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Source: *The American Economic Review*, May, 1989, Vol. 79, No. 2, Papers and Proceedings of the Hundred and First Annual Meeting of the American Economic Association (May, 1989), pp. 197-203

Published by: American Economic Association

Stable URL: <https://www.jstor.org/stable/1827756>

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PERSPECTIVES ON ECONOMIC DEVELOPMENT[†]

Markets, Market Failures, and Development

By JOSEPH E. STIGLITZ*

A central question in development economics is, how can we account for differences in the levels of income and the rates of growth between the developed and less developed economies? In the 1950s and 1960s, there was a standard answer to this question: the poor are just like the rich, except they are poorer—they have less human and nonhuman capital. There was an immediate prescription for this diagnosis: increase the resources of LDCs, either by transferring capital to them (either direct aid or education) or by encouraging them to save more.

Today, these answers seem less convincing that they did two decades ago. If the problem were primarily a shortage of physical capital, the return to capital should be much higher in LDCs than in developed countries, and the natural avarice of capitalists would lead to a flow of capital from the more developed to the less developed economies (see Howard Pack, 1984 and my 1988 paper). If the problem were primarily a shortage of human capital, then the educated in LDCs should receive a higher (absolute as well as relative) income than the educated in more developed economies. How then can we account for high levels of unemployment among the educated and the migration of the educated from LDCs to more developed economies?

Moreover, the predictions of the standard neoclassical growth model, of a convergence of growth rates in per capita income, with

permanent differences in per capita consumption being explained by differences in savings rates and reproduction rates, do not seem to have been borne out.

These observations suggest that the LDCs differ from the developed countries in at least some other important respects, and this view is corroborated by those studies which have looked at the productivity of similar plants operating in developed and less developed economies. (See Pack, 1984; 1987.)

The difference can be attributed, perhaps tautologically, to differences in economic organization, to how individuals (factors of production) interact, and to the institutions which mediate those interactions. Among the most important of these “institutions” are markets.

It is by now well recognized that there are many instances of market failures in more developed economies (see Bruce Greenwald and myself, 1986). In some cases, market failures may be ameliorated by nonmarket institutions. If, for instance, capital markets do not function well (“perfectly”), if only because of costly and imperfect information, nonmarket institutions (internal capital markets within large conglomerates) may develop.¹ Market failure is more prevalent in LDCs, and the nonmarket institutions that ameliorate its consequences are, at least in many instances, less successful in doing so. The objective of this paper is to explore the causes and consequences of these market failures and the failure of private nonmarket solutions, and to suggest possible roles for government intervention.

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¹It is important to realize that not only may nonmarket institutions not fully ameliorate the inefficiencies arising from market failure, they may actually exacerbate the market failure. (See R. Arnott's and my 1988 working paper.)

In this discussion, I focus on three examples of central importance to LDCs: learning, capital markets, and product markets. In each instance, I shall identify why markets do not work in the way hypothesized by neoclassical theory.

I. Learning and Information

Among the "commodities" for which markets are most imperfect are those associated with knowledge and information (for instance, see my 1987b paper). In many respects, knowledge is like a public good. Firms may have a difficult time appropriating their returns to knowledge, resulting in an under-supply; and to the extent that they are successful in appropriating, underutilization results (since they will have to charge for its use.) This has several consequences for the development process.

II. Learning by Doing

Some recent studies (Robert Lucas, 1988; myself, 1987a; Paul Romer, 1986) have argued that a major difference between the more and less developed countries arises from learning by doing (Kenneth Arrow, 1962) and limits on the ability to transfer what learning occurs across international boundaries. The less developed countries, finding it impossible to acquire the learning of the more developed countries, find it optimal (given their initial disadvantage) to specialize in technologies or products with lower learning potentials. While undoubtedly the learning phenomenon is related to development processes, the relationship is more subtle than a simple analysis might suggest.

Price Effects. In the case where goods are competitively produced and there is free trade, price adjustments may partially (fully, or more than fully) offset differentials in increases in (physical) productivity: with unitary price elasticities, countries producing commodities with lower growth rates of productivity will experience fully offsetting increases in relative prices (Susan Skeath, 1988).

Imperfect Competition. When spillovers of knowledge within a country (as one surely

would expect) are less than perfect, then markets will never be perfectly competitive. The first entrant in a market will enjoy monopoly rents (Partha Dasgupta and myself, 1988). These monopoly rents may account for the persistence of income differences, and changes in the pace of innovation would then account for a widening of income differentials.

Localized Learning. Moreover, to the extent that technological change (learning) is localized (Anthony Atkinson and myself, 1969), productivity increases for the kinds of production processes used in more developed economies will have limited spillovers for the less developed countries. Again, an increase in the degree of "localization" (an increase in the disparity between the kinds of technologies used in LDCs and those used in more developed economies) will result in an increase in the gap between the two.

Learning to Learn. Finally, my earlier paper (1987a) suggested that the ability to learn is itself learned,² and that learning abilities may themselves be localized.

Low-Level Equilibria. Among the several implications of "learning to learn" and localized learning abilities is the possibility of a low-level equilibrium trap: a country may not only find itself in a steady-state equilibrium with a low level of capital, using a technology with a low rate of technological change and a low ability to learn, but it may find it optimal (given high enough discount rates) to remain there.

Consider a simple lifecycle model, where individuals live for two periods, working in the first only, where savings during the first period finances consumption during retirement, and where savings rates are an increasing function of the rate of growth in income per capita and a decreasing function of the rate of interest. We assume technological change is labor augmenting, that the steady-

²That is, if we postulate a learning function of the form, say, $\ln c_t - \ln c_{t+1} = a + b \ln Q_t$, then learning to learn means that there may be changes in the parameter b . Localized learning-to-learn means that changes in the parameter b for one technology leave the parameter b unaffected for other technologies.

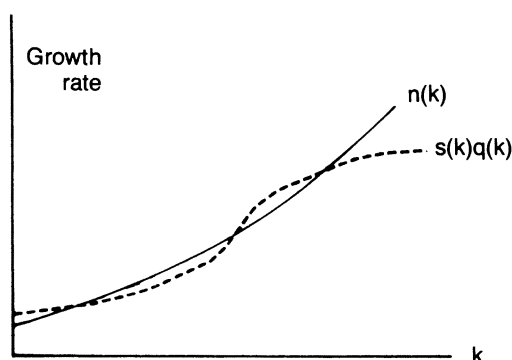


FIGURE 1. MULTIPLE EQUILIBRIA WITH LOCALIZED LEARNING

state rate of labor augmenting technological progress associated with technology k is $n(k)$, where k is the capital-effective labor ratio, and that more capital-intensive technologies have higher steady-state learning functions ($n' > 0$). For simplicity, it is assumed population is constant. Then in steady-state equilibrium, the rate of growth of capital (K) must equal the rate of growth of the effective labor supply, that is,

$$d \ln K / dt = sQ/K = s(k)q(k) = n(k),$$

where Q is total output and $q(k)$ is the output capital ratio for technique k ; q is a declining function of k . Under these assumptions, the savings rate, s , is simply a function of k ; if s increases rapidly enough with k (either because of growth or interest rate effects), there can clearly exist more than one solution to the above equation, as Figure 1 illustrates, with the equilibria at higher values of k being associated with higher rates of growth of productivity. Alternative formulations with infinitely lived individuals yield similar results.

History Matters (Hysteresis). Which of the multiple equilibria characterizes a particular country depends on history. Indeed, in models of learning, especially with localized learning, particular events (wars, plagues, depressions, etc.) have permanent effects. (In contrast, in the Solow neoclassical growth model, the steady-state equilibrium to which

the economy converges is independent of initial conditions and historical occurrences.)

Dynamic Comparative Advantage. Learning itself, and the fact that learning (and learning to learn) is localized means that it will not be optimal to pursue myopic policies; one cannot use current comparative advantages as the only basis for judgments of how to allocate resources. Moreover, it may be optimal to initially incur a loss; the imperfections of capital markets (which I discuss in the next section) thus may impose a more serious impediment on LDCs taking advantage of potentials for learning.

Learning Externalities. The experiences of Silicon Valley and Route 128 suggest that there are important externalities in the learning and R&D process. The intellectual ferment undoubtedly contributes to innovative activity. There are always unappropriated spillovers of knowledge. These nonmarket externalities are *diffuse*, which is why it is difficult for any single firm to internalize them (for example, by mergers.)

Risk and Entry. Karla Hoff (1988) has explored one importance class of such externalities. The process of development involves entrepreneurs taking risks: are the resources of the country well suited to the production of a particular commodity? The success or failure of an entrepreneur conveys information to other entrepreneurs, the return to which cannot be easily appropriated. Hoff has shown that as a result there may be too little entry into new industries.

Externalities and Multiple Equilibria. These nonmarket externalities, too, can give rise to multiple equilibria. There are positive feedbacks: the high level of expenditures on R&D by firm i has sufficiently high spillovers that it may increase the marginal return to firm j doing research. (See Raaj Sah's and my forthcoming paper.)

There are other *positive* feedbacks that may give rise to multiple equilibria. Assume there are two groups within the population: innovators and inventors. Inventors generate new ideas; innovators turn them into profitable businesses. Innovators search among inventors for good ideas. The more inventors there are, the more it pays to be an innovator; and the more innovators there are, the

greater the returns to invention.³ Having more educated individuals in a society may serve to increase the returns to education.⁴

Income effects also give rise to multiplicity of equilibria. If all other sectors of the economy are growing rapidly, demand for my products will be growing rapidly. It will pay me to produce more, and to expand my production rapidly, leading to rapid learning. (This effect is obviously less important for internationally traded goods.)

Differences Between Developed and Less Developed Countries. The problems I have discussed arise in developed economies as well as LDCs, but they have particular force within LDCs for two reasons. First, the large scale of more developed economies, and the enterprises within them, allow them to reap sufficient benefits from undertaking what in many instances can be viewed as "overhead information acquisition activities," thus reducing welfare losses from the failure to appropriate all of the returns. Thus, AT&T found it profitable to support basic research leading to the development of the laser and transistor; the private gains from their undertaking this research were sufficiently large to warrant the expenditures, even though they were clearly lower than the social gains.

Second, to a large extent, the problem of development, and particularly industrialization, is that of the acquisition of information about technology, of ascertaining what products can and should be produced, how they should be produced, and how the technology should be acquired.

III. Capital Markets

Problems of adverse selection, moral hazard, and contract enforcement imply that

³In other contexts, Peter Diamond (1982) has shown that search models can give rise to multiple equilibria, while Dale Mortenson (1982) and Greenwald and I (1988a) have shown that search equilibria are, in general, Pareto inefficient.

⁴There are also socioeconomic interactions that give rise to multiple equilibria: a society with more innovators at time t is likely to produce more innovative individuals at later dates; innovation breeds on itself. By the same token, bureaucratic environments reward bureaucratic behavior.

even in developed economies, capital markets do not look like the (old) textbook models of perfect capital markets. Even competitive markets may be characterized by credit rationing (see my paper with Andrew Weiss, 1981) and what Greenwald and I call "equity rationing" (1988b): new share issues result in sufficiently large decreases in firm's market value that few firms resort to new equity issues as a way of raising capital.

Equity rationing implies that firms cannot divest themselves of the risks which they face. They will, accordingly, act in a more risk-averse manner. Shocks to the economy, resulting for instance from an instability in the international market at which exports are sold, may have strong adverse effects both on their willingness to invest in capacity expansion and on their willingness to produce. (Of course, even with well-organized internal equity markets, firms would not be able to divest themselves of the political risks that may impose major impediments to investment.)

The greater riskiness of the environment in which they live and the poorer performance of their markets in allowing entrepreneurs to divest themselves of these risks have further repercussions on the rate of growth of productivity, so long as productivity is a result either of investment in *R&D* or of learning by doing (see Greenwald's and my 1988b paper). Again, multiple equilibria may result.

The greater prevalence of credit rationing means, further, that firms may rely more on internal financing for their capacity expansion. Capital is less effectively reallocated.

In more developed economies, large firms have developed internal capital markets, that lead to reallocation of funds among units that are the size of many firms in LDCs. The LDCs are thus at a double disadvantage: not only are there informational imperfections, leading to credit and equity rationing; not only are these informational imperfections likely to be more important within LDCs, because the process of change itself leads to greater informational problems; but more importantly, the institutional framework for dealing with these capital market imperfections are probably less effective, because of

the small scale of firms within LDCs and because the institutions for collecting, evaluating, and disseminating information are likely to be less well developed.

Moreover, as noted in the previous section, learning implies the optimality of non-myopic policies, entailing firms borrowing; thus borrowing constraints have a greater impact on countries in earlier parts of their learning curves.

IV. Product Markets

Informational imperfections affect producers directly, and indirectly, through their effect on consumers. Imperfect information is one of the reasons that most firms in the industrialized sector of developed countries as well as LDCs face downward-sloping demand curves for their products, as opposed to the perfectly elastic demand postulated in neoclassical theory.

For the LDCs, this has two implications. First, lowering exchange rates may not have large immediate effects on sales. Second, there appear to be important externality effects across producers with regard to quality. Consumers may lump goods produced by different firms within the same country together; a shoddy good produced by one firm may lead consumers to think it more likely that other firms from the same country produce shoddy goods. There may be good Bayesian reasons for these inferences: if quality is partly related to the nature of the economic environment in which the goods are produced, for example, the quality of inputs, of labor, or the weather. (See Hoff for a similar Bayesian formulation, in a somewhat different context.) If this is the case, then there will be an underproduction of high-quality commodities.

Imperfect information impedes entry into markets for two reasons. First, because consumers may be concerned about the quality of the good produced, new entrants may have difficulty in establishing themselves in new markets. And firms in LDCs may face great uncertainties about their ability to produce and market new goods.

There are, furthermore, important externalities. For instance, the information acquired by a firm that explores the market

potential for its product is not fully appropriable; other firms may see where the firm has been successful, and try to enter.

Some earlier literature stressed the importance of the absence of complementary products: if consumers only like tea with sugar, it would not pay to develop tea in the absence of sugar, and conversely. The need for coordination has been put forward as grounds for government planning. In the example just given, there is good reason to believe that the externality could be internalized; it is only in the case of the *diffuse externalities* discussed earlier that such internalization appears to be difficult.

V. Market Failure and Government Intervention

In this paper, I have illustrated the thesis that market failures, particularly those related to imperfect and costly information, may provide insights into why the LDCs have a lower level of income and why so many find it difficult to maintain existing current differentials, let alone to catch up. What is at stake is more than just differences in endowments of factors, but basic aspects of the organization of the economy, including the functioning of markets. I have also argued that some of the ways by which developed countries ameliorate these market failures through nonmarket institutions (such as large firms) may be less effective in LDCs.

The kinds of market failures with which I have been concerned are markedly different from those that were the focus of attention some two decades ago. There, the concern was with the ability of the market to provide good signals for investment. Planning, or at the very least, indicative planning, was the prescription. That view was wrong on three accounts. First, it underestimated the extent of planning that firms undertake. When firms make an investment decision, they make forecasts concerning future prices of inputs and outputs. Second, it overestimated the importance of the general equilibrium problem, particularly for small open economies, for whom material balance equations (for particular products) do not have to hold. It probably also overestimated the ability of general equilibrium models to improve sig-

nificantly on forecasts made in less sophisticated ways. Third, it underestimated the importance of micro management. It may be less important to know what sector to expand than to find some niche within a particular sector. The success of a project is likely to be highly dependent on finding good managers and providing good incentive structures. These are the problems associated with the market imperfections, in the capital, product, and labor market, with which I have been concerned in this paper. National planning simply does not address these issues.

Indeed, if, as I suggested in the introduction to this paper, the differences between LDCs and the more developed countries lies largely in matters of economic organization, then the first item on the research agenda should be a better understanding of the *microeconomics* of LDCs. What is needed is a theory of rural organization, as well as a theory of industrial organization, focusing on the special characteristics of LDCs.

While the market failures with which I have been concerned do provide a rationale for a variety of types of government intervention, governments face information and incentive problems no less than does the private market. It may be foolhardy for the government to go where the private market fears to tread: credit rationing in private capital markets does not necessarily suggest a role for government providing credit. It may, indeed, be at a disadvantageous position both in screening applicants and monitoring loans (ignoring the obvious political economy problems to which government loan programs can give rise, particularly in highly inflationary situations).

In some instances, such as the imperfect capital market, I suspect that there may be little scope for government intervention. (I say this in spite of the results of Greenwald's and my 1986 paper and my paper with Weiss showing that, in principle, there are Pareto-improving welfare interventions.) In these cases, the question facing the government is, are there government policies that can ameliorate some of the adverse effects of these market imperfections? Commodity price stabilization schemes, for instance, may, if properly designed, reduce the risks facing

producers, leading to higher levels of production and investment. Eliminating tax policies that exacerbate the risks facing firms (limited loss offset provisions) provides another example. In other cases, there is a more positive potential role for the government, in taxes and subsidies (to offset some of the informational externalities I have identified), and in institutional development (for example, in forming export-marketing cooperatives, possibly with compulsory membership, to avoid free-rider problems). These examples also provide a cautionary note on government intervention: in some cases, special interests have diverted price stabilization schemes and export-marketing cooperatives to serve their narrow interests. But the fact that government policies have sometimes been used in this way does not mean that government interventions are necessarily bad. Government intervention has played a critical role in successful development efforts.

Markets are an important set of institutions in the organization of modern economies. We need to remember that much of production in more developed economies is not, however, mediated through markets, but occurs within large corporations, each of which is the size of at least the smaller of the LDCs.

Market failures are particularly pervasive in LDCs. Good policy requires identifying them, asking which can be directly attacked by making markets work more effectively (and in particular, reducing government imposed barriers to the effective working of markets), and which cannot. We need to identify which market failures can be ameliorated through nonmarket institutions (with perhaps the government taking an instrumental role in establishing these nonmarket institutions). We need to recognize both the limits and strengths of markets, as well as the strengths, and limits, of government interventions aimed at correcting market failures.

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