

CRITICAL SURVEY

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Growth, trade and uneven development

William Darity, Jr and Lewis S. Davis*

Theories of growth and international trade are reviewed critically from the perspective of understanding persistent inter-country and inter-regional income inequality. Three separate literatures are considered for the insights they offer about international disparity: Classical political economy, the North–South trade models, and the 'new' growth and trade theories that incorporate increasing returns and/or product differentiation. Classical antecedents of the more recent theories are identified, and contrasts are drawn between structuralist and neoclassical approaches to explaining the income gap between rich and poor nations.

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1. Unorthodox theories of trade and growth

From a neoclassical perspective, the persistence of international income inequality is something of a puzzle. Neoclassical growth theory predicts *instantaneous* income convergence unless international technology and capital flows are proscribed (Barro *et al.*, 1995), and squaring the theory with cross-country data requires untenable assumptions: population growth and investment rates are taken as exogenous

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Address for correspondence: L. S. Davis, Pierce Hall 107, Smith College, Northampton, MA 01063, USA; email: lsdavis@smith.edu

*University of North Carolina–Chapel Hill (William Darity, Jr) and Smith College (Lewis S. Davis). We are grateful for extensive comments by two anonymous referees for the *Cambridge Journal of Economics*.

(Mankiw *et al.*, 1992); technology is proxied by the *ad hoc* introduction of political variables (Sala-i-Martin, 1996); and international capital and technology flows are proscribed.¹ Similarly, in the presence of restrictions on international factor mobility, neoclassical trade theory suggests that trade in products acts as a substitute for trade in factors, resulting in a convergence of economic outcomes across countries.

In the 1970s and 1980s, dissatisfaction with the ability of neoclassical theory adequately to address the related phenomena of uneven development and persistent international inequality led to work on North–South models of growth and trade. Grounded in an appreciation for the structural and institutional characteristics of countries at different levels of development, North–South trade models produced decidedly non-orthodox outcomes regarding the effects of foreign trade.

Factor price equalisation does not come about; uniformity of per capita incomes does not come about; or, if incomes equalise it occurs in extraordinary circumstances rather than normal circumstances in the North–South framework. Even foreign trade based upon comparative advantage can prove to be disadvantageous with respect to prospects for achieving international equality in North–South models.

North–South models investigate the dynamics of trade and growth in a world where there is a schism predicated on the existence of uneven economic development. As Ronald Findlay (1984, p. 222) observed, ‘I use the term “North–South” model to refer to any model in which there is some basic asymmetry related to the stage of development between the two regions.’ The foundation of these models is the identification of a critical *asymmetry* between the North and South that goes beyond the familiar neoclassical focus on differences in factor endowments and tastes. Northern and Southern economies may differ, for example, with regards to their macroeconomic structures (Solow, Lewis, Kaleckian, Neomarxian, etc.) or due to the impact of specialising in products with sharply different microeconomic characteristics (returns to scale, demand elasticities).

In contrast, the recent explosion in interest in imperfect competition and product differentiation in the theory of foreign trade among more conventionally minded economists has involved an attempt to resolve puzzles regarding the nature of North–North trade: How do you get trade between similarly endowed countries? Why does intraindustry trade arise or two way trade in goods produced with similar factor intensities? Why does direct foreign investment take place?

These are puzzles self-generated by the Heckscher–Ohlin–Samuelson approach to foreign trade, puzzles that acknowledge the lacuna between the reality of neoclassical theory and the reality of empirical observation. Imperfect competition has been introduced to fill this gap. In spite of its initial concern with the nature of North–North trade, the presence of increasing returns implies that this literature may be used to generate non-orthodox implications regarding the propensity for initially similar trading economies to evolve to have quite different outcomes in terms of technological capabilities and affluence.

Substantively, the imperfect competition-cum-product differentiation approach is fully consonant with ‘traditional theory.’ It explores creatively and extensively the exceptions that ‘traditional theory’ would admit to its standard results—exceptions

¹ The closed economy assumption is even applied in studies of income convergence among regions within a country, e.g., Barro and Sala-i-Martin (1992).

attributable to the breakdown or absence of perfectly competitive conditions due to the role of increasing returns (or decreasing costs) and/or the presence of sufficient product differentiation to give rise to monopolistic competition.

Findlay (1984, p. 222) did not see North–South models as ‘rivals or substitutes for the conventional symmetric ‘Countries A and B’ approach to international trade’ or the Krugman–Helpman work on identical countries ‘with trade based purely on the possibility of exploiting economies of scale’. Ironically, in many respects the rhetoric of Krugman, Grossman and Helpman has been more confrontational with ‘traditional theory’ than that of Findlay.

Indeed, the paradoxical immiserising growth result, attributable to Jagdish Bhagwati (1958), can occur only if a country’s export activity influences the terms of trade (i.e., it is not a price taker in international markets) or if there are one or more pre-existing distortions in the structure of relative domestic prices; once again, there is a breakdown or absence of perfectly competitive conditions.¹ In North–South analysis, growth and trade have a general immiserising quality for the South—not necessarily from a welfare-theoretic standpoint of reduced utility from a consumption bundle—but from a relative status standpoint. The South lags behind the North indefinitely.

Unlike the ‘new’ trade theory of imperfect competition, the North–South approach reaches back to the integrated vision of trade, growth, and international disparity that characterised Classical political economy rather than neoclassicism. Both Smith and Ricardo paid particular attention to the implications of the sectoral structure of economies, and Findlay’s (1984, p. 222) interest in resurrecting the Classical vision stems from his desire to take into account ‘structural peculiarities’ associated with developing countries.

Though not generally invoked, Adam Smith could be attributed with many of the insights that underlie the new work on trade and growth, with its emphasis on increasing returns, innovation and market size. Indeed, in the contrast between Smith’s optimism and Ricardo’s pessimism, we find the basis for the modern contention that the characterisation of returns to scale is the pivot upon which growth theoretic outcomes turn.

In keeping with these introductory remarks, the remainder of the paper considers the relative merits of theoretical understanding of uneven development provided by Classical political economy, the North–South trade literature and the new work on growth and trade. In doing so, we emphasise the Classical roots of the modern literature on uneven development. We also briefly consider the empirical evidence on uneven development.

Before beginning, two remarks are in order. First, in keeping with our limits of space and expertise, the literature on colonialism, imperialism and neocolonialism is neglected or referenced only in passing, as is the ‘high development theory’ of the 1940s and 1950s. To a certain extent, this omission is less glaring, in that the North–South literature is a direct attempt to formalise notions of unequal exchange. Similarly, Krugman (1993) has argued that much of the flavour and insight of high development theory is captured by the new growth models.

¹ Note that in Bhagwati’s treatment, it is market power on the part of the country rather than the firm or industry that matters.

Second, the focus of attention is on uneven development rather than Southern underdevelopment *per se*. To some degree, this choice is dictated by the literature. Much of the theoretical and empirical work surveyed concerns relative rather than absolute growth rates and income levels. Moreover, uneven development is interesting in its own right. Widespread poverty in 1700 was not much of a puzzle, but since that time some countries have been able to raise living standards for the majority of their populations. It is difficult not to view this as a possibility for the rest of the world, and then to ask why this possibility has not been realised.

2. Evidence on international income inequality

Large differences in per capita incomes across nations, and theoretical structures able to account for them, are a matter of less concern if it can be shown that international inequality is a transitory rather than enduring characteristic of the global economy. An examination of the recent literature on the empirics of economic growth, somewhat inappropriately known as the ‘convergence literature’, suggests the opposite. Furthermore, while cross-country growth regressions typically report a positive relationship between trade and growth, as discussed below there are important reasons to treat this result as less than conclusive.

Much of the evidence we shall consider is drawn from cross-country growth and income regressions. Since most regressions place equal weight on each observation—India and Trinidad–Tobago are both single observations—this approach may seem awkward from an ethical perspective. However, our primary concern here is not to generate a global welfare function, but to consider the patterns and determinants of country-level variations in income levels and growth rates. Unless it is believed we get more information from the Indian per capita income, country observations should be weighted equally.

2.1 *The persistence of international income inequality*

Several broad patterns have emerged regarding long-run relative development. The first, which may be considered the pre-eminent economic trend of the past hundred years, is income divergence. According to estimates by Pritchett (1997), the income ratio of the richest to the poorest country has increased dramatically, from around five in 1870 to over twenty in 1990. Pritchett also finds that the standard deviation of per capita income, a more inclusive measure of inequality, increased from 0.64 to 1.06 over the same period. In the post-war period, the correlation between initial income and subsequent growth is positive—rich countries grew faster than poor ones—though not significant (Romer, 1994; Sala-i-Martin, 1996).

A second salient characteristic of relative income dynamics is polarisation, as indicated by evidence of club convergence. Modelling the evolution of the international income distribution as a Markov process, Quah (1993, 1996) finds a pronounced tendency toward the pooling of countries at high and low relative income levels with thinning of the distribution in the middle. The existence of ‘convergence clubs’ is often viewed as primary evidence of multiple equilibria and thus of a role for increasing returns, broadly construed, in the determination of income levels.

A much heralded finding from the cross-country growth regressions is evidence of conditional convergence (Barro, 1991; Mankiw *et al.*, 1992; Sala-i-Martin, 1996).

The so-called 'iron law of convergence' holds that incomes converge to their long-run levels at about 2% per year. Since initial claims in the early 1990s, this work has generated a significant body of criticism, especially regarding the measurement of human capital and the reputed uniformity of conditional convergence rates across different countries and regions (see Durlauf and Quah, 1998, for a review).

Even taken at face value, conditional convergence does not imply a reduction in international inequality. It implies only that each country's income converges toward its own steady-state level, as determined by structural variables such as population growth rates, investment rates and human capital. Since the values of these structural variables differ widely across countries, so do disparities in predicted steady-state income levels (Jones, 1997, pp. 28–31).

2.2 *Empirics of trade and growth*

A casual reading of the new growth empirics would give the impression that a positive relationship between trade and growth had been firmly established. Influential papers in this respect have been Dollar (1992), Sachs and Warner (1995), Edwards (1998) and Frankel and Romer (1999). In spite of the intense research effort in this area, a number of researchers continue to express scepticism regarding drawing strong conclusions from this work.

A persistent problem for this literature is the lack of good measures of trade policy. Trade shares, though often used, are not a measure of trade policy. Direct measures of trade policy tend to be only weak measures of policy restrictiveness. Tariff revenue as a share of imports, for example, may fall as tariff rates increase, and administrative measures such as quota coverage are insensitive to the intensity of quota restrictions (Harrison, 1996).

In the absence of a single acceptable measure, some researchers have employed a variety of proxies for openness (e.g., Edwards, 1998; Harrison, 1996). However, Pritchett (1996) finds that common indicators of 'outward orientation' are pairwise uncorrelated, raising the question of whether any of these measures adequately captures economists' intuitive understanding of what it means for a country to have an open or liberal trade regime.

An additional problem for empirical work in this area is that indicators of trade policy are likely to be endogenous, and finding appropriate instruments for trade policy is difficult, because so many variables arguably affect growth. For example, as Durlauf and Quah (1998, p. 43) point out with respect to the geographic variables used as instruments by Frankel and Romer (1999), 'it is wholly plausible that land mass correlates with military expenditures and military strength, which themselves correlate with tax rates and political regime'.

Rodrik and Rodriguez (1999) point to specific weaknesses in the measures of trade used in a number of high-profile studies. Dollar's (1992) paper utilises the distortion of domestic relative to international prices, which is highly sensitive to exchange rate distortions and thus to macroeconomic misalignment. They also find that most of the explanatory power of the openness variable constructed by Sachs and Warner (1995) is due to inclusion of the black market currency premium—a reflection of macro policy—and state monopoly on exports, which is strongly correlated with location in Africa. Finally, Rodrik and Rodriguez (1999) report that Edwards' (1998) results, derived using per capita income to weight observations, are

not robust to equal weighting, suggesting they are driven primarily by rich country experience.

A broader critique of this work, and one which pertains to growth regressions more generally, stems from the problems associated with parameter heterogeneity.¹ The new growth literature is replete with non-convexities that suggest parameter values may vary with the level of development, human capital or political regime. A similar disconnect between theory and empirics exists with respect to models of North–South trade. In these models, the relationship between trade and growth depends on a country’s level of development, on the existence of surplus labour or an institutionally set subsistence wage, on scale economies and market structure in the export sector, or on the sectoral composition of exports. The estimation of linear regression models, so common in growth empirics, provides information on population averages but is of little use in illuminating the kinds of issues posed by these branches of theory.²

A few researchers have begun investigating questions that are more in the spirit of the North–South trade literature, specifically the relationship between primary production and growth. Sachs and Warner (2001) find that the share of natural resource exports in GDP is negatively correlated with growth, even controlling for changes in the terms of trade. In a similar vein, Glyfason (2001) finds that natural resource wealth undermines growth, stressing the impact of natural resource abundance on educational expenditures and attainment. These papers suggest that it may be ill advised to draw strong conclusions regarding trade and development from studies that do not consider the sectoral composition of exports.

3. Classical antecedents to North–South models

Formal investigation into the phenomenon of uneven development—the mechanisms producing persistent disparity between rich and poor nations—has centred on North–South models of trade and growth since the 1970s. But the North–South approach to trade, growth and uneven economic development finds its precursors in Classical political economy, particularly the work of Adam Smith and David Ricardo. Both were deeply concerned about the partition of the world between advanced and backward regions. Indeed, as early as the 1770s, marked differences in economic development between countries already were evident to Smith, leading him to refer to ‘nations of savages’ coexisting with ‘civilised nations’, to the contrast between the levels of development of England and Scotland, and the greater the extent of the division of labour in the town versus the countryside.

Both Smith and Ricardo focused on the dynamics of growth with special attention given to the sectoral structures of economies. They were not trade theorists *per se*; they were growth theorists for whom trade played an important role. Smith, unlike Ricardo, gave an optimistic and cosmopolitan reading of the eventual outcome of the process. While different regions or nations could coexist at different stages of development, for Smith free trade could produce universal, dynamic benefits.

¹ See Temple (1999, pp. 126–7) and Durlauf (2001, p. 67) for further discussion.

² Durlauf and Johnson (1995) use regression trees to partition countries into groups with relatively homogeneous parameters for Solow model variables. Using an endogenous data-sorting methodology Papageorgiou (2002) finds that the parameters in neoclassical growth regressions are strongly influenced by income level and trade shares.

Smith's most advanced regions were those with the most extensive division of labour. Paul Samuelson (1978) has ascribed diminishing returns to Smith, implicitly suggesting that there must be limits to the division of labour. Smith never indicated that was the case. Although he claimed that the potential for productivity increases was greater in industry than in agriculture, he never argued that there was some insuperable barrier beyond which further extensions of the division of labour was impossible. Still, the seeds of a North–South asymmetry reside in Smith's argument about the dynamic benefits of trade accruing disproportionately to the industrial nation. But Smith's (1937, p. 385) essential vision was one of optimism about prospects for worldwide economic growth under a global regime of 'perfect' economic liberty.

Regions that lag behind others do so for four reasons for Smith. First, initial conditions of absolute cost advantage can lead some regions to devote more productive resources to manufacturing, others to agriculture. The former will grow faster than the latter. These cost conditions could be linked to the topographical features of particular regions or nations.

Second, the policy environment could lead one nation to develop more rapidly than another. If their internal institutions of civil law and property rights failed to insure an adequate degree of security for economic actors, incentives for productive activity and capital accumulation, including human capital, will not exist. He offered as examples the failure to guarantee 'tolerable security' the cases of China under the mandarins, England and Scotland in feudal times, and conditions in Turkey and Indostan (Smith, 1937 pp. 95, 268). Similarly, policies that placed restrictions on exchange activity, whether domestically or internationally, would limit the extent of the market, the extent of the division of labour, and, hence, the pace of economic growth.

Third, the lack of natural access to markets, such as due to the presence of mountains or deserts or the absence of waterways, could lead to relatively slower growth in some regions compared with others. Smith's (1937 pp. 20–1) examples of geographically disadvantaged regions were inland Africa and the interior of Asia. He contended that the first evidence of the division of labour appeared on seacoasts or on navigable rivers, especially the ancient nations of the Mediterranean coast.

Finally, too low a concentration of population could limit the market as well, also limiting the stimulus to extend the division of labour and thereby raise productivity. The sparsely populated countryside necessarily would display far less evidence of task and occupational specialisation than the cities or towns (Smith, 1937, pp. 17–19).

The laggard regions were either victims of geography, policy or demography. In principle, virtually all these sources of disparity are reversible. The transportation barriers associated with an unfavourable topography could be eased via human inventiveness. Conditions of intolerable security or barriers to trade could be removed by more astute policymaking, i.e., by 'good government.' And population density would rise with additional net increases in population, coupled with the tendency toward rural to urban migration. Complete international factor mobility and mobility of technical know-how in Smith's ideal cosmopolitan world should create pressure for equalisation of incomes everywhere. Continued divergence in incomes would be contingent on factor and technological immobility.

Only the first source of disparity associated with absolute cost differentials between regions might require proactive state policy—even an infant industry strategy—to change the structure of production for a region whose 'natural' specialisation is

agriculture. Smith's predisposition toward the minimalist state probably steered him away from recognising this implication of his theory.

Though incongruent with his overall optimism, Smith's analysis may be used to support the notion that initial differences in per capita income across countries may be exacerbated by subsequent divergence in rates of growth, with a more advanced division of labour resulting in a more rapid rate of growth.

This may occur, for example, as a result of changes in the mechanism driving inventiveness. At low levels of the division of labour, inventions are due to the insights of specialised workers. As the division of labour progresses and a capital goods-producing sector emerges, the locus of invention switches from the users of machines to their makers. Additional increases in the division of labour give rise to 'philosophers and men of speculation', which collectively may be thought of as a nascent research and development sector.

As argued by Rosenberg (1965), Smith consistently identifies more profound and insightful inventions with the activities of workers in the capital goods sector and invention specialists. Thus, changes in the sectoral locus of invention associated with an advancing division of labour increase the rate of technical progress.

If the adoption of new techniques requires a particular threshold of the division of labour already to exist, as suggested by Elmslie (1994), trade will tend to exacerbate international disparities by locating the capital and knowledge producing sectors in the more advanced of two trade partners. This is a variant of an argument made by the mercantilist writer Josiah Tucker (1744) in the 18th century.

International migration provides a second potential mechanism for the persistence of international inequality. It seems that Smith anticipated that if workers could move freely, they could migrate to the more developed region leading to a levelling of wages and incomes internationally. It is unclear, however, that this is necessarily true, given the logic of his system. International migrations may increase the wage of workers in the region of immigration owing to a process of cumulative causation driven by increases in population density and, hence, improvements in the division of labour.

Still, Smith's fundamental optimism projected an entire world engaged in free trade becoming developed. Growth is boundless. The free movement of technical know-how and factors of production should lead to global convergence in economic outcomes.

In contrast, David Ricardo's (1817) long-run vision of the growth process was decidedly pessimistic. The ultimate end of the process of economic growth is the stationary state. The engine of growth permanently runs out of fuel. But before the stationary state becomes universal, there also is the potential for the equivalent of a North-South divide in Ricardo's system.

The North, the advanced region already closer to the stationary state, has wages rising, rents rising and the rate of profit in decline. The South, the backward region—perhaps a newly settled colonial hinterland—has abundant fertile land and no rising cost pressure on the provision of subsistence.

Under such conditions the North will have the Ricardian *comparative* advantage in manufactured goods. The South will tend to specialise in food ('corn') production. In Ricardo's Chapter 7, where his famous case is made for comparative advantage and free trade, the keys to the salutary mutual effects of free trade in his Anglo-Portuguese example are the relative immobility of capital and labour and the condition that

neither country is an exporter of means of subsistence, implying that traded goods are produced under conditions of constant rather than decreasing returns.

If the South exports corn to the North, where corn is a significant component of labour's 'necessaries and conveniences', divergent growth will occur. The North can arrest its propulsion toward the stationary state by importing corn, thereby lowering the domestic gold price of corn and reducing the gold price of labour.¹ If the cost of labour declines in Ricardo's system the rate of profit will rise in the North. This will, in turn, lead to a renewed acceleration in capital accumulation in the North.

Conversely, in the South the successful export of corn will result in pressure to shift agricultural activity onto less and less fertile tracts of land. The domestic gold price of corn will rise, the gold price of labour will rise, and the rate of profit will fall. Therefore, capital accumulation will decelerate in the South.

This process of divergent growth will continue until the South has expanded corn production to the point where cost of production dictates an export price similar to the cost of production of corn in the North. At that stage, both countries will continue on the road to the stationary state. But, obviously, there is no reason for them to attain the same levels of per capita income. Indeed, the already comparatively advanced North, having experienced a growth spurt due to the dynamically beneficial pattern of trade, should achieve a wider gap between its level of income and that of the South after trade has been opened.

The central mechanism driving Ricardo's world toward the stationary state is the constraint on production given by the natural environment, namely the overwhelming force of diminishing returns in agriculture due to uneven fertility of land. Technical change in agriculture is construed as slowing the approach to the stationary state but not being capable of reversing the tendency. Diminishing returns in food production exercise a brake on economic progress that is both inexorable and inevitable.

Smith's considerable optimism lay in the absence of diminishing returns in his analysis. Instead, his emphasis on the division of labour, the development of which is governed by the extent of the market, makes his system one in which increasing returns take pride of place. Still, even for Smith, there is no necessary tendency toward equalisation of economic outcomes across the globe.

In a world where access to increasing returns are universal if one nation or region gets a head start in a particular line of production with scale economies, it should acquire a persistent cost advantage over its rivals. Since Smith presupposed that the division of labour could extend further in manufacturing than in agriculture—that more rapid unit cost reductions were feasible in the former than the latter—the nation that is first to industrialise also is most likely to sustain a competitive edge in manufacturing indefinitely. While Smith foresaw prospects for economic progress for all nations, there is nothing in his theory that propels the world towards a uniform standard of living, unless factor mobility is complete.

The Classical economics in Smith's and Ricardo's hands provides a framework for directly addressing the phenomenon of *divergent* economic development. Trade on Smithian absolute advantage grounds or on Ricardian comparative advantage grounds could drive a wedge between rich and poor nations, regardless of their antithetical

¹ Reducing the cost of labour does not reduce labour's standard of living. Labour can receive the same subsistence bundle for a lower gold wage because the gold price of 'corn' has fallen.

characterisations of the law of returns. Absent altogether from their work was the more analytically convenient assumption that has animated so much of neoclassical economics, until recently, of constant returns to scale.

Furthermore, in Smith's work we find a fully articulated theory of *endogenous* technical change, now the 'hot' topic in growth theory. Whether it is a satisfactory theory of endogenous technical change is another matter, but it is definitely a theory of endogenous technical change that foreshadows virtually all that is being done in this area (see Darity, 1994). The central mechanism of rising productivity is the extension of the division of labour prompted by market expansion.¹

4. Modern North–South theory

The modern North–South tradition of modelling trade and growth really can be said to have begun with Arthur Lewis' (1954) self-professed Classical model of economic growth, his famous model of growth with surplus labour.² Lewis' model is one where, in the long run, economic performance is convergent. Once a surplus labour economy reaches its turning point, its wage rate rises and, in Ricardian fashion, its profit rate falls.

To offset the comparative decline in fortune, the local capitalists either can import cheaper labour from the remaining surplus labour regions or they can export their own capital to the remaining surplus labour regions where they can earn a higher rate of return. Eventually, this process will push the entire world past Lewis' turning point, generating uniform returns to labour and capital internationally, leaving a situation where further economic progress depends exclusively upon further technical change. The whole world becomes developed at the close of the Lewis process.

But the observed persistent disparity between rich and poor nations led Lewis (1978) to extract from the open economy section of his 1954 paper a Ricardian pattern of trade model and elaborate upon it. The North and South are specialised in two distinct categories of exports dictated by comparative advantage.³ While both countries produce food, which is not traded, the North exports steel, a manufacturing good while the South exports coffee, a primary product.

Northern productivity is higher in food. Combined with immobile labour and the Law of One Price, this implies a higher Northern food wage. The steel sector pays a wage that is higher still, a mark-up over the Northern food sector's wage, and charges a higher price than the South charges for its export, coffee. The terms of trade favour the North owing to the North's superior productivity in food.

There is a paradoxical contrast between the implications of the closed economy and open economy versions of Lewis' model. In the closed economy, surplus labour model a rise in food sector productivity in the South will slow the growth of the manufacturing sector. In the open economy model, the rise in food sector productivity in the South will improve the South's commodity terms of trade.⁴ A rise in food sector productivity

¹ In Ricardo's analysis, technical change has a more autonomous and peripheral quality. It occurs in a non-systematic fashion and ultimately leaves economic trajectories unchanged.

² Arguably, his model is far more influenced by Ricardo than the other Classics.

³ Why comparative advantage is what it is remains unexplained by Lewis.

⁴ Since prices are cost driven in Ricardian models, the commodity and double factorial terms of trade are the same.

will raise Southern wages, which will translate into a higher cost-driven price for coffee on international markets.

The 1950s yielded not only the Lewis model of growth with unlimited labour but also the famous Solow (1956) version of the neoclassical growth model. This is a model of savings-driven growth under continuous full employment. Here the economy grows at its natural rate and gets into the steady state owing to diminishing returns to the reproducible factor, capital, in each slice of time. Exogenous labour-augmenting technical change maintains the same story.

In 1979, Roy Ruffin published a paper featuring a world economy model with two regions characterised as Solow economies. Ruffin's Solow–Solow world has both economies producing the same good and growing at a common natural rate. With a single good, the possibility of gains from trade is restricted to inter-temporal trade, driven by an inter-regional disparity in savings rates. Diminishing returns to capital imply that the region with the higher savings rate will be the creditor; the region with the lower savings rate will be the debtor. Growth rates and per capita incomes converge. Ruffin's Solow–Solow world is one where the two regions are symmetrical with respect to both structure and specialisation.

We move from the Ruffin model where the two regions are structurally the same and share the same export specialisation to the Findlay model where structure and specialisation are dissimilar. The North–South literature to be discussed follows Findlay in placing an emphasis on asymmetry in structures of trade and in economies. The analyses also start with the presumption that divergence is the norm in the world economy and the processes depicted by the models lead to *perpetual* per capita income differences.

Findlay (1980, 1981) introduced the breakthrough model where both the structure of the economies and the patterns of specialisation are asymmetrical. He combined a Solow North, producing a manufactured export, and a Lewis South, producing a primary product, in an attempt to determine the long-run terms of trade. The North experiences steady-state growth at its own, internally determined, natural rate. In the South, the rate of growth depends on the ability to import manufactured goods and, thus, on the growth of Northern demand for the South's exports. With unitary income elasticities for both goods, the South ultimately grows at the North's rate. The uniformity of growth rates provides the condition for long-run equilibrium in the terms of trade.

Convergence in growth rates need not mean convergence in levels of per capita income. Rather, eventual growth at a common rate fixes a permanent, relative gap in per capita incomes. Here, the impact of the structural asymmetry is evident: income inequality persists in spite of diminishing returns in both regions, which tends to generate income convergence among structurally similar economies. The model also captures an important aspect of Southern dependence. The common rate of growth is determined entirely in the North in that only Northern parameters enter the equation for the steady-state growth rate.

Findlay's imposition of uniform international growth rates as an equilibrium condition for the world economy limits the model's usefulness in addressing uneven development. By substituting a uniform-rates-of-profit condition into Findlay's framework, Darity (1990B) was able to demonstrate that, when profit rates become uniform in a Solow–Lewis world, growth rates cannot be the same. There is no adjustment

mechanism in the model to allow simultaneous equalisation of both growth and profit rates. Darity's extension of Findlay model is able to support an equilibrium in which there will be a widening gap in incomes between the two regions for perpetuity.

Burgstaller and Saveedra-Rivano (1984) altered Findlay's Solow–Lewis world to permit capital mobility. In their version of the model long-run and long-period conditions hold simultaneously. They make the terms of trade satisfy both the condition of balanced economic growth in the world economy and the ratio of the North's marginal physical product of capital to the South's marginal physical product of capital for equilibrium.

One of the major issues in this literature is the relationship between Northern monopoly power in trade and movements in the terms of trade. The famous Prebisch–Singer hypothesis has it that the secular deterioration in the terms of trade for the developing countries is due to the North's monopoly power in trade. Their result can be supported by formal theoretical models of the short run determination of the terms of trade (see Dutt, 1988; Conway and Darity, 1991). But the result necessarily is absent in Findlay's long-run with uniform growth rates, since the terms of trade become fixed. Conversely, the Prebisch–Singer result is theoretically possible in the long period with uniform rates of profit (Darity, 1990B) when the North follows a mark-up pricing rule in Kaldor–Kalecki fashion, rather than the implicit supply and demand pricing in the Solow model. Of course, the Prebisch–Singer result can be generated with differences in price and income elasticities between primary products and manufactures in more conventional models (Bacha, 1978).

In contrast, Burgstaller (1985) has the equilibrium terms of trade solely meet the long-period criterion of uniform rates of profit. Here, capital is treated as a wages-fund, and the mobility of advances to labour across regions in response to profit rate differentials leads to equalisation of returns. Burgstaller generates a truly Classical result. The terms of trade deteriorate for a region as its costs of production fall and improve as its costs of production rise.

Cambridge economist Nicholas Kaldor (1978) developed a world economy model predicated on a structural asymmetry with respect to returns to scale. Kaldor's North is the manufacturing goods region that features increasing returns, while Kaldor's South is the primary products region that features decreasing returns. Kaldor's asymmetry was derived from his interpretation of Adam Smith's assertion that the division of labour could proceed further in industry than agriculture.

Kaldor also was influenced by his mentor Allyn Young (1928), who had advanced a brilliant exposition of the possibilities for exploiting economies of scale in manufacturing. Kaldor also drew upon the work of P. J. Verdoorn (1949); Verdoorn asserted that there were a series of empirical findings linking manufacturing activity to the general rate of economic growth, indicating that the manufacturing sector is the engine of growth and suggesting that manufacturing is characterised by increasing returns.

Kaldor's model has been given a variety of mathematical formalisations, including papers by Molana and Vines (1989), Canning (1988) and Conway and Darity (1991). The Classical model *à la* Ricardo would have it that the region with falling costs, the North for Kaldor, should face *deteriorating* terms of trade, which would be the opposite of Kaldor's conclusion and would invert the Prebisch–Singer hypothesis. Conway and Darity (1991) demonstrate that Kaldor's conclusion and the Prebisch–Singer hypothesis can be reconciled with increasing returns in the North once the role of

demand elasticities is brought into the picture. Of course, the pure Ricardian approach is entirely cost-driven and demand elasticities play no role. The upshot of the findings in all three papers is to establish that there is a robust range of conditions under which a world with Kaldor's features will generate persistent relative poverty for the South.

A related alternative construct is a formalisation of the Lewis–Nurkse theory, presented by Lewis (1980) in his Nobel lecture, which constitutes a dynamic version of Lewis' steel–coffee world (Darity, 1982B). In this formalisation, the North and South have asymmetric engines of growth. The North's engine is internal, its own rate of capital accumulation, while the South's engine is external, its exports of primary products to the North. It is a model of unidirectional dependency where the North transmits its cyclical swings to the South. When the North is on an upswing, it imports more of the South's goods, producing higher rates of growth in the South; when the North is on a downswing, it transmits recession to the South by reducing its demand for the South's exports. In the steady state, a persistent income gap between the regions is likely.

Dutt's (1989) valuable survey paper mixes and matches different structures, maintaining the central proposition that North and South are necessarily dissimilar. In addition to a Solow North, Dutt also considers a Kalecki North and pairs each with a Lewis South and what he terms, in somewhat of a misnomer, a Neo-Marxian South. The Kalecki North, unlike the Solow North, treats more developed countries as being subject to unemployment.

Lance Taylor (1981, 1983), one of the earliest contributors and innovators in North–South modelling, has given formal content to and systematised the Latin American structuralist tradition. He has experimented with a wide variety of structures for the North, drawing upon Solow, Kalecki, Keynes, Kaldor and Pasinetti. In Taylor's work, the functional distribution of income plays a central role in both regions. Again the model generates divergent growth and divergent incomes.

Burgstaller (1987) also has provided a short and clever paper that features reversals of comparative advantage over time. The North is the manufacturing centre, and the South is the primary products centre. Over time, comparative advantage shifts as the South becomes the industrial centre, and the North becomes the agrarian nation. Specialisation reverses. Obviously, this is not a case of permanent disadvantage for the South, but it is a model of permanent asymmetry between the North and South. Thus, while the role of each region in the world economy changes, there is always divergence and always a 'South'.

Why have such asymmetries arisen, which form the basis for North–South models? Darity (1982A, 1982C, 1990A, 1992) and Dutt (1992A) explicitly have appealed to the role of the Atlantic slave trade, slavery in the Americas and British colonialism in India for the origins of the structural asymmetries that perpetuate inequality. This direct resort to the role of historical forces associated with slavery, colonialism and imperialism has not been widely embraced by the economics profession, but it has not been substantively challenged either. Less satisfactorily, Arthur Lewis tended to appeal to anthropology to explain structural 'dualisms'.

If generally explicit about the origin of structural asymmetries, the North–South literature is less clear regarding the prospects for their eventual demise. Findlay, for example, holds that international dualism 'is usually considered to be a transitional phenomenon, though possibly a very protracted one', while Taylor, who tends to be

more aggressively anti-neoclassical than Findlay, never has presumed that the structural asymmetries will vanish of their own accord.

Ideally, the structural characteristics that determine the nature of an economy's international interactions would be treated as endogenous. Doing so would allow the literature to address questions on which it is currently mute. Does a particular pattern of international interaction tend to reinforce an economy's initial set of structural characteristics, leading to perpetual international inequality? Or, does it tend to undermine them? If structural characteristics change, does this result in catching up on the part of the South or a new pattern of international dualism?

Currently, the use of endogenous macroeconomic structures for the North and South is limited by our general inability to derive them from more primitive economic assumptions. (Though one might argue that a willingness to entertain plausible macroeconomic structures that are not explicitly derived from microeconomic optimisation exercises is a strength of this literature.) Other structural characteristics, however, such as surplus labour in the South and asymmetries associated with the pattern of comparative advantage, would be relatively easy to endogenise.

A related modelling issue regards the formal division of the world into two homogeneous regions. The position of the newly industrialising countries and the transitional economies of Eastern Europe do not fit neatly into the North–South framework as normally constituted. One approach would be to introduce a third region with appropriate characteristics to the North–South framework. Taylor (1981) did advance a three-region model where the third region was OPEC, but he did not give the third region much development. Darity and Dhar (1994a) have advanced what they term a Classical analysis of North–South trade with the South functioning as an emerging industrial centre, but this is a first pass at the analysis.¹

Implicit in the treatment of Northern and Southern economies as homogeneous regions is the assumption that these economies tend to converge among themselves, if not between groups. While convergence among relatively well-off economies appears to be the norm (Dowrick and Nguyen, 1989), the use of a monolithic South precludes the possibility of late industrialisation by individual countries. That late industrialisation appears to take place on a piecemeal basis, rather than uniformly across Southern economies, suggests a high return to formalisations incorporating a disaggregated South.

A third area of potentially profitable investigation is that of financial dualism, which has been integral only to Taylor's work.² Virtually all North–South models are 'real' models of growth and trade. The role of multinational banks and multilateral organisations as sources of financial capital and the role of capital flight from the LDCs has been missing in action in the mathematically formal North–South literature.

Fourth, the role of government policy is not at the forefront of most of these papers. If we believe these processes operate and perpetuate international inequality, precisely how do we reverse them? Via industrial policy, South–South trade, South–South finance, autarky? Rarely does the formal literature on North–South trade and growth answer the question of how the world should be changed.

¹ See also Dutt (1992B) and Mainwaring (1993).

² Darity (1987) has developed a somewhat idiosyncratic North–South model of Sraffian surpluses and multinational bank finance, but little has been done with this framework subsequently.

5. 'New' trade theory and 'new' growth theory

North–South models have offered a direct assault on the analysis of uneven development, but these models have not been absorbed into the standard corpus of either trade or growth theory. A more recent and more enthusiastically received assault comes from the models of imperfect competition and endogenous technical change mentioned at the start of this paper. The new models of growth and trade proceed from an assumption of symmetry which distinguishes them from the structuralist perspective that motivated the North–South trade literature.

Common ground for the new growth and trade literatures is an interest in increasing returns. Analysis of increasing returns has helped to solve a number of puzzles generated by earlier, neoclassical approaches.¹ A world in which increasing returns plays a significant role is one in which economic processes may be self re-enforcing rather than self limiting, introducing the possibility of a rich variety of related economic phenomena including threshold effects, cumulative causation, poverty traps and multiple equilibria. The analysis of increasing returns creates a powerful theoretical tool for understanding international inequality as a stable equilibrium outcome in the world economy rather than a temporary disequilibrium.

The notion of diminishing returns to physical capital appears to be ingrained sufficiently in the thinking of many economists for explanations of increasing returns to rely heavily on other forms of capital, specifically 'knowledge' and human capital. Alternately, some models abstract from the distinctions among various forms of capital to consider collectively the accumulation of reproducible factors, broadly defined to include physical, human and knowledge capital. The change of focus from physical capital to human and knowledge capital may also be seen as an attempt to frame analysis of the somewhat elusive processes of learning and technical progress in terms of the comfortable and familiar mechanics of accumulation.

Whatever the limits of conceptualising technical progress as capital accumulation, thinking more carefully about how knowledge is generated and enters production has proved useful for theorising about uneven development. In moving away from the rather lofty traditional view of technology as the stock of 'human knowledge', a global public good, the new growth theory has embraced dimensions of technology that may differ across countries: human capital, proprietary knowledge, and production practice.

The focus on increasing returns suggests new avenues for investigating the relationship between trade and international inequality. By providing a link between productivity and market size, the introduction of increasing returns into models of international trade might be presumed to augment traditional neoclassical arguments regarding the benefits of international trade. Loosening the constraints that underlie perfect competition, however, also undermines the certainty with which neoclassical models predict gains from trade. Whether or not both trade partners benefit depends sensitively on the mechanisms that give rise to increasing returns. If these play out such that there are economies to national rather than international production, trade may act to increase income or development gaps across countries.

¹ Endogenous growth may be generated in the absence of increasing returns. Specifically, the formal requirement is constant marginal returns to reproducible factors, taken collectively. This is the motivation for the linear or 'AK' growth models due to Jones and Manuelli (1990), King and Rebelo (1990), Rebelo (1991), which employ a convex production technology.

Moreover, in an endogenous growth framework, the case for dynamic gains from trade is a priori ambiguous. The central contention of the new growth theory is that growth is generated within the economy. It is the result of particular economic activities. Exposure to international prices may increase or decrease the resources devoted to growth producing activities.

The new trade and growth literature has grown very rapidly over the past two decades. As a result, rather than attempt an exhaustive review of this work, we seek to highlight the key innovations that form the backbone of this literature. We organise this work by focusing on the manner in which increasing returns is formalised and considering the implications for international income inequality in a world of autarkic and trading economies.

5.1 Spillover models

In attempting to provide an explanation for persistent growth in industrial economies, Romer's (1986) path-breaking paper presents a model in which private investments generate knowledge spillovers that offset diminishing returns to capital. Provided the spillover effect is sufficiently strong, aggregate production will exhibit constant or increasing marginal social returns to capital. Romer's model serves to highlight the relationships between externalities, aggregate increasing returns and endogenous growth.

Endogenising growth, making it a function of the parameters describing an economy, opens the door to uneven development. Countries that differ with respect to critical parameters will grow at different rates. In Romer's model, knowledge spillovers are proportionate to aggregate investment, so larger economies grow faster than small ones, generating a 'scale effect' in growth rates.¹ For a sufficiently small economy, the growth rate will be negative.

These results, however, turn on the assumption that spillovers are national in scope. If spillovers are instantaneous and international, knowledge growth may be viewed as exogenous to each country, implying that countries converge to a common income level and growth rate. These polar assumptions regarding international knowledge flows, while extreme, serve to identify differential access to technical knowledge as a potential source of international inequality. We treat this subject in a more careful fashion below, when we consider the literature knowledge diffusion.

A second spillover model, Lucas (1988), combines constant returns to human and physical capital taken together with a positive externality determined by the average level of human capital. Importantly, while Lucas models the spillover as an economy-wide phenomenon, his discussion suggests that it results from social interactions and operates primarily at the level of urban economies.

Because Lucas presents this externality as explicitly local in nature, the model is consistent with permanent international income differentials. With the externality proportionate to average, rather than aggregate, human capital, the model does not support scale effects of the type found in Romer (1986): structurally similar economies converge to a common rate of growth.

¹ The controversial outcome that growth rates are increasing in country size, known as a 'scale effect in growth', is discussed in further detail below.

The Lucas (1988) model also provides an explanation for the neoclassically counter-intuitive flow of educated workers from regions of relative human capital scarcity to those of relative abundance, a cumulative process that tends to accentuate international productivity and income disparities. Thus, if international migration is allowed, the Lucas model has in common with the early development literature that Northern development may occur at a cost to the South (e.g., Myrdal, 1957).

Azariadis and Drazen (1990) present a model in which more productive production technologies become available in a country once average of human capital reaches a certain level. The resulting 'threshold externalities' may generate multiple equilibria, including a stable low-level equilibrium. Countries with low initial levels of education or high costs of human capital accumulation may cease accumulation prior to reaching the levels of human capital that allow adoption of more productive technologies. Like Lucas (1988), Azariadis and Drazen (1990) address income differentials by building their model around an extremely localised form of knowledge—knowledge embedded in individual workers.

In contrast to the Lucas model, with its constant elasticity spillovers, the discrete nature of external effects in Azariadis and Drazen (1990) provides no basis for similar economies to converge to parallel growth paths. As a result, Azariadis and Drazen (1990) suggests a role for initial conditions absent from Lucas's formulation and is consistent with the huge income divergence that characterises modern economic history.

Dynamic trade models illustrate the power of sectoral spillover effects and comparative advantage to generate uneven development. Krugman (1981) assumes there are external economies in the manufacturing sector and constant returns in agriculture. The region with a slightly higher initial capital stock has a comparative advantage in manufactures, generates a higher rate of profit and accumulates capital more rapidly, increasing its cost advantage in manufactures.

The self-reinforcing nature of capital accumulation and cost reduction in Krugman (1981) generates interlocking virtuous and vicious cycles for the two regions. Industrialisation in the North drives de-industrialisation in the South: 'the lagging region's nascent industrial sector is destroyed by manufactured exports from the leading regions' (p. 14). Interestingly, uneven industrialisation does not lead to wage divergence until the North is completely specialised in manufactures. The role of the agricultural sector as an anchor for wages is similar to that in Lewis' surplus labour model.

Matsuyama (1992) constructs a trade model incorporating dynamic external economies in manufacturing: the growth rate of human capital is proportionate to manufacturing employment. In this model, in an open economy greater natural resource abundance leads to fewer workers in manufacturing and a lower rate of growth. Interestingly, for a closed economy, natural resource abundance has the opposite effect, as higher income leads to greater manufacturing employment.

A second, less cited, model in Lucas (1988, pp. 27–35) considers international trade in a two-sector model in which workers in both sectors learn, but at different rates. Unlike the two trade models noted above, initial conditions imply complete specialisation in one of the goods, and the economy grows at one of two rates. Like Krugman (1981) and Matsuyama (1992), Lucas sees external economies as central to understanding uneven development: 'Is it possible, I wonder, to account for the large

cross-country difference in growth rates that we observe in a theoretical model that does not involve external effects of the sort I have postulated here? I have not seen it done' (1988, p. 35).

These models serve to formalise arguments, familiar from development economics, that for countries with a comparative advantage in agriculture, specialisation in accordance with international prices may undermine the dynamic processes that facilitate growth. Furthermore, because the dynamic benefits of producing manufactures are external to the individual firm, the models imply scope for positive government intervention in the subsidisation of manufactures. Finally, in each of these models the critical assumption for generating uneven growth is that the externalities be 'of the sort' Lucas considers, that is, national rather than international in scope.

5.2 *Endogenous fertility models*

Human capital accumulation is also the key to uneven development in the endogenous fertility literature, which considers the interaction of schooling and fertility decisions. Becker *et al.* (1990), for example, provide an informal dynamic model in which quality–quantity trade-offs generate multiple steady-state equilibria. The intuition of the model is that smaller families allow greater educational investment in each child, while higher educational attainment raises the opportunity cost of large families in the next generation. Depending on initial conditions, these forces may act together to generate a virtuous or vicious cycle.

As with the human capital models discussed above, the local nature of the intra-familial and Lucas-type spillovers associated with human capital in fertility models suggests that the benefits of a virtuous endogenous fertility cycle accrue at a national level, and thus may contribute to international income inequality.

A number of researchers have extended this line of inquiry by identifying variables that may influence the fertility–education decision. Galor and Weil (1999) suggest that rapid technical change raises the return to human capital, by placing a premium on rapid learning, implying a secondary or complementary effect to knowledge growth. In Kremer and Chen (1999) and Morand (1999), high (intra-national) income inequality leads to high fertility and low education among the poor, limiting the scope for human capital spillovers and leading a low-income, high-fertility equilibrium.

Considering potential international interactions, Tamura (1996) argues that a certain level of human capital may be necessary to absorb international 'social capital'. A country grows along an independent path until this threshold is reached, at which point access to international spillovers raise the return to human capital, lowering fertility and drawing a country into a common high-level equilibrium with other high human capital countries. The threshold itself falls in the level of world human capital, implying that initial income divergence may be followed by income convergence. This divergence–convergence pattern is generated by endogenising the scope of potentially international spillovers.

International trade may also affect the timing of demographic transition through its effect on the return to human capital. In Galor and Mountford (2003), local increasing returns in manufacturing generate factor price divergence across trade partners. Countries that specialise in manufactures experience a rise in the return to human capital, altering the quality–quantity trade-off in a manner that supports the demographic transition, while a fall in the return to human capital retards

the demographic transition in countries that specialise in primary products. Galor and Mountford (2003) place the interaction of trade and the demographic transition at the heart of the story of why incomes diverged.

Alternatively, McDermott (2002) provides a model in which economic integration facilitates the demographic transition in all countries. The critical formal distinction from Galor and Mountford (2003) is that in McDermott's treatment increasing returns are treated as global rather than country specific, so that trade increases the return to human capital across all regions. Tellingly, McDermott (2002) seeks to explain European growth, while Galor and Mountford (2003) address the population explosion in poor countries.

5.3 *Specialisation and diversity models*

A third approach to aggregate increasing returns is to posit gains to the specialisation or diversity of inputs. This is accomplished by interpreting the Dixit–Stiglitz (1977) utility function, which exhibits gains to diverse consumption, as a production function with gains to the diversity of intermediate inputs. The inspiration for this approach clearly lies in the vision of economies of specialisation expounded by Adam Smith (1937) and Allyn Young (1928) (e.g., Romer, 1987; Ethier, 1982). Intermediates are produced by monopolistic competitors, introducing a second form of increasing returns.

The twin sources of increasing returns provide Romer's (1987) growth model with two characteristics that carry over into the later literature on endogenous technical change. First, growth takes place through continuous expansion of the range of intermediate goods, which are produced from a stock of 'primitive capital'. Competition among intermediates serves here as a form of diminishing returns, but this effect is offset by gains to the number of intermediates, allowing the introduction of new intermediates to serve as an engine of growth.

Second, each intermediate is utilised by the entire labour force, so a larger population implies greater output of each intermediate. This implies a greater return to the introduction of new intermediates, resulting in a scale effect—larger economies grow faster. As is true in general for models with scale effects, a sufficiently small economy will experience negative growth as it consumes its capital stock.

The form of increasing returns captured by Romer (1987) clearly operates at an international level and, thus, is not a source of international inequality. Participation in international trade provides larger markets for domestically produced intermediate goods and gives final good producers access to foreign intermediates. Indeed, Ethier (1982, p. 269) finds that factor price equalisation, a central pillar in the argument that trade reduces international income disparities, is robust to the introduction of gains to diversity.

The implications for the relationship between growth and trade are also clear: trade increases the market for each variety of intermediate good, inducing them to be introduced faster, raising the rate of growth. While autarkic economies will grow at different rates, in accord with differences in their population sizes, economies linked by international trade will not. In this framework, international trade does not contribute to international income disparities.

Monopolistic competition models may also be used to generate less sanguine outcomes, giving rise to multiple equilibria and poverty traps. In Murphy *et al.* (1989),

manufacturers choose between a 'traditional' constant returns technology or an 'industrial' technology subject to increasing returns, with higher productivity at high levels of output. As these goods are consumed directly, rather than combined with labour to produce a final consumption good (as in Romer, 1987), demand for each variety depends not on labour force size but on national income. As a result, adoption of the modern technology by a given firm is optimal only if a sufficient number of other firms adopt as well. The model formalizes Rosenstein–Rodan's (1943) argument that pecuniary externalities may give rise to multiple equilibria and that market co-ordination may not suffice to direct an economy to the more favourable outcome.

The win–win nature of international trade in this framework is also fragile, being overturned by the introduction of international transport costs. Krugman and Venables (1995) construct a model in which trade is costly and the use of manufactures as intermediates create forward and backward linkages in the spirit of Hirschman (1958).

Sufficiently high transport costs result in an autarkic equilibrium with equal incomes. With a reduction in transport costs, trade generates income disparities. The interaction of linkages and transport costs gives rise to agglomeration effects that serve to localise the gains from increasing returns. Southern manufacturing firms offer a lower wage to offset their locational disadvantage. Further reductions in transport costs lead to income convergence as agglomeration effects dissipate. In this framework, the level of transport costs determines whether increasing returns are domestic or international in scope, and thus whether trade serves to support or undermine international inequality.

The literature on labour specialisation, which provides an alternative to gains to diversity captured by the Dixit–Stiglitz production function, focuses attention on domestic trading costs and an economy's internal organisation. Yang and Borland (1991), Becker and Murphy (1992), Tamura (1992, 1996) and Davis (2003A, 2003B) endogenise labour specialisation decisions based on a trade-off between gains to the exploitation of specialised skills and the cost of trading with other specialist producers. These models emphasise that development involves the adoption of increasingly sophisticated patterns of economic organisation, including increases in market size and the complexity of interpersonal exchange, which facilitates the accumulation of specialised knowledge and skills.

The central role of transaction costs in these models suggests links both to Smith (1937), with his emphasis on water transport, geography and 'tolerable' justice, and the new institutional work on growth (e.g., North, 1990). The focus on domestic transaction costs also implies an explicitly local character to increasing returns that is compatible with uneven development. In Becker and Murphy (1992), for example, a given canon of knowledge can be more easily mastered when each agent concentrates her efforts on a narrow range of topics. Thus, the model is consistent with the existence of significant 'knowledge gaps' between countries as determined by local transaction costs. In Davis (2003A), the inefficient provision of physical and institutional infrastructure leads to high market transaction costs, which undermine specialisation and thereby limit the local accumulation of knowledge.

5.4 Innovation models

In contrast to spillover models, in which knowledge growth is the unintended by-product of other investments, models due to Romer (1990), Aghion and Howitt

(1992) and Young (1993) emphasise the role of profit-seeking investments in proprietary knowledge. Successful innovation generates the 'blueprint' for a new intermediate good. New intermediates either complement existing varieties resulting in gains to diversity, e.g., Romer (1990), or replace them, as in Aghion and Howitt's (1992) model of creative destruction. In these models, innovation is the engine of growth. Knowledge spillovers in the research sector free innovation from diminishing returns. The long-run rate of growth depends on the equilibrium allocation of resources to innovation.

This first generation of innovation models offers a possible explanation of divergent growth in terms of scale effects. The profit from a new intermediate good depends on the size of the final good sector. A larger economy devotes a greater proportion of its resources to research and grows at a faster rate.

Following Jones' (1995A) argument that scale effects are inconsistent with the US growth experience, however, most researchers in this area have viewed scale effects with scepticism, as an unintended and undesirable side effect of modelling innovation rather than a potentially valuable insight into the determinants of relative growth performance. In Lucas' (1993) words, scale effects 'are a nuisance implication that we want to dispose of'.¹ A central focus of more recent work on endogenous innovation has been the development of non-scale growth models, which introduce some form of diminishing returns in the research sector.² In non-scale growth models, size dictates income levels but not growth rates.

Taking population size as the relevant measure of economic scale, most researchers also view scale effects as being at odds with the experience of less developed countries. Think, for example, of India and Singapore. Davis (2002), however, argues that this dismissal may be premature in that population size may be a poor proxy for economic scale. In particular, when domestic transaction costs are high, effective scale may be limited by fragmented internal markets, and when international transaction costs are low, scale may be augmented by participation in international trade.³

5.5 International technical diffusion models

In models of innovation driven growth, per capita income is proportionate to a country's stock of knowledge. Thus, the ability of these models to account for persistent international inequality depends on how knowledge flows across countries. By introducing proprietary knowledge, models of endogenous technical progress provide an important alternative to the neoclassical understanding of technology as a global public good. However, the technical isolation assumed by single economy growth models is probably also not descriptive of the world economy.

Formal treatment of knowledge flows differs along a number of dimensions: diffusion may be autonomous or profit-seeking, unidirectional or bidirectional, disembodied or embodied in traded intermediates. In an extension of the neoclassical growth model, Barro and Sala-i-Martin (1997) treat international knowledge flows as a gradual, uniform and autonomous, so that diffusion augments neoclassical conditional convergence. While

¹ Quoted in Dinopoulos and Thompson (1999).

² See for example Jones (1995B), Kortum (1997), Segerstrom (1999), Dinopoulos and Thompson (1998), Peretto (1998), Young (1998). Dinopoulos and Thompson (1999) review the non-scale growth literature.

³ Ades and Glaeser (1999) find that openness reduces the importance of initial income in growth regressions, suggesting that trade may be a substitute for domestic economic scale.

arguably consistent with post-war OECD experience, such an approach is unlikely to help account for the divergence and polarisation of per capita incomes noted in Section 2 or the differential growth experience of countries with similar levels of the key Solow variables (e.g., Lucas, 1993).

Deviations from the assumption of uniform autonomous diffusion tend to allow equilibria with persistent income inequality. In a two-country innovation model, Grossman and Helpman (1990) show that differential rates of knowledge diffusion can sustain permanent income differentials. In the country which absorbs foreign knowledge more easily, access to a greater body of knowledge leads to higher research productivity. In a balanced growth equilibrium, relative incomes reflect relative research productivity.

Breaking from the assumption of autonomous diffusion, Grossman and Helpman (1991) consider a world in which North–South knowledge flows result from Southern investments in imitation. Increases in the productivity of Southern imitation both reduce international income disparities and increase the common rate of income growth. Though Southern imitation reduces the expected duration of monopoly profits for Northern innovators, this effect is more than offset by the relocation of intermediate good production in the South, which releases Northern resources into the research sector.

International trade also plays a central role in attempts to account for differential diffusion. Rivera-Batiz and Romer (1991) present a ‘lab equipment’ model in which researcher productivity depends on the available range of intermediate inputs rather than on knowledge spillovers. In the lab equipment model, it is trade in intermediate goods that matters for growth, rather than technical diffusion or ‘trade in ideas’.

The ‘lab equipment’ model may also be interpreted as capturing an element of reverse engineering, in which traded intermediates serve as a conduit for the transmission of ideas. Note that this differs from the understanding of trade and growth in the spillover literature (Lucas, 1988; Matsuyama, 1992), in which trade increases growth rates only if it increases the production of manufactures. In diffusion models growth rates also increase through increasing manufactured imports.

Several papers refine the link between trade and knowledge diffusion by stressing the potential role of domestic factors. In Keller (1996), knowledge absorption by reverse engineering depends both on access to imported intermediates and domestic human capital. Keller uses this model to argue that there is nothing automatic about the technological gains to an ‘outward-oriented policy regime’, that these cannot be reaped without complementary domestic investments in human capital.

In Goodfriend and McDermott (1998), the proportion of imported intermediate goods that contribute to domestic learning depends on a ‘familiarity’ parameter that reflects geographic, cultural and commercial knowledge of the trade partner. Low levels of familiarity localise knowledge spillovers, generating persistent income gaps, while mutual familiarity facilitates international spillovers with mutual benefits. While Goodfriend and McDermott take ‘familiarity’ as exogenous, their discussion suggests the potential for cumulative causation, in which low levels of familiarity ‘inhibit the kind of commercial interaction that promotes familiarisation.’ (p. 1285)

A final approach to knowledge diffusion views the domestic cost of technology adoption as the result of deliberate barriers rather than any intrinsic difficulty in learning. Parente and Prescott (1994) show that small differences in the cost of changing

production techniques may result in large persistent income gaps, while reductions in adoption barriers are consistent with rapid catching up. Parente and Prescott (1999) endogenise resistance to adoption as arising from monopoly input providers. They also stress the role of trade policy, in that protection from import competition is a necessary component in maintaining the monopoly power of inefficient monopolists.

5.6 *Classical roots*

The influence of Smith on the new growth and trade theory goes beyond formal models of the division of labour. The connection between expanding markets and research and development in Grossman and Helpman (1990) and in Romer (1986, 1990) carries over from Adam Smith's connection between the extent of the market and the division of labour. Although the Krugman, Helpman and Grossman trade theory with increasing returns includes external economies, contested markets, Cournot duopoly and monopolistic competition, it can be deemed deeply Smithian to the extent that the increase in market size is accompanied by an increased rate of capital accumulation and labour productivity. Consider also the use of the Dixit–Stiglitz production function (Romer, 1987, 1990) in which increasing returns to the number of inputs serves as a proxy for increasing returns to specialisation.

The link between market size and the rate of invention is distinctly Smithian in that it derives from the demand for and subsequent utilisation of a specialised input, the 'blue print' for a new capital good. The contemporary R&D researchers in Romer's work are little different from Smith's 'philosophers' who design new machinery. While Romer makes virtually no mention of Smith, he even uses evidence from the 19th century US to make his case a la Smith. Romer (1990) reports on rates of patenting in towns where transport costs were lower owing to access to waterways! Recall that in Smith's theory, access to waterways was a crucial factor promoting the extent of the market, thereby promoting productivity increases via the division of labour. Endogenous technical change in late 20th century economics unequivocally finds its inspiration in Smith rather than Karl Marx.

5.7 *One-size-fits-all?*

A curious aspect of this latest surge of interest in growth theory is the unconscious manner in which it has brought about a change in subject matter. It was once thought that growth theory pertained to industrial economies, while a separate body of work, development economics, sought to explain the experience of less developed economies. In contrast, with its emphasis on increasing returns and threshold effects, the new growth theory attempts to provide something of a 'grand unified theory' of growth, which applies to economies at very different levels of development.¹ A similar change is evident in the empirical work on growth: absolute convergence, for example, is rejected because it does not hold for broad samples in which a majority of observations come from developing economies.

Some aspects of this change of focus are to be lauded, particularly the fact that it has served to restore the phenomenon of underdevelopment to the centre of contemporary economic inquiry. The new growth and trade theory has also served to vindicate

¹ Krugman (1993) has pointed out that the new growth theory has formalised and reinterpreted many of the central concepts from the development theories of the 1940s and 1950s such as the big push, minimum critical effort, pecuniary externalities and the like.

traditional development thinking, which held as a central tenet that an appreciation of market failure is integral to understanding the related phenomena of growth, industrialisation, and uneven development.

It is possible though that something has been lost in this one-size-fits-all approach. The new growth theory takes the neoclassical model as its primary point of reference and in doing so makes assumptions that may be inappropriate for less developed countries. To cite an obvious example, in the new growth theory, models often rely on aggregate production functions or, in multi-sector models, include an intermediate good and research sectors. Few address directly the particular nature of agricultural production, which plays a substantive role in North–South models and in many countries still accounts for the majority of employment.

Deviations from perfect competition tend to be limited to the exploration of increasing returns. The new growth and trade theory does not attempt to come to grips with the prominent economic fault lines in developing countries captured by notions of dualism. In addition, the economic role of institutions may be greater in less developed countries, implying that models that ignore institutional detail will do more poorly when applied to less developed countries.

Development economists have long been sceptical of the assumption that markets deviate from efficiency in a manner easily captured by models of imperfect competition. This scepticism does not appear to be play a prominent role in the new growth and trade theories.

These concerns aside, there is a sense in which the new developments in mainstream trade and growth theory have eliminated the centre of trade theory. There are no core propositions that can be embraced without strong qualifications. For example, the factor price equalisation theorem assumes common technological conditions worldwide. The ‘new’ analyses suggest how different technological conditions might evolve over time. Although Paul Krugman has often espoused free trade in his public pronouncements, his theoretical work roundly denies the generality of its efficacy.

The genie of increasing returns, once out of the bottle, obliterates the traditional Chicago economists’ favourable predisposition toward *laissez faire*. By treating economies of scale as an externality, Lucas demonstrates that the optimal growth path is not the growth path that will be produced by private decisions. Intervention to ‘internalise the externality’ will be ‘welfare-improving’. The floor is opening up under traditional economics, and the floor is being opened up by some economists who have been most forcefully identified with orthodoxy, Lucas and Becker in particular. What is orthodoxy with respect to trade and growth theory is now very much up in the air. Whether mainstream economics actually will pay any attention to the ideas of the North–South theorists remains an open question.

6. Conclusion

In reviewing the formal literature on uneven development, we have argued that the North–South trade literature is distinguished from the more recent work on trade and growth with increasing returns by its reliance on international asymmetry. It remains to be said whether this should be considered a virtue or a vice. To the extent that we are able to endogenise the relevant economic structures, a greater reliance on more primitive economic relationships is desirable. The danger in this is that a dogmatic

insistence on microeconomic foundations may preclude the analysis of plausible institutional and structural characteristics of developing countries or the world economy. As argued earlier, this is particularly relevant to macroeconomic structures, which are in general difficult to account for on the basis of microeconomic optimisation exercises, but also concerns the modelling of dualism in developing countries.

The new growth and trade literature's reliance on symmetry also places a premium on the importance of initial conditions. This is attractive relative to explanations that rely on differences in capabilities, attitudes or potentialities of people in different regions. Azariadis and Drazen (1990 p. 503, emphasis in original) are explicit on this point:

One explanation, of course, is that persistent differences in national economic performance are due entirely to systematic variations across countries in culture, religion, national economic policies, or broadly defined social institutions, that is, to economically 'exogenous' factors. This paper explores the alternative possibility that sustainable differences in per capita growth rates could appear even among economies with *identical* structures.

Economies are assigned to have identical structures, but the initial positions of countries or regions are different at the start of model time. Depending upon those initial conditions they plunge toward an underdevelopment trap or surge toward prosperity.

So what dictates these all-important initial conditions? None of the new trade/growth theorists offers an answer of substance. Azariadis and Costas might find themselves pushed back to the 'economically "exogenous" factors' they admirably want to avoid, the factors not far removed from Lewis' anthropological basis for dualism. Becker *et al.* (1990, p. S14) make the following intriguing observation:

Multiple steady states mean that history and luck are critical determinants of a country's growth experience. In our formulation, initial levels of human capital and technology, and subsequent productivity and other shocks, determine whether a country grows richer over time or stagnates at low income levels. Many attempts to explain why some countries and continents have had the best economic performance during the past several centuries give too little attention to accidents and good fortune.

They go on to talk about the role of shocks to physical or human capital as triggers toward particular paths (Becker *et al.*, 1990, p. S33). But these shocks are by definition random events, so that differences in economic growth are driven by luck!

In contrast, the North–South modellers have argued that history matters from the start of their project, not only in fixing so-called initial conditions but in producing structural asymmetries in economies. And the North–South modellers have been explicit in identifying the history of colonialism and imperialism as the mechanism that shaped these structural dissimilarities. But this suggests that economic history now will return to centre stage as the key battlefield for explaining today's gap between rich and poor nations. This may even bring Karl Marx back into the picture.

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