology to a number of different time-periods during the 20th century and obtain similar results, i.e. that trade raises incomes. However, they discover that their results are not robust to the inclusion of one extra variable, the distance from the equator. They claim that this problem also affects the Frankel and Romer results.

Moving away from the role of trade per se, there is evidence that knowledge and productivity does flow across countries. Coe and Helpman (1995), for instance, find that domestic total factor productivity in OECD countries is positively related to both domestic and foreign R&D activities. However, the effect is bigger for domestic R&D. In Coe et al. (1997) they extend their analysis to developing countries and report that their productivity levels are significantly related to R&D activities in their (industrialised country) trading partners. In addition, Coe et al. show that domestic productivity levels are positively affected by machinery and equipment imports. They conclude that

... developing countries derive important and substantial benefits from research and development performed in the industrial countries. (p. 148)

There has also been an increasing number of studies that consider firm-level and industry-level data to examine the extent to which openness increases productivity. Griffith et al. (2000), for instance, obtain similar results to Coe and Helpman (1995) with respect to the benefits of foreign R&D on domestic TFP using industry-level data for 13 OECD countries. However, they do not find a robust relationship between trade and technology diffusion. Instead, the key factors determining the speed of catching-up are the levels of domestic R&D and human capital.

In his recent survey on manufacturing firms in developing countries, Tybout (2000) reports that there is strong evidence that exporting firms are more productive than firms serving the domestic market. This finding seems to support the current policy consensus. However, the causality could also go the other way, as it is quite likely that more productive firms are those that become exporters. The causality question is examined in Clerides et al. (1998) for firms in Colombia, Mexico and Morocco, and in Bernard and Jensen (1999) for U.S. firms. Both studies reach the same conclusion. There is no evidence that exporting makes firms more efficient. Instead the studies find that exporters tend to self-select, i.e. more productive firms tend to become exporters.

Another general result reported in Tybout (2000) is that foreign-owned firms in developing countries tend to be more productive than their local counterparts. This suggests that capital flows in form of FDI could be an important transmission mechanism for knowledge and technology. Xu (2000) examines to what extent U.S. multinationals contribute to international knowledge flows. His results show that they do seem to transmit knowledge to other industrialised countries, but not to developing countries. Xu finds that this is largely due to threshold effects in human capital. Most developing countries in his sample do not appear to have sufficient levels of human capital to attract knowledge-intensive multinationals. Aw and Batra (1998) find that Taiwanese firms appear to benefit from knowledge diffusion, but that FDI is not the transmission channel. They also emphasise the role of skilled labour to effectively learn from abroad.

Aitken and Harrison (1999) confirm these results on the lack of knowledge transmission via FDI. Using Venezuelan plant-level data for the 1976-89 period, they find that foreign participation tends to raise productivity in smaller, but not in larger firms. However, there are no spillovers to domestically-owned firms in the same industry. If anything, the presence of

wholly or partially foreign-owned firms in an industry is associated with a reduction in productivity of domestically-owned competitors.

In an earlier study, Krueger and Tuncer (1984) claimed on the basis of firm-level data for Turkey that infant-industry protection was negatively associated with productivity growth. Harrison (1994) re-examined their data and, after careful empirical analysis, reaches exactly the opposite conclusion. There is no evidence of a negative relationship between protection and productivity growth in the data. In fact, she finds just the opposite. If anything, the correlation appears to be positive.

Having examined a number of studies on the empirical relationship between openness and economic performance in developing countries, the overall impression is that it has been fairly difficult to establish any robust correlations in aggregate data. Moreover, the microeconomic evidence is far from conclusive on the benefits of openness. One thing it suggests is that complementary inputs could be important for the transmission of knowledge and technologies. Overall, the evidence seems a lot less conclusive than the proponents of greater openness and the more optimistic views on the perceived benefits of globalisation for developing countries seem to suggest.

7. Conclusions

The paper started off with the observation that the long running debate on the relative merits and costs of greater openness in developing countries appears to have been soundly won by the proponents of openness. The current policy consensus is that greater integration into the world economy is beneficial for poor countries. By implication, this suggests that developing countries should benefit from the process of economic globalisation.

In this paper I have examined in detail the theoretical and empirical basis for this consensus view. To address the question of dynamic gains and losses I have concentrated on modern growth theory in the theory parts. The section on the structure of the basic closed-economy versions of both the neo-classical model and endogenous growth theory stresses the importance of knowledge creation and technical change.

The theoretical part then concentrated on the implications of extending these models to an open-economy setting. And indeed, some models do suggest that countries will converge in the long run and that openness raises poor countries' growth rates, at least temporarily. There is thus a potential theoretical basis for the consensus view on the benefits of openness and globalisation. One key assumption is required, though. Technical progress must come in form of general technologies and knowledge that are diffused costlessly at a global level. It is only in this case that productivities will converge.

Although endogenous growth theory is often referred to as final proof that developing countries are to benefit permanently from greater openness and economic integration, there is surprisingly ample scope for just the opposite result. The literature suggests a number of possibilities for divergence, depending on which particular assumptions are made about the origins of technical progress. Here linkage effects and dynamic comparative advantage due to sector-specific learning turn out to be important. Nevertheless, a key problem remains: There is little empirical evidence both on the general validity of endogenous growth models compared to the neo-classical model, and to help distinguish between different variants.

In contrast, it is the neo-classical growth model that, when extended to an open-economy setting, provides the clearest case for greater openness and economic integration. While in these models there are only static gains in the long run, knowledge flows, capital flows and trade all tend to speed up convergence between poorer and richer countries. Nevertheless, the neo-classical model does not allow for learning-by-doing, linkages and scale economies, and it is exactly these factors that lead to the possibility of divergence in new growth theory.

Empirically, there is little evidence of convergence in per-capita incomes between rich and poor countries, irrespective of whether one considers longer time series or the post-war period only. During the last two decades we have even witnessed an acceleration in the speed of divergence. Since the mid-1980s the relative gap between both the top and the middle, and the middle and the bottom, of the distribution has widened. Tracing the fortunes of particular country groups over time, those countries that were poor in 1960 consistently underperformed relative to the rest. This implies that roughly the same group of countries remained at the bottom throughout the sample period.

Next I turned to the empirical evidence assessing the link between openness and economic performance. As several recent studies have argued, there is no robust econometric evidence linking faster economic growth to trade liberalisation. A major and persistent problem that has plagued this literature is that it is extremely difficult to find a good measure of trade policy. However, there is some evidence at the aggregate level for technological and knowledge spillovers between rich and poor countries.

Recent microeconomic studies have focused on the role of exporting activities and foreign direct investment as a major cause of the diffusion of knowledge to developing countries. This interest is based on the observation that both exporters and foreign-controlled firms tend to be more productive than other firms. However, the evidence in favour of spillover effects is not favourable for the consensus view. Exporters are not more productive because exporting activities force them to be more efficient, but because firms that are more efficient in the first place are those that become exporters. Similarly, the greater efficiency of foreign-controlled firms does not appear to spill over to domestic firms in developing countries.

We are thus left with the conclusion that the potential benefits of greater openness and, by implication, increased globalisation for developing countries have been significantly overstated. There simply is neither the empirical evidence to substantiate the claims, nor are there unambiguous theoretical results. It has to be stressed, though, that there is practically no evidence that restrictions on trade and factor flows are beneficial for developing countries. Thus one may conclude that it does not really matter that much of the benefits are overstated.

However, there are clear dangers in adopting such a position. One reason is public relations. By continuously claiming that the worries of opponents of globalisation are completely without foundation (see Martin Wolf's quote in the introduction), the popularisers of the view that 'globalisation is good for you according to Economics' are actually doing us a great disservice, since the misrepresentation and oversimplification of the current state of economic research is undermining our credibility with non-economists.

A second danger is that other, potentially more important, issues run the risk of being ignored in the debate. One issue that comes out of the research surveyed in this paper is that the transmission of knowledge, i.e. the crucial element in generating convergence, requires cer-

tain complementary factors, such as a sufficient level of human capital and domestically generated expertise.

Another issue that may not receive sufficient attention is that greater integration into world markets causes disruptions and usually benefits some segments of society more than others. Rodrik (1998a), for instance, believes that “it is not *whether* you globalise that matters, it is *how* you globalise” (p. 156). He argues that open economies need strong institutions for ‘conflict management’, and may require more government resources to compensate losers (Rodrik 1998b). Countries that have strong institutions are likely to benefit more from greater openness than others.

In summary, the issues related to the question whether poor countries are likely to benefit from greater openness and increased globalisation are a lot more complex and ambiguous than they are usually made out to be by the proponents of the current consensus.

Bibliography

- Aghion, P. and P. Howitt (1992). A model of growth through creative destruction. *Econometrica* 60, pp. 323-351.
- Aghion, P. and P. Howitt (1998). *Endogenous Growth Theory*. MIT Press, Cambridge, MA.
- Aitken, B. and A. Harrison (1999). Do domestic firms benefit from direct foreign investment? Evidence from Venezuela. *American Economic Review* 89 (3), pp. 605-618.
- Aw, B. and G. Batra (1998). Technological capability and firm efficiency in Taiwan (China). *World Bank Economic Review*, 12 (1), pp. 59-79
- Baldwin, R. (1989). The growth effects of 1992. *Economic Policy* (October), pp. 247-281.
- Baldwin, R. and A. Forslid (2000). Trade liberalisation and endogenous growth: a q-theory approach. *Journal of International Economics* 50 (2), pp. 497-517.
- Baldwin, R., P. Martin and G. Ottaviano (1998). Global income divergence, trade and industrialisation: the geography of growth take-offs. *NBER Working Paper 6458*, NBER, Cambridge, MA.
- Barba Navaretti, G. and D. Tarr (1999). International knowledge flows and economic performance: an introductory survey of the evidence. *FEEM Working Paper*, University of Milan, November.
- Barro, R., N. Mankiw and X. Sala-i-Martin (1995). Capital mobility in neo-classical models of economic growth. *American Economic Review* 85 (1), pp. 103-115.
- Barro, R. and X. Sala-i-Martin (1995). *Economic Growth*. McGraw Hill, New York.
- Barro, R. (1997). *Determinants of Growth*. MIT Press, Cambridge, MA.
- Bernard, A. and J. Jensen (1999). Exceptional exporter performance: cause, effect, or both? *Journal of International Economics* 47, pp. 1-25.
- Bertola, G. (1999). Convergence ... an overview. In R. Baldwin et al. (eds.), *Market Integration, Regionalism and the Global Economy*. Cambridge University Press, Cambridge.
- Clerides, S., S. Lach and J. Tybout (1998). Is learning-by-exporting important? Microdynamic evidence from Colombia, Mexico and Morocco. *Quarterly Journal of Economics* 113 (3), pp. 903-47.
- Coe, D. and E. Helpman (1995). International R&D spillovers. *European Economic Review* 39 (May), pp. 859-887.
- Coe, D., E. Helpman and A. Hoffmaister (1997). North-South R&D spillovers. *Economic Journal* 107 (January), pp. 134-149.
- Diao, X., T. Roe and E. Yeldan (1999). Strategic trade policies and growth: an applied model of R&D-driven endogenous growth. *Journal of Development Economics* 60: 343-380.
- Durlauf, S. and D. Quah (1999). The new empirics of economic growth. In J. Taylor and M. Woodford (eds.), *Handbook of Macroeconomics, Volume 1*. Elsevier Science, Amsterdam.
- Edwards, S. (1993). Openness, trade liberalisation, and growth in developing countries. *Journal of Economic Literature* 31 (3), pp. 1358-93.
- Eicher, T. (1999). Trade, development and converging growth rates – dynamic gains from trade reconsidered. *Journal of International Economics* 48 (1), pp. 179-198.
- Feenstra, R. (1996). Trade and uneven growth. *Journal of Development Economics* 49, pp. 229-256.
- Feenstra, R., D. Madani, T. Yang and C. Liang (1999). Testing endogenous growth in South Korea and Taiwan. *Journal of Development Economics* 60, pp. 317-341.
- Easterly, W. and H. Yu (2000). *Growth Database*. Global Development Network, World Bank, Washington, DC.
- Goodfriend, M. and J. McDermott (1998). Industrial development and the convergence question. *American Economic Review*, 88 (5), pp. 1277-1289.

- Griffith, R., S. Redding and J. van Reenen (2000). Mapping the two faces of R&D: productivity growth in a panel of OECD countries. *CEPR Discussion Paper 2457*, CEPR, London.
- Grossman, G. and E. Helpman (1991). *Innovation and Growth in the Global Economy*. The MIT Press, Cambridge, MA.
- Gundlach (1999). Technology, convergence and income growth in open economies. Kiel Institute of World Economics, mimeo.
- Hall, R. and C. Jones (1999). Why do some countries produce so much more output per worker than others? *Quarterly Journal of Economics*, 114 (February), pp. 83-116.
- Harrison, A. (1994). An empirical test of the infant industry argument: comment. *American Economic Review* 84 (4): 1090-1095.
- Harrison, A. and G. Hanson (1999). Who gains from trade reform? Some remaining puzzles. *Journal of International Economics* 59, pp. 125-154.
- Irwin, D. and M. Terviö (2000). Does trade raise income? Evidence from the twentieth century. *NBER Working Paper 7745*, NBER, Cambridge, MA.
- Jones, C. (1995). Time series tests of endogenous growth models. *Quarterly Journal of Economics* 110 (May), pp. 495-525.
- Jones, C. (1997). On the evolution of the world income distribution. *Journal of Economic Perspectives* 11(3), pp. 19-36.
- Jones, C. (1998). *Introduction to Economic Growth*. W.W. Norton, New York.
- Jones, C. (1999). Growth: with or without scale effects. *American Economic Review, Papers and Proceedings* 89 (2), pp. 139-44.
- Klenow, P. and A. Rodriguez-Clare (1997). The neo-classical revival in growth economics: has it gone too far? In B. Bernanke and J. Rotemberg (eds.), *NBER Macroeconomics Annual 1997*, MIT Press, Cambridge, MA, pp. 73-114.
- van de Klundert, T. and S. Smulders (1996). North-South knowledge spillovers and competition: convergence versus divergence. *Journal of Development Economics* 50, pp. 213-232.
- Krueger, A. (1998). Why trade liberalisation is good for growth. *Economic Journal* 108 (September), pp. 1513-1522.
- Krueger, A. and B. Tuncer (1982). An empirical test of the infant industry argument. *American Economic Review* 72 (5), pp. 1142-1152.
- Levine, R. and D. Renelt (1992). A sensitivity analysis of cross-country growth regressions. *American Economic Review* 10 (2), pp. 323-339.
- Lucas, R. (2000). Some macroeconomics for the 21st century. *Journal of Economic Perspectives* 14(1), pp. 159-168.
- Maddison, A. (1994). Explaining the economic performance of nations, 1820-1989. In W.J. Baumol, R.R. Nelson and E.N. Wolff (eds), *Convergence of Productivity: Cross-National Studies and Historical Evidence*, pp. 20-61.
- Mankiw, G., D. Romer and D. Weil (1992). A contribution to the empirics of economic growth. *Quarterly Journal of Economics*, 107 (May), pp. 407-437.
- McGrattan, E. and J. Schmitz (1999). Explaining cross-country income differences. In J. Taylor and M. Woodford (eds.), *Handbook of Macroeconomics, Volume 1*. Elsevier Science, Amsterdam, pp. 669-737
- Obstfeld, M. and K. Rogoff (1996). *Foundations of International Macroeconomics*. MIT Press, Cambridge, MA.
- Prescott, E. (1998). Needed: a theory of total factor productivity. *International Economic Review* 39 (3), pp. 525-51.
- Pritchett, L. (1996). Measuring outward orientation in LDCs: Can it be done? *Journal of Development Economics* 49 (2), pp. 307-35.
- Pritchett, L. (1997). Divergence, big time. *Journal of Economic Perspectives* 11 (3), pp. 3-17.

- Quah, D. (1993). Galton's fallacy and tests of the convergence hypothesis. *Scandinavian Journal of Economics* 95 (4), pp. 427-443.
- Quah, D. (1996). Empirics for economic growth and convergence. *European Economic Review* 40, pp. 1353-1375.
- Quah, D. (1999). Convergence as distribution dynamics (with or without growth). In R. Baldwin et al. (eds.): *Market Integration, Regionalism and the Global Economy*, Cambridge University Press, Cambridge.
- Redding, S. (1999). Dynamic comparative advantage and the welfare effects of trade. *Oxford Economic Papers* 51, pp. 15-39.
- Rivera-Batiz, L. and Romer, P. (1991). International trade with endogenous growth. *European Economic Review* 35, pp. 971-1004.
- Rodriguez, F. and D. Rodrik (1999). Trade policy and economic growth: a skeptic's guide to the cross-national evidence. *NBER Working Paper 7081*, NBER, Cambridge, MA.
- Rodrik, D. (1998a). Globalisation, social conflict and economic growth. *World Economy* 21 (2), pp. 143-158.
- Rodrik, D. (1998b). Why do more open economies have bigger governments? *Journal of Political Economy* 106 (5), pp. 997-1032.
- Rodrik, D. (1999). *The New Global Economy and Developing Countries: Making Openness Work*. John Hopkins University Press, Baltimore.
- Rodrik, D. (2000). How far will international economic integration go? *Journal of Economic Perspectives* 14 (1), pp. 177-186.
- Romer, P. (1990). Endogenous technological change. *Journal of Political Economy* 98 (5), pp. 71-102.
- Sachs, J. and A. Warner (1995). Economic reform and the process of global integration. *Brookings Papers on Economic Activity* (1), pp. 1-118.
- Scholte, J. (2000). *Globalisation: A Critical Introduction*. Macmillan, Basingstoke.
- Slaughter, M. (1998). International trade and per capita income convergence: a difference-in-difference analysis. *NBER Working Paper 6557*, NBER, Cambridge, MA.
- Smith, A. (1999). Discussion. In R. Baldwin et al. (eds.): *Market Integration, Regionalism and the Global Economy*, Cambridge University Press, Cambridge, pp. 150-152.
- Solow, R. (2000). *Growth Theory: An Exposition (2nd Ed)*. Oxford University Press, New York.
- Temple, J. (1999). The new growth evidence. *Journal of Economic Literature* 37 (March), pp. 112-156.
- Tybout, J. (2000). Manufacturing firms in developing countries: how well do they do, and why? *Journal of Economic Literature* 38 (March), pp. 11-44.
- Ventura, J. (1997). Growth and interdependence. *Quarterly Journal of Economics*, 112 (1), pp. 57-84.
- Xu, B. (2000). Multinational enterprises, technology diffusion, and host country productivity growth. *Journal of Development Economics* 62 (2), pp. 477-93.
- Young, A. (1991). Learning by doing and the dynamic effects of international trade. *Quarterly Journal of Economics*, 106 (2), pp. 369-406.
- Young, A. (1995). The tyranny of numbers: confronting the statistical realities of the East Asian growth experience. *Quarterly Journal of Economics*, 110 (August), pp. 641-80.
- Whalley, J. (1999). Developing countries in the global economy: a forward looking view. *CSGR Working Paper No.36/99*, Centre for the Study of Globalisation and Regionalisation, University of Warwick, Coventry, UK.