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Working Paper No. C94-038

The Contributions of Endogenous Growth Theory to the Analysis of Development Problems: An Assessment

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University of California at Berkeley

July 1994

Department of Economics

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**The Contributions of Endogenous Growth
Theory to the Analysis of Development
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Key words: learning, strategic complementarities, new goods

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Abstract

In this paper we provide a critical assessment of the contributions of new growth theory to the theory of economic development. We focus positively on the new emphasis on fixed costs and nonconvexities in the process of introduction of new goods and technologies, particularly in the realm of trade and technological diffusion for a developing country, and on the formalization of coordination failures and underdevelopment traps.

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I.

The "old" growth theory influenced the theory of economic development in several ways. Starting with the basic Harrod-Domar structure of capacity growth, development economists paid attention to the constraints posed by savings and the efficiency with which savings are utilized. The basic model was extended to incorporate structural rigidities constraining the capacity to convert exportables into imports of capital and intermediate goods (leading to the foreign exchange gap as an additional constraint) and the capacity to shift once-installed capital intersectorally (leading to a growth premium on investment allocation in favor of machine-making as in the Fel'dman-Mahalanobis planning model). The optimum growth literature led to a sophisticated discussion of terminal capacity constraints and social time discount rates in the context of development planning. The "turnpike" feature of optimum growth models, derived from the earlier model of von Neumann (1945), showed a useful convergence property of optimal paths in planning models. Given the persistence of unemployment and underemployment and the precapitalist organization of production in some sectors (like agriculture), the classical growth model of Smith, Ricardo and Marx (to which Arthur Lewis had drawn attention) was often considered more appropriate for studying development problems than the Solow-Swan neoclassical growth model.

Contrary to the claim sometimes made in the literature on the "new" growth theory, many of the growth models of the 1950's and the 1960's endogenized technical progress in significant ways: apart from Arrow's (1962) celebrated learning-by-doing model where learning emanated from the dynamic externalities of cumulated gross investment, the earlier related learning model of Haavelmo (1956), and Uzawa's (1965) model of investment in

human capital generating technical change, there are several Kaldor models culminating in the Kaldor-Mirrlees model (1962) where investment is the vehicle of technical progress and Shell's (1967) model of inventive activity. Learning by doing particularly in the form of acquisition of tacit knowledge and inter-firm spillover effects of cumulated gross output influenced development theory by providing a formal rationale for an old argument for support of "infant" industry producing import-substitutes (or new exports), as in the models of Bardhan (1970) and Clemhout and Wan (1970). The acquired and sometimes policy-driven nature of dynamic comparative advantage, to which the East Asian challenge has awakened many developed-country trade theorists, has been a persistent theme in the trade and development literature for decades. In general the old literature on the microeconomics of technological progress has always emphasized the pervasiveness of externalities in the innovation process, in the transfer, absorption, development and adaptation of new technologies and the discussion in development economics on the problems posed by the catching-up process in the developing countries reflected this. Thus the models of Romer (1986) and Lucas (1988), while helping in the formalization of these ideas of dynamic externalities in a perfect competition framework, do not provide any substantial breakthrough in development theory as such.¹

Where then are the distinctive contributions of the "new" growth theory that may be particularly useful for understanding development problems? They certainly do not lie in

¹ In fact as Srinivasan (1992) points out, human capital and the process of its accumulation play somewhat the same role in the Lucas (1988) model as the capital goods sector in the two-sector model of Mahalanobis (1955).

Development theory has even less to learn from the strand of new growth theory which shows that substantial growth is possible even in the absence of technical progress or increasing returns as long as the marginal product of capital has a positive lower bound, a result the old growth theorists were already aware of.

the so-called convergence controversy which has spawned a large part of published output in the literature.² The main result, reached on the basis of dubious cross-country regressions and even more dubious data quality, that the lack of convergence in per capita income growth rates across countries belies the standard presumption of the availability of the same technological opportunities in all countries of the world is not particularly earth-shaking from the point of view of development economics. As Solow (1994) comments on this body of empirical work: "I do not find this a confidence-inspiring project. It seems altogether too vulnerable to bias from omitted variables, to reverse causation, and above all to the recurrent suspicion that the experiences of various national economies are not to be explained as if they represent different 'points' on some well-defined surface". In any case a development economist plowing through this literature gets hardly any clue (and a lot of red herrings) about the factors determining the crucial international differences in factor productivity growth.

A much more substantive contribution of the "new" growth theory is to formalize endogenous technical progress in terms of a tractable imperfect-competition framework in which temporary monopoly power acts as a motivating force for private innovators. The leading work in this area of what has been called neo-Schumpeterian growth theory is by Romer (1987, 1990), Grossman and Helpman (1991), Segerstrom, Anant and Dinopoulos (1990), and Aghion and Howitt (1992). Growth theory has now been liberated from the confines of the competitive market framework of earlier endogenous growth models in which

² For an evaluation of the empirical literature see Levine and Renelt (1992), Levine and Zervos (1993), Pack (1994) and section 3 of Srinivasan (forthcoming). For an examination of the data quality see the symposium on Database for Development Analysis in the Journal of Development Economics, June 1994 issue.

dynamic externalities played the central role (even considering the models of Kaldor who repeatedly emphasized the importance of imperfect competition in the context of endogenous technical progress, the current models drawing upon the advances in industrial organization theory are more satisfactory). In particular, the emphasis on new goods and the fixed costs in introducing them provides valuable new insights. The major impact of this literature on development theory has been in the area of trade and technological diffusion in an international economy, which we discuss in the next section.

II.

The East Asian success stories have given credence³ to the belief of many economists in a positive relationship between "outward-orientation" and economic development (although a rigorous empirical demonstration of the causal relationship between some satisfactory measure of outward-orientation and the rate of growth is rather scarce). Standard neoclassical growth theory did not provide any such general theorem on the effect of trade on the long-run growth rate.

A major result in the new literature is to show how economic integration in the world market, compared to isolation, helps long-run growth by avoiding unnecessary duplication of research and thus increases aggregate productivity of resources employed in the R & D sector (characterized by economies of scale). World market competition gives incentives to entrepreneurs in each of these countries to invent products that are unique in the world

³ It should, however, be noted that the export boom in manufactures for Korea and Taiwan in the 1960's came before any significant trade liberalization. As Rodrik (1992) suggests, a realistic exchange rate policy and a generous program of export subsidies, rather than trade liberalization per se, may be the key ingredients for successful export performance.

economy -- see the models of Rivera-Batiz and Romer (1991) and Grossman and Helpman (1991), Ch. 9. One has, of course, to keep in mind the fact that sometimes these unique products are unique in the sense of product differentiation but not in the sense of any genuine technological advance (it is well-known, for example, that in the pharmaceutical industry a majority of the so-called new products are really recombinations of existing ingredients with an eye to prolonging patent protection, and that they are new, not therapeutically, but from the marketability point of view). Of course trade often helps transmission of useful ideas in production engineering and information about changing product patterns. But the presumption in many of the models of a common pool of knowledge capital created by international spillovers of technical information is sometimes not relevant for a poor country.

When knowledge accumulation is localized largely in the rich country and the poor country is also smaller in (economic) size, particularly in the size of its already accumulated knowledge capital (which determines research effectiveness), the rich country captures a growing market share in the total number of differentiated varieties, and the entrepreneurs in the poor country foreseeing capital losses may innovate less rapidly in long-run equilibrium with international trade than it does under autarky, as shown by Feenstra (1990) and Grossman and Helpman (1991), Ch. 9. Trade reduces the profitability of R and D in the poor country as it places local entrepreneurs in competition with a rapidly expanding set of imported, differentiated products and may drive the country to specialize in production rather than research, and within production from high-tech products to traditional, possibly stagnant, industries which use its relatively plentiful supply of unskilled workers -- thus slowing innovation and growth. For the lagging country isolation would have been more

advantageous for the pace of innovation.⁴

These growth results are quite consistent with atemporal comparative advantage considerations except for the effect of the initial conditions of accumulated knowledge capital and country size. Much depends on the general-equilibrium effects on the intersectoral allocation of labor. For example, suppose output of finished goods depends on labor and a composite intermediate input H , where

$$H = \left[\int_0^n x^\alpha(j) dj \right]^{\frac{1}{\alpha}}, \quad 1 > \alpha > 0 \quad (1)$$

with $x(j)$ as the intermediate input of type j -- all symmetric but imperfect substitutes aggregated in the standard Dixit-Stiglitz way -- and n as the measure of continually augmented inputs as well as the stock of cumulative knowledge capital. The blueprints for intermediate inputs are generated by research. Then the innovation output of the R and D sector is

$$\dot{n} = \frac{l}{a/n}, \quad (2)$$

where l is the labor devoted to the R and D sector, a is the fixed labor coefficient in the R and D sector, and research effectiveness of labor improves with the cumulative stock of

⁴ This is at least consistent with the view in the historical studies of Japan's innovation system that restrictions on imports and foreign direct investment may have played a major positive role in regard to R and D effort until the early 1970's. See Odagiri and Goto (1993).

knowledge capital. Thus the rate of growth $\frac{\dot{n}}{n}$ depends directly on what happens (say, as a result of trade expansion or restriction) to l : a trade-induced movement of labor away from the R and D sector toward the production sector will reduce the rate of growth in this case. Of course, slower growth does not necessarily mean that the consumer loses from trade: apart from usual static gains from trade, consumers may have access to more varieties innovated abroad. But trade may sometimes cause a net welfare loss, since in the poorer country it accelerates a market failure (underinvestment in research in the initial situation) by allocating resources further away from research.

One should note that the relevant R and D for a poor country is, of course, more in technological adaptation of products and processes invented abroad and in imitation. But even this kind of a R and D sector is usually so small that major changes in aggregate productivity and growth on the basis of the trade-induced general-equilibrium type reallocation of fully employed resources into or away from the R and D sector, as emphasized by Grossman and Helpman, seems a little overdrawn if applied in the context of poor countries. In any case the ambiguity in the relationship between trade expansion and productivity growth in these general-equilibrium models only confirms similar conclusions in careful partial-equilibrium models, particularly when entry and exit from industries are not frictionless -- see, for example, Rodrik (1992).

In the Grossman-Helpman model of the innovating North and the imitating South with all firms in Bertrand competition with one another, imitation has two opposing effects on the incentive to innovate in the North: on the one hand, imitation reduces the duration of monopoly profits of the innovator; on the other hand, it frees up Northern labor to

produce more of the as yet unimitated products and to conduct more R and D.⁵ In these models labor costs form the only component of the cost of entry into the imitative-adaptive R and D activity in the South. So, armed with cheaper labor the Southern firms can relentlessly keep on targeting Northern products for imitation, unhampered by many of the formidable real-world non-labor constraints on entry (for example, those posed by the lack of a viable physical, social and educational infrastructure or that of organizational knowhow in a poor country).

In general most of the new models of trade and growth, by adopting the Dixit-Stiglitz-style consumer preferences, assume a uniform price elasticity and a unitary expenditure elasticity for each of the differentiated products which enter symmetrically in the utility function. This, of course, immediately rules out what has been a major preoccupation of the trade and development literature: to explore the implications of sectoral demand asymmetries for trade relationships between rich and poor countries. The Dixit-Stiglitz functional form also narrows the operation of scale economies to take the form of expansion of variety, not in the scale of output. The assumption of monopolistic competition and contestable markets in the models also precludes any serious examination of the impact of trade on growth through the lowering of entry barriers in oligopolistic industries, industry rationalization and reduction of the gap between actual and best practice international technology that foreign competitive pressure may induce. This gap between actual and best practice partly depends on the degree of modernization of the capital stock aggregated over

⁵ It may also be noted that in the Grossman-Helpman (1991, Ch. 11) model of imitation, where the poor country grows faster with imitation and trade than without them, it is the process of imitation rather than the integration of product markets per se that contributes to a more rapid pace of innovation in the poor country.

different vintages. The "quality ladder" models, for example that of Grossman and Helpman (1991, Ch. 4), ignore this aspect by assuming that older inputs are instantaneously rendered obsolete by new inputs. The old "putty-clay" vintage models of capital, however, had old and new inputs co-existing and there was an endogenous determination of the economic life of capital in each industry. Bardhan and Kletzer (1984) develop such a vintage-capital model of endogenous growth with learning by doing, where they trace the impact of trade policy on the time-path of productivity.

The slow diffusion of technology from rich to poor countries is often interpreted in the literature as reflecting the frequent laxity in the enforcement of patents in poor countries and innovators in rich countries thus compelled to protect their ideas through secrecy. This brings us to the controversial issue of intellectual property rights (IPR), which has sometimes divided the rich and poor countries, as notably in the recent Uruguay Round discussions. Rich countries often claim that a tighter IPR regime encourages innovations (by expanding the duration of the innovator's monopoly) from which all countries benefit. Poor countries often counter this by pointing to their losses following upon increased monopoly power of the larger companies of rich countries. Since the poor countries provide a very small market for many industrial products, the disincentive effects of lax patent protection in those countries may be marginal on the rate of innovation in rich countries, and as such attempts at free riding by the poor countries may make sense, as Chin and Grossman (1990) suggest. To this Diwan and Rodrik (1991) add the qualification that the disincentive effects may be very significant in the case of innovation in technologies or products that are particularly appropriate for poor countries (for example, drugs against tropical diseases). But both of these theoretical models use a static partial-equilibrium framework. Helpman (1993)

recently constructed a dynamic general-equilibrium model of innovation and imitation to discuss the question of IPR. In the long-run equilibrium of his model, a tighter IPR (reducing the rate of imitation by the lower-wage poor country) increases the fraction of the total number of products produced (unchallenged) in the rich country, but lowers the long-run rate of innovation of new products⁶ (this works through the rise in the price-earning ratio of the R and D firm in the rich country, consequent upon the general-equilibrium labor reallocation effect of a larger range of manufactured products produced in the rich country).⁷ Even apart from this effect on the rate of innovation, a tighter IPR, by shifting production from the lower-wage (and therefore lower-price) country to the higher-wage country makes consumers in both countries worse off.

The discussion advocating a tighter IPR regime also ignores the cases of restrictive business practices of many multinational companies (like pre-emptive patenting and "sleeping" patents where new patents are taken out in poor countries simply to ward off competitors but seldom actually used in local production⁸). Furthermore, the flow of technology through direct investments by multinational enterprises to a poor country is often constrained not so much by restrictive government policy in the host country as by its lack of infrastructure (the development of which in turn is constrained by the difficulty of raising

⁶ This result may not be robust for the case where direct foreign investment as well as imitation acts as a channel of technology transfer, as Lai (1993) shows.

⁷ In a different context Mookherjee and Ray (1991) have shown that when a dominant firm decides on the adoption of a sequence of potential cost-reducing innovations with Bertrand competition in the product market, a faster rate of diffusion of the latest technology to a competitive fringe may, over some range, increase the competitive pressure on the leader, quickening the latter's pace of innovations.

⁸ Some estimates by UNCTAD (1975) suggest that 90 to 95 percent of foreign-owned patents in developing countries are not used in those countries.

large loans in a severely imperfect international credit market).

In fact while the new models of trade and growth bring into sharp focus the features of monopolistic competition particularly in the sector producing intermediate products and, in some models, the Schumpeterian process of costly R and D races with the prospect of temporary monopoly power for the winner -- aspects which were missing in most of the earlier macroeconomic growth models -- there are other important aspects of imperfect competition (like the case of "sleeping" patents above or how international credit market imperfections shape the pattern of comparative advantage⁹) which need formalizing in the literature on trade and development. In general the growth literature that stresses the importance of capital market imperfections as the source of endogenous generation and persistence of wealth inequalities in the process of development is still in its infancy.¹⁰

In another respect the new literature marks a substantial advance over the old. This relates to the dynamic economies of scale associated with learning by doing. An important extension of the models of Bardhan (1970) and Clemhout and Wan (1970) has been carried out by Krugman (1987) and Boldrin and Scheinkman (1988), where the learning effects (emanating from production experience measured by cumulated industry output) enhance over time the existing sectoral patterns of comparative advantage; this may call for a deliberate trade policy that can orchestrate a breakout from such a historical "lock-in".¹¹

⁹ Kletzer and Bardhan (1987) show how more costly credit under imperfect information may drive a poor country away from specializing in sophisticated manufactured products which require more selling and distribution costs than traditional primary products.

¹⁰ For a brief review of this literature see Aghion and Bolton (1992).

¹¹ A similar model of hysteresis, based on self-reinforcing advantages not of learning but of headstarts in R and D, is developed in Grossman and Helpman (1991), Ch. 8.

An explanation of the reverse flow of capital and human skills from poor to rich countries in terms of the external effects of the higher average stock of human capital in rich countries, as suggested by Lucas (1990), is also an important corollary of these models of dynamic externalities and learning.

But these models of learning share with the earlier ones the unrealistic feature of continued learning at a given rate on a fixed set of goods. As Lucas (1993) comments, evidence on learning on narrowly defined product lines often shows high initial learning rates, declining over time as production cumulates, and for on-the-job learning to occur in an economy on a sustained basis it is necessary that workers and managers continue to take on tasks that are new to them, to continue to move up the quality ladder in goods. The major formulations that try to capture this in the context of an open economy are those of Young (1991) and Stokey (1991). On the basis of learning by doing that spills over across industries, although bounded in each industry, Young's model endogenizes the movement of goods out of the learning sector into a mature sector in which learning no longer occurs and thus gives a plausible account of an evolving trade structure. Stokey has a model of North-South trade, based on vertical product differentiation and international differences in labor quality; the South produces a low-quality spectrum of goods and the North a high-quality spectrum. If human capital is acquired through learning by doing and so is stimulated by the production of high-quality goods, free trade (as opposed to autarky) will speed up human capital accumulation in the North and slow it down in the South. A similar result is obtained by Young. The country that begins with a technological lead tends to widen that lead over time. (It, of course, does not follow that the South would be better off under autarky.) It also indicates why a policy of subsidizing infant export industries is

sometimes more growth-promoting in the long run than that of protecting infant import-substitute industries, since in the former case the opportunities for learning spillover into newer and more sophisticated goods are wider than when one is restricted to the home market. Export growth encourages accumulation of technological capability not only in the producer firms but also in the specialized supplier firms through vertical linkage. A high level of skills in the labor force as in some of the East Asian cases facilitates this process. The rapid growth of exports also enabled these countries, as Pack (1992) points out, to overcome imperfections in technology markets, such as monopolistic licensing fees, that limit the diffusion of proprietary knowledge and hinder a move toward international best practice.

Going beyond these learning models, one can generalize and say that probably the most important contribution of the new growth theory is to formally draw our attention to the process of introduction of an ever-expanding set of new goods and technologies (in the case of developing countries, often imports of new types of produced inputs) and the large fixed costs usually associated with it. These fixed costs underline the fundamental importance of nonconvexities and imperfect competition in economic analysis. As Romer (1994) shows, the welfare costs of restrictions on the process of introduction of new goods (as, for example, in the case of trade or foreign investment restrictions in developing countries) are substantially larger than the static misallocation effects in the case when we deal with a fixed set of goods. I agree with Romer (1994) when he says: "New growth theory may not be new, but it is about newness. And newness, like history, matters." The new literature in some ways diverts our attention from the abiding concern of development economists with the problems of structural transformation and with those of reallocation of resources from traditional sectors to other sectors with different organizational and

technological dynamics. But it does serve a purpose in focusing attention on the serious nonconvexities involved in the process of diffusion and adoption of new goods and technologies in a developing country.

III.

While the emphasis in the new growth theory is to search for the factors that perpetuate growth, it is not directly concerned with an older question of development theory: how underdevelopment often tends to persist and how does a poor country get out of a poverty trap? Yet a fallout of the recent formalizations and explorations of dynamic externalities has been to revive interest in the older question. In the immediate postwar florescence of development economics one idea that was particularly prominent was that of how coordination of investments across sectors is essential for industrialization. The literature that grew out of the famous paper of Rosenstein-Rodan (1943) emphasized that when domestic markets are small (and foreign trade is costly), simultaneous expansion of many sectors can be self-sustaining through mutual demand support, even if by itself no sector can break even (primarily because firms in a sector may not by themselves be able to generate enough sales to render adoption of modern increasing-returns technologies with large fixed costs profitable). There was a presumption in this literature of multiple equilibria and the essential problem was posed as one of escaping a "low-level equilibrium trap" to a higher-income equilibrium with industrialization.

To capture the full flavor of this problem of strategic complementarity of industries in terms of market size, one needs a full-scale model of plant-level economies of scale in production (with the associated imperfections in market competition) which can be tapped

with large demand spillovers. This formalization was done in a recent model by Murphy, Shleifer and Vishny (1989). One common objection to such models is that in an open economy where an industry faces the world market, the size of the domestic market cannot plausibly limit the adoption of increasing returns technologies. Such objections usually underestimate how the size of the domestic market matters even in an open-economy. In any case the idea of intersectoral complementarities in investment can be reformulated for an open economy with tradeable final outputs, but where jointly used infrastructure (like roads, railways, power stations or training facilities) and other non-traded support services and specialized inputs (like repair and maintenance, some ancillary parts and components, and financial communication or distribution services) are indispensable for the production and distribution of the final goods. One variant of the models in Murphy, Shleifer and Vishny (1989) shows how in the case of shared infrastructure each industrializing firm that uses it contributes to the large fixed cost of building it and thus indirectly helps other users and hence makes their industrialization more likely. In one of the equilibria of the model the infrastructure will make money on its first-period investment if the economy industrializes, but will incur a large loss if no industrialization takes place and there are no users of its services. Thus the infrastructure is not built lest an insufficient number of firms industrialize and this in turn ensures that firms do not make the large-scale investments needed to industrialize. This is an underdevelopment trap caused by a coordination failure.

Alternatively, Rodríguez (1993) has a model of multiple equilibria arising from sectoral complementarity and cumulative processes generated by increasing returns in the production of support services and inputs. The tradeable final goods require these non-traded intermediate inputs and services readily available in close proximity. The domestic

availability of a wide variety of such specialized inputs enhances the productive efficiency of the manufacturing sector, but the extent of input specialization (or division of labor in their production) is limited by the extent of the market. In such a situation the economy may get stuck in an equilibrium where the division of labor in the input producing sector is shallow and the final goods production remains confined to the use of low-productivity techniques that do not require a wide variety of inputs.¹² The task of development policy here is to compensate for an historical handicap (in the form of a trap of low-productivity specialization), either by trade policy or a policy of subsidization of fixed costs or of other ways of encouraging appropriate linkages between the final goods sector and the intermediate inputs sector. In the model of the preceding paragraph, on the other hand, coordination of investments between sectors is the key, and the role of expectations (about investment by other firms) and self-fulfilling prophecy become more important. The task of development policy is to coordinate expectations around high investment. This "history versus expectations" dichotomy in the dynamic processes of how a particular equilibrium gets established has been further analyzed by Krugman (1991) and Matsuyama (1991) and the relative importance of the past and expected future is shown to depend on some parameters of the economy (like the discount rate and the speed of adjustment).

The idea of strategic complementarities between sectors generated by increasing returns must be one of the early examples in the flowering of the general literature on

¹² A low initial average level of human capital plays a similar trapping role in the model of Ciccone (1994), where the interdependence between individual human capital accumulation and the supply of specialized physical capital goods may lead to equilibria with no potential for technical progress or growth. Earlier Azariadis and Drazen (1990) had emphasized the threshold effects of human capital and the multiple balanced growth paths induced by the externalities in the technologies of human capital accumulation.

coordination failures in economics. It was so central to the development economics of the 1950's. Yet it lost much of its intellectual force in the subsequent decades, not so much because it lacked, until recently, a firm anchoring in a formal model using tools of imperfect markets equilibrium analysis, as Krugman (1992) suggests, but more because at the policy level the difficulties of aggregate coordination were underestimated (particularly at the existing levels of administrative capacity and political coherence in the developing countries), and the incentive and organizational issues of micro-management of capital were underappreciated. The resulting government failures diverted the profession's attention from what nevertheless remains an important source of market failure discovered by early development economics. From the policy point of view the new literature on learning and strategic complementarities, like the earlier development literature on externalities, underestimates the difficulty of identifying the few sectors and locations where the spillover effects may be large and particularly difficult to internalize. It is sometimes overlooked that learning is often highly localized and project-specific. Evenson and Westphal in Chapter 37 of this volume have pointed to the related policy problems arising from "tacitness and circumstantial sensitivity" of technology. In addition, the extent of spillovers depends crucially on the nature of competition that the policy environment promotes and its interaction with the nature of the physical, social and organizational infrastructure in the country.

Another by-product of the recent formalizations of market size, increasing returns and imperfect competition has been in the area of economic geography, which throws some light on the problem of urban concentration and uneven regional development in the developing countries. Krugman (1994) has a model of the endogenous determination of agglomeration

economies out of the interaction among economies of scale at the plant level, transportation costs and factor mobility. (These economies may be particularly important in poor countries where basic manufacturing using the transport system is still more important than the new footloose service industries and where the small market size makes the issue of scale economies significant.) The pattern of urban growth and regional inequality are shaped by a tension between centripetal forces that tend to pull population and production into agglomerations and the centrifugal forces that tend to break up such agglomerations. On the one hand, firms want to locate close to the large market provided by other firms' workers, and workers want to live close to the supply of goods provided by other firms; on the other hand, commuting costs and urban land rent (not to speak of congestion and pollution) tend to generate diseconomies of city size. While this is no doubt a promising line of enquiry and opening the door for more sophisticated formalization, here as in other aspects of the new growth theory, the theoretical models have a long way to go before they can catch up with the complexity of the empirical reality, particularly in developing countries.

Robert Lucas (1988), pondering over the questions of differential development performance of poor countries and what can be done about it, says: "The consequences for human welfare involved in questions like these are simply staggering: Once one starts to think about them, it is hard to think about anything else". Coming from a leading economist in the mainstream, which has long marginalized development economics, this is indeed reassuring. But notwithstanding popular impressions to the contrary, the advances made so far in the new literature on growth theory (over and above its rediscovery, with great fanfare, of some of the insights of the old development literature¹³) have barely scratched the

¹³ See on this Bardhan (1993).

surface. The new emphasis on fixed costs and nonconvexities in the process of introduction of new goods and technologies is important. But these fixed costs actually go much beyond the ordinary set-up costs in starting new economic activities: particularly in a developing country they encompass massive costs of collective action in building new economic institutions and political coalitions and in breaking the deadlock of incumbent interests threatened by new technologies. While the new interest in model-building will be helpful in sharpening our analytical tools and in critically examining our implicit assumptions, let us hope that it will not divert our attention from the organizational-institutional issues and distributive conflicts in the development process which are less amenable to neat formalization.

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