Technology Transfer by Multinational Corporations in Africa : Effects on the Economy

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The technological gaps between rich and poor countries have been stressed in much recent writing on development. (1) It has been argued, for instance, that if only the world's *available* technological knowledge could be transferred to less-developed countries, « their socio-economic transformation can be carried out rapidly ». (2) At the same time, the central role of multinational corporations (mnc's) in development and transfer of such knowledge has been recognized. This role, in turn, has been seen as a major justification for less-developed countries' encouraging mnc's to undertake production in their economies (3).

This paper examines the validity of such reasoning in the African context. It suggests : first, that there are some rather particular economic factors that explain the central mnc role in technology transfer ; second, that these factors underlie important problems that mnc technology transfer generates in African economies ; and third, that these problems underlie patterns of political economy in many African states that themselves inhibit and distort broadly-based, widely-shared economic progress. The focus of analysis is primarily the mnc transfer of manufacturing technology ; and evidence is drawn heavily, though not exclusively, from Kenya**.

I. THE ECONOMICS OF KNOWLEDGE TRANSFER

Technology in its broadest sense may be considered to be specialized knowledge related to production ; (4) that knowledge may relate to the process of production (as in innovations in how a given product is made), or to *products* themselves (as in innovations of new products or product modification). In either case, the focus is on knowledge or information.

Knowledge, as Boulding notes, (5) is a peculiar economic commodity, in that once it is developed, it may be passed on without thereby reducing one's own supplies of it. Patent systems establish property

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rights over such knowledge, but that only adds the complications. On the one hand, the sale price a patent owner might establish for his knowledge is indeterminate since he incurs no « production » costs for each licence he sells. While on the other hand, the buyer of the knowledge has, virtually by definition of the commodity highly imperfect information as he makes his purchase ; « its value for the purchaser is not known until he has the information, but then he has in effect acquired it without cost ». (6) The range of prices that might result in any such exchange could therefore be very wide. The lowest acceptable price for the seller could be virtually zero, while the highest acceptable price for the purchaser could be just less than the (probably) high cost of developing the knowledge himself ; in the technology case such costs of reproducing innovation may often be extremely high.

This exchange ambiguity can be overdone. There is *some* competition among sellers of technology, and purchasers can hire consultants to advise on the likely value of different technologies offered. However, there are also *other* ambiguities in knowledge as a commodity. The first is that specialized knowledge is not homogeneous (again virtually by definition) ; its uniqueness gives individual firms a basic for monopoly power in market sales, if that knowledge is embodied in particular differentiated products. This possibility provides firms with large incentives to try to innovate commercially-useful specialized knowledge, through research and development efforts. Again, though, the nature of knowledge complicates this process, since there must always be considerable uncertainty about the potential sucess (and financial cost) of an R and D effort.(7) Only large firms, with diversified R and D activities and high cash flows, seem to be able to accept such uncertainty (8) There is an interplay between these factors which underlies the emergence of very large corporations to dominant market positions in many national economies : innovation has generated monopoly or oligopoly profits, which have offset the uncertainty and financed the cost of further innovation, which in turn has generated more oligopoly profits and a large cash flow, which have... etc. (9)

These large corporations, of course, have become increasingly multinational in their production activities since 1950, and the economics of knowledge can help explain that, too. (10) As Baldwin and others have stressed, (11) specialized knowledge is a very difficult commodity to sell-requiring sophisticated absorptive capacity on the part of a receiving firm, and involving (to be effective) continuing and considerable flows of information that may be very hard to measure for pricing purposes. Therefore large corporations, with the organizational capacity to do so, have commonly found it more profitable to transfer technology through establishing their own subsidiaries abroad. The incentive to do this has been furthered by the possibility of using technological monopolization to generate monopoly-like profits on other parts of the mnc investment package (capital, material inputs, etc.) (12)

To return to the distinctions above, two sorts of such mnc technology transfer may be identified - involving what Helleiner calls *production* technology, and *consumption* technology. (13) The first refers to process knowledge transferred to begin producing existing products in a given country ; the second refers to the transfer of new products and of demand for them to the country - with the technology embodied in the products, and reflected in differentiating characteristics such as brand names.

The mnc transfer of each sort of technology to Africa, this brief discussion would suggest, is clearly less straight forwardly beneficial than might first appear. To begin with, both mnc processes and products have generally been innovated for developed country markets ; yet, for an mnc, transferring those *particular* technologies to a subsidiary in Africa will be virtually *costless* - while modifying products or processes for African conditions would incur extra development cost ; that is a strong incentive for most mnc's simply to reproduce their existing technology in Africa. Second, that technology embodies certain monopoly-power, and maximization of potential monopoly rents is critical to the mnc's ongoing R and D effort ; added to the information imbalance that necessarily affects any African government attempts to bargain with mnc's over technology transfer, this raises the possibility of very high returns going to the mnc. Third, the ongoing mnc R and D effort makes technology transfer a treadmill process ; once a country focuses its economy about mnc-type technology, the future innovations of mnc's relate to its economy too, and it becomes hard not to have to go on purchasing technology over and over again — therefore never really escaping high potential direct costs of the relationship, and the socio-economic effects of mnc technology reproduction. The rest of this paper examines these issues in more detail.

II. ECONOMIC EFFECTS OF MNC TECHNOLOGY TRANSFER IN AFRICA

There are three broad economic questions which are of interest in examining mnc technology transfer in Africa. First, do mnc's in fact transfer technology, in the sense of specialized knowledge, to *Africans* through their operations in the continent ? Second, if they do, is the direct economic cost of this external benefit, in terms of profit outflows, so high that the overall results of mnc operations in Africa nevertheless appear generally negative, particularly when compared with other potential forms of technology transfer ? And third, how should other external effects (14) of mnc operations (the mnc impact on local employment, entrepreneurship, linkages, etc.) be assessed in on overall evaluation of mnc technology transfer ? The section asks each of these questions in turn.

a) *Is technology transferred ?*

If, by and large, mnc's do not make it possible for African nationals to absorb specialized technology knowledge through their subsidiaries, then the economic benefits of mnc technology transfer come into questions ; few longer-run learning effects could be expected.

This question is not easily answered, since there is evidence of cases where mnc investment does rely so heavily on expatriate personnel that Africans are precluded from absorbing the relevant technological knowledge. This has been identified as a problem in the operations of French corporations in Senegal (15). Such a strategy, it has also been suggested, characterized Anglo American's efforts to maintain effective control of Zambia's copper sector, despite majority state shareholding. (16) Similarly, mnc's in Tanzania have been criticized for deliberately frustrating training efforts (17). Nigeria, too, has reported similar problems though the situation does seem very mixed there. (18)

That such blockages are by no means comprehensive on the continent, though, is shown by the Kenyan case. A detailed survey of mnc subsidiaries in that country showed first, that expatriate employment dropped over 1967-72 from 11.3 % to 2.3 % of total employment, and second, that most subsidiaries *were* undertaking training - some of them very extensively and at high, technology-related levels. (19) Some firms interviewed were attempting to restrict sophisticated technological knowledge to their expatriate employees, but most firms — and particularly the larger mnc's, like Unilever, Hoechst, Exxon, Shell and Metal Box — had a much longer-term strategy of fully incorporating Kenyan Africans into their company structure ; long-term training in high-technology facilities overseas was often part of this effort. The spread effects of this specialized training are evident, inter alia, in the higher levels of the Kenya civil service, where former African mnc executives are not uncommon.

This question does probably not, therefore, suggest a key problem in the effects of mnc technology transfer in Africa. Considerable pressures, as in the Kenyan work-permit system, may be necessary to goad subsidiaries into transferring specialized knowledge to Africans But there appear to be no fundamental structural or institutional impediments to the process.

b) *How financially costly is mnc technology transfer ?*

This second question is more important, especially in light of Latin American studies showing large effective mnc profits being surreptitiously generated through transfer pricing. (20) Such high profits show not only monopoly rents on unique technology, but high returns on other parts of the mnc investment package, made possible by technological monopolization.

Unfortunately, similar studies have not been systematically undertaken in black Africa, though there has been evidence suggested of the

various non-dividend channels by which mnc's do receive financial returns from their investments. (21) Some of these channels involve explicit payments for technology, through fees and royalties — these have been quite marked in Nigeria, for instance. (22) But it would be a mistake to interpret such particular figures, as in any sense representative of the price for technology transfer. It is clear that mnc's select channels which are convenient to use for surplus repatriation, and technology fees in any given country may simply be more or less easy to use, depending on tax levels and regulatory procedures. The financial cost of mnc technology transfer is better considered to be the effective profits generated through all channels, in excess of some « normal » opportunity-cost rate of return on subsidiary capital employed.

Average after-tax profit rates in the mnc as a whole, for instance, might be taken as a « normal » return (though in fact they will often reflect world-wide mnc oligopoly power and hence be higher than prevailing international capital market interest rates). Kenyan evidence from 29 reporting manufacturing subsidiaries in 1972 showed after-tax profits plus fees to total 22.8 % of subsidiary capital employed, compared to parent company equivalents of 8.8 %, so this technology transfer price may be very high indeed.

That the excess profits are related to technology transfer is suggested by two aspects of detailed analysis of the Kenyan data : first, statistical analysis shows that those mnc's that do transfer their particular brand-name products (as opposed to producing products developed for Kenya) are significantly more profitable ; second, the importance of process technology transfer is suggested by statistical analysis showing that high capital/labour ratios were associated with increasing subsidiary profitability over the 1967-1972 period. Similarly, detailed study of several individual industries showed that mnc consumption technology transfer, in particular, made mnc subsidiaries much more profitable than their locally-owned counterparts. (23)

Some data is available which suggests the Kenyan case is not atypical. (24) So the financial cost of mnc technology transfer is likely very high (though a plea for more research may be more important to underline). However, even that probable cost is not conclusive in assessing the mnc economic effect. One needs three further sets of facts. First, what is the social value of mnc technology/training transfer ? That would have to be set against the high mnc financial outflows. Second, what is the likely cost of alternative means of technology transfer ? That would have to be compared with the mnc cost. It is conceivable that the first value could be high, and the second calculation not that much lower than the mnc « price ». Third, there are other external effects of mnc technology transfer, and these have to be worked into the analysis too. If these further externalities represent social benefits, as some have claimed, then they may decisively outweigh the financial outflows considered in this subsection ; if they represent social costs, they may be conclusive in a negative economic assessment.

c) *Other externalities : benefits or costs ?* (25).

A wide range of social effects of mnc technology transfer could be discussed, but only three issues can be considered in the confines of this paper. Compared to possible alternatives, how well does mnc technology transfer : (i) contribute to widening employment in Africa ; (ii) induce further linkage investments ; or (iii) encourage indigenous entrepreneurship ? Each of these points is examined in turn.

i.) The criticism has been made (26) that mnc's generally transfer highly-capital-intensive technology (measured in terms of capital/labour ratios), and that mnc subsidiaries therefore *restrict* employment effects through their activity. Other analysts have questioned this, (27) noting there is some evidence that suggests mnc subsidiaries may be *less* capital intensive than locally-owned firms producing identical products. (28) As Stewart stresses, (29) however, such evidence misses the point : that production technology is relatively product specific, and that the particular products transferred by subsidiaries are what underlies mnc capital-intensity in choice of technique ; therefore study of identical product cases is irrelevant. Instead, one must examine choice of consumption techniques by different firms in the context of more Kenyan exidence shows that mnc subsidiaries transfer product demand for shelter, for instance, can be met by anything from mud huts to highrise apartments).

To take the case of basic demand for cleaning aids as an example, Kenyan evidence shows that mnc subsidiaries transfer product demand (via heavy advertising and other promotion) for brand-name detergents and toilet soaps. These products require much more capital-intensive techniques than production of the simpler bar laundry soap undertaken by local soap manufacturers. The successful mnc consumption technology transfer, therefore, which undercuts local laundry soap producers, results in significantly lower employment effects than perpetuation of the local consumption technology would have involved — particularly since the mnc expansion in Kenya has pushed local producers in the direction of similar consumption technology (more standardized, with sophisticated packaging, and using foreign brand names), and consequent capital-intensive production technology (30).

Added to such consumption technology considerations, Kenyan evidence also suggests intra-firm pressures which lead subsidiaries to adopt similar production technology as their parents (as labour-saving in the core production processes, though somewhat more labour-intensive in periphery activities like material handling and storage). The majority of producing subsidiaries are constrained by head office control over their choice of techniques ; and for other subsidiaries, in any event, the need to produce standardized, brand-name products to parent company specifications, often enforced by head office quality-control checks, strongly biases preferences toward capital-intensive, advanced machinery. New product introduction, by which many subsi-

diaries gain competitive advantages, adds to this pressure, since specialized machinery for producing the product has usually been developed in high labour cost economies.

The limitations on industrial employment implied by the details of this evidence must be qualified somewhat. Much parent mnc production technology is originally developed for high levels of output, and may not be economic at the limited output levels characterizing many African economies. Therefore smaller subsidiaries in Kenya are significantly more labour intensive than larger subsidiaries (even allowing for sectoral differences); (31) but the long-run implication of this is that as these subsidiaries grow, their employment may even decrease, as it becomes possible to substitute high-output, capital-intensive technology for the original machinery. This advanced technology, too, is subject to mnc innovative efforts abroad (of the sort that may be both capital and labour saving), (32) which subsidiaries will then adopt in Africa, limiting ongoing employment effects even more.

There is, then, considerable Kenyan evidence collaborating a negative view of mnc employment effects. Across a wide range of industry areas — including soap, shoes, textiles, building materials, food products and beverages — there are signs that mnc consumption technology transfer limits employment effect relative to what might be expected from local alternatives. In these and other industry areas are further signs that mnc production technology transfer limits employment effects, as new labour-saving process innovations are introduced.

There seem to be signs of a similar dynamic at work in other African countries. In Nigeria, mnc investment also concentrates in capital-intensive product sectors, while local alternatives are more concentrated in labour-intensive sectors ; as a result mnc technology transfer has been described as having few employment benefits in the country. (33) In Senegal, too, which has been more heavily reliant on mnc investment for its industrialization, the substantial increase in production in the sixties was marked by lack of growth in employment as capital intensity was increased by firms. (34) The Kenyan evidence, suggesting there are external employment *costs* from mnc technology transfer, may thus represent more than an atypical case.

ii) Wat of mnc linkage effects ? The inducement effects of an investment on further investments have been traditionally stressed in development theory, particular with respect to industrialization. (35) And mnc investment projects might be expected to have such spread effects. That this can not be automatically assumed, however, is suggested by Bell's work in Thailand, (36) which shows that the product-differentiated and sophisticated nature of mnc technology transfer can serve as a severe impediment to local linkages (product differentiation cuts down demand for given material inputs — which vary among subsidiaries — while sophisticated technology inputs must be perfectly standardized).

Similar negative linkage features are evident in analysing Kenyan subsidiaries. This is reflected in the fact that they import virtually all of their machinery, that most of them import over 70 % of their material inputs, and that they have made very few efforts to develop any local African sub-contractors (only one third of firms interviewed did *any* sub-contracting). This weakness is closely related to mnc technology transfer, too. The sophistication of mnc production technology emerges as one important factor : Statistical analysis shows that the more capital-intensive subsidiaries are, the higher a percentage of their material inputs they import (analysing all subsidiaries together, and then allowing for sectoral differences in import patterns). (37) Mnc consumption technology transfer is an even more important factor. Product transfer by subsidiary from parents leads to greater import intensity (78 % of such subsidiaries import over 3/4 of their inputs — compared to only 47 % of those subsidiaries not exclusively tranferring parent products to Kenya). Similarly, the quality control checks of parent companies, implicit in such brand-name import reproduction, are associated with higher import levels in subsidiaries. Overall, advertising efforts — a good proxy for mnc consumption technology transfer efforts — are statistically significant in shaping higher subsidiary imports.

The interplay of these mnc production and consumption technology transfer factors with employment and linkage effects can be shown in a simple Kenyan example. Cotton textile manufacturing companies in Kenya averaged capital/labour ratios in 1972 of well under K £ 1,000, and were able to obtain 75-80 % of their material inputs in East Africa ; one large mnc subsidiary, however, was engaged in consumption technology transfer, through the production and promotion of advanced synthetic textiles ; this involved sophisticated production technology transfer, too — resulting in a capital-intensive K/L ratio of K £ 2,386 — and generated high import-intensity, since 65-95 % of its material inputs had to be imported (much of them from the parent company, at high « transfer » price). This is a clear case of high social and financial costs that can result from mnc technology transfer. (38)

Again, the Kenyan situation does not appear atypical in Africa. Analysis of Nigeria has stressed how low subsidiary linkages are there, (39) and the same point has been emphasized in Senegal. (40) Case studies of Tanzanian mnc projects have criticized the same heavy import intensity. (41) Generally, the standardized and/or differentiated characteristics of mnc products transferred, the related capital intensity of mnc production technology, and the integrated exchange emphasis within mnc firms (which is less related to technology transfer, the subject of this paper) have combined to turn mnc linkage externalities into social costs rather than social benefits, in comparison to potential alternatives.

iii) The mnc impact on indigenous entrepreneurship is also important to consider, given the emphasis placed by some theorists on this factor's key role in the development process. (42)

Again, however, it is rather difficult to discern social *benefits* of mnc technology transfer in this context. Subsidiaries in Africa, for instance, might conceivably be expected to encourage and assist the emergence of small-scale local input supplies for their operations (as the General Motors subsidiary has been described as doing, with important entrepreneurial benefits, in Australia). (43) The evidence, such as it is, suggests otherwise. The low backward linkage effects described above are one sign of this, since they mean few input supplies are even obtained locally. Nor is this entirely a matter of non-availability ; oficials of Kenya's indigenous industrial estates program, for example, have tried to persuade mnc subsidiaries to work with them to develop local input sources from the estates, and have encountered considerable resistance ; (44) subsidiaries seem to see no reason to help encourage such social benefits from their operations — given the complexity of many of the inputs into their consumption technology transfer, and the consequent effort and uncertainty involved in having local entrepreneurs produce them.

The other side of the mnc impact on entrepreneurship involves subsidiaries' competition with local entrepreneurs. And again the Kenyan evidence suggests strongly that negative social effects are the consequence of this impact. Two industries were examined in some detail in that country. In the first, shoe manufacturing, the low-cost efficiency of large-scale production technology transferred by the Bata subsidiary, combined with that firm's promotion efforts, was seriously undercutting small-scale African producers ; some 20 of the 32 enterprises investigated in one rural-urban district (Machakos) were declining — in many cases forcing entrepreneurs, with the skill to manufacture shoes, to nevertheless limit their activity to much lower-turnover shoe repairs. In the second case, soap manufacturing, it was mnc consumption technology transfer which was responsible for marked declines in profitability and/or turnover among local soap firms throughout the country ; very high mnc advertising expenditures to promote detergents and brandname toilet soaps seem to have shifted consumer demand toward such products, as opposed to the simpler cleaning aids made by local firms. (45) In both cases, those local firms that were managing to adapt to mnc competition were doing so by adopting mnc-type production or consumption technology — and were accordingly starting to generate financial outflows for specialized machinery and royalty or licensing fees.

In some sectors where production technology from abroad was especially critical to use, mnc technological monopolization could have even more directly damaging effects on local entrepreneurship. One remarkable Kenyan case involved an indigenous entrepreneur who has discovered a large fluorspar deposit and was seeking to develop it

with mining technology from abroad. Resource mnc's, from Krupp (of Germany), to Lonrho (of the U.K.), to Continental Ore (of the U.S.) refused to provide the technology except through arrangements that would put them in control of the deposit. The eventual outcome was that the resource mnc's and the Kenyan government forced the local entrepreneur out of the project and established an mnc-managed joint venture. (46)

Overall, then, Kenyan evidence suggests mnc technology transfer *undercuts* the growth of indigenous entrepreneurship. And again, signs of similar effects elsewhere in Africa imply Kenya is not atypical. The same conclusion has been drawn on the basis of Tanzanian experience ; (47) it is reflected in complaints among Senegalese businessmen about foreign domination ; (48) and it is evident in Nigeria in analysis of the inequalities of mnc-indigenous competition there. (49)

d) *A preliminary conclusion :*

The implications of this section are : first, that mnc technology transfer to Africa *can* generate social benefits in the shape of spread effects of technological know-how among Africans ; second, that the financial cost of this form of technology transfer is probably very high ; and third, that this form of technology transfer also generates certain social costs, in the shape of employment and linkage limitations, as well as the undercutting of indigenous entrepreneurship.

It may appear, then, that the economic effects of mnc technology transfer are likely to be distinctly negative in the case of most mnc investments. The argument, however, is often made that these effects reflect certain government policies (such as capital subsidies that encourage capital intensity and discourage mnc employment effects) and can be reversed by changes in government policy or by government bargaining efforts with subsidiaries. (50) The next section examines evidence relating to this argument, on a wider political economy level of analysis.

III. THE POLITICAL ECONOMY OF MNC TECHNOLOGY TRANSFER IN AFRICA.

This section first examines mnc-government bargaining, in a brief effort to specify the nature of states relations with mnc's in much of Africa. Then the section attempts to explain such relations and understand their implications through analysing the mnc impact on income distribution and class formation in African countries.

a) *The nature of state-mnc bargaining*

The rationale for emphasizing state bargaining with mnc's is evident in the discussion in Section one above ; the nature of technology transfer is such that a wide range of « prices » might satisfy both supplier and recipient. The low cost to an mnc of transferring the techno-

logy, given that it has already been developed, interacts with the high cost to the recipient country of innovating the technology anew. The resulting price bargain, as Streeten has suggested, is likely to be determined by bargaining skills and strategy. An added incentive for a less-developed country is the possibility of « unpackaging » the technology component from the rest of the mnc investment, so that the potential monopoly rents for technology are not reflected in high returns on mnc capital and material inputs, too ; this perception has motivated government strategy in Latin America. (51) Furthermore, bargaining strategies can be used to try to share subsidiary behavior on externality issues — so positive employment, linkage and entrepreneurship effect *are* generated by mnc technology transfer.

In fact, however, state-mnc bargaining in Africa seems of very limited significance in all these respects. Detailed analysis of Kenyan negotiations over the 1965-73 period shows that mnc's gained most from the bargaining — especially import restrictions or bans against competitors, but also rights to duty-free input imports and government financing ; the Kenyan government obtained far fewer concessions. Mnc techology transfer in Nigeria seems to lead to parallel bargaining gains for subsidiaries there. (52) Similarly, mnc enterprise in Senegal seems to have used relations with the state to win assurances of market protection and advantages in taxes and import duties. (53) In short, bargaining in Africa seems often to have represented a means by which manufacturing mnc's win *privileges* from the state, rather than a constraint by which social priorities or profit limitations are enforced on them by the state.

This has been true even in cases where a number of mnc's have competed against each other for the right to undertake a given import-substitution project. The 1968-69 negotiations between Firestone and Kenya over a tiremanufacturing subsidiary offer a good example. Despite competition from Dunlop and Uniroyal, Firestone bargained out : a virtual monopoly for its new subsidiary ; the right to use its own price formula ; rights to duty-free import of inputs ; government financial participation in the projects ; the right to include technological knowledge as part of its equity capital ; *and* the right to charge ongoing fees on the new factory's sales. Parent limitations on the subsidiary's export rights were also permitted.

Part of such mnc bargaining sucess undoubtedly reflects the power of technological control in negotiations. Transfer of production technology seems especially critical to bargaining success. In Kenya, for instance, intermediate goods producers, which usually employ more sophisticated production technology than consumer goods producers, were significantly more successful than the latter in winning concessions from government during entry negotiations. In Senegal, too, greater mnc influence generated by greater technological skills has been noted. (54)

But another element in outcomes like those for Firestone is the goals of bargaining on the side of the state negotiators. In Kenya, there is virtually no evidence that the state seeks to maximize employment, linkage or entrepreneurial gains from mnc operations ; such articulated state goals as regional decentralization of industry, which could increase such gains, are in *fact* ignored in bargaining. (55) Nor is much outflow-reducing bargaining undertaken. Instead, the Kenyan state emphasizes two sorts of goals : a maximization of capital inflows, to counter balance-of-payments constraints ; and more significant, an increased role for Africans as partners, senior executives or profitable retailers for mnc enterprises. (56) Thus mnc subsidiaries can win privileges by agreeing to share them with a prominent African partner, by clearly incorporating prominent Africans into their management, and/or by establishing retail outlets owned by prominent Africans. In the Firestone case, for instance, a former cabinet minister and one of the governement's civil servant negotiatiors were brought into the subsidiary as senior executives, while the government was given the right to appoint retail tire distributors (including M.P.'s and the Defence Minister's son).

Bargaining thus emerges in Kenya as a key process in establishing a *symbiosis*, or mutually co-operative dependence, between the state and mnc's. The mnc's win privileges, particularly import protection by which they pre-empt African markets from competitors, and can accordingly maximize their monopoly rents from technology transfer ; the state, in turn, gains a share, for those prominent Africans that dominate it, in these high mnc profits. What does *not* happen is significant pressuring of subsidiaries to increase the social benefits and cut the financial costs of mnc technology transfer. This bargaining process, moreover, is what shapes government policy on import substitution, and on effective capital subsidies. So it is also naive to expect exogenous government policy changes that might generate different mnc externalities. Government industrial policy, at least in Kenya, is part of the developing state-mnc symbiosis.

b) *A broader analysis.*

The priorities of many African states in their bargaining with mnc's seem symptomatic of wider patterns of political economy on the continent. And the state symbiosis with mnc's seems to reflect a more fundamental relationship between periphery African economies and the international capitalist economy.

Within many African economies, the nationalist movements which captured state power at independence have used the structure of the state to underwrite their own embourgeoisement. This is reflected across much of Africa in state allocations, regulations and tax systems that seem — often despite the rhetoric of regimes — to generate cumulative privileges for African insiders, who are able to accumulate high

state salaries, to obtain subsidized loans from parastatals, to step into newly « Africanized » business sectors, and to escape significant tax loads. Only a few states, like Tanzania, have initiated serious efforts to restrict the embourgeoisement of their insiders and to shift state allocations in favour of poor rural majorities. In Kenya, for instance, the post-independence pattern of state-dependent capital accumulation and manipulation of privilege, and its shaping of gross inequalities among Africans, has been traced in some detail. (57)

It seems clear that in those countries where this pattern has had some success, in terms of perpetuating itself, the role mnc technology transfer has been a critical factor in the process. There has been a deeper symbiosis implicit in this dynamic ; mnc technology transfer has shaped class formation and income effects in such a way as to facilitate and sustain the emergence of the state-dependent bourgeoisie, while the income distribution and state regulation associated with this emergence have facilitated and sustained the growing role of manufacturing mnc's in the continent. The bargaining evidence above has already suggested the importance of state regulation to mnc success via blocking competitors' market access ; it should be stressed, too, that it is highly unequal income distribution of countries like Kenya, the Ivory Coast, Zaïre, Senegal and Nigeria (58) that provides a market for the consumption technology that mnc's transfer from the higher-income markets for which it was developed (an egalitarian income distribution would generate little demand for automobiles, for instance, where per capita income is 150 Dollar a year !).

On the other side of the symbiosis, the analysis above has also suggested how shares in mnc privileges can hasten insider embourgeoisement ; (59) but this impact must be traced further. The state may be strengthened through its share in mnc surplus — which can be used to channel subsidized loans to insiders, or to defuse periodic political protest by financing minimal gestures (like eliminating lower-level school fees in Kenya). More significantly, it is clear in Kenyan evidence that the nature of mnc production technology transfer helps generate a small, relatively well-paid labour aristocracy in that country, (60) defusing the possibility of working-class political protest ; at the same time, mnc consumption technology transfer, as noted above, weakens the emergence of independent industrialists in the system, pushing local entrepreneurs who do succeed into close relations with the state and/or the mnc sector — this also weakens the strenght of potential political opposition to the regime. The result in Kenya has been well-described by the 1972 ILO Report on that country :

« There is now a closer correlation of interests between the urban elite, the owners of large farms and the larger, expatriate companies... Moreover, such coalitions of interest were, before independence at least, conspicuous, and racially vulnerable to nationalist challenges. Kenyanization has significantly reduced this risk. Moreover, within the circle, the influence of foreign companies appears to be growing rapidly... » (61)

This pattern of internal development in many African political economies should be seen in a wider transnational context. The growing polarization and inequality in such countries seem to reflect the integration of a segment of their economies more fully into transnational capitalist production, by means of mnc technology transfer, while most of the local society remains excluded from any benefits of this process (the consequence of mnc employment and linkage limitations). This is precisely the pattern of evolving capitalist dualism which Latin American dependency theorists have analysed in that continent. (62) Continuing mnc technology innovation perpetuates the transnational core of this system ; and continuing mnc production and consumption technology transfer of these innovations to periphery countries perpetuates and extends the inequalities and structural duality there.

Overall, then, political economy effects of mnc technology transfer may be rather central to the emerging patterns of income distribution and dialectics of political struggle in much of Africa. Such technology transfer seems to focus a symbiosis that furthers and sustains state-dependent embourgeoisement and its inequalities ; it seems to shape class formation that supports these inequalities (or at least accepts them) ; and it seems itself to generate and extend the technological dualism of the periphery by its fuller incorporation of a segment of periphery political economies into the transnational capitalist economy.

IV. CONCLUSION

This paper has ranged rather too quickly over a wide set of issues in assessing the effects on African economies of mnc technology transfer. Much of the evidence drawn on, too, has been Kenyan — and the particular history of settler colonialism and Asian entrepreneurship in that country warns against generalizing Kenyan findings accross the continent. Therefore conclusions must be underlined as tentative.

Nevertheless, some key points do emerge. First, the peculiar economics of knowledge underlies assessement of the mnc in Africa. They suggest why the financial costs of mnc technology transfer to Africa are so high. They also suggest why mnc's generally *reproduce* their technology in Africa ; and this reproduction underlies the limited employment and linkage effects of mnc production and consumption technology transfer, relative to alternatives ; at the same time, it is clear that the success of mnc technology transfer *undercuts* those alternatives, resting, as they do, on indigenous entrepreneurship.

The economics of knowledge also explain why state bargaining might be expected to be a socially beneficial response to mnc technogical monopolization. It is in analysing the realities of such bargaining, though, that the need for a somewhat wider framework becomes evident. For bargaining emerges as a path to mnc privileges rather than

a means of enforcing social priorities. Closer analysis shows a *state-mnc symbiosis* around technology transfer. Such transfer clearly helps perpetuate regimes that are shaping burgeoning internal inequalities ; and those inequalitites make technology transfer commercially lucrative to the mnc's. This symbiosis, in turn, seems the heart of a new transnational dependency relationship into which African economies are being drawn.

In this wider context, it becomes naive for any conclusion to consider the strategies that African governments might best adopt toward mnc technology transfer — given its financial costs and problematic social external effects. For a few countries, like Tanzania, such considerations might be useful (and are reflected in decisions there to rely much less on such technology transfer). But for most African countries, the critical prior question would seem to be how regimes will be established, that in fact *would* determine strategy toward mnc's in terms calculated to serve the interests of poor African majorities. In the dialectics of class struggle by which that question must be answered, the effects of mnc technology transfer are important, but probably not determinant. Mnc technology transfer is generating widening inequalities and structural dualism ; but it is also shaping class formation that, in the medium term, weakens likely political reactions against that polarization.

In the longer run, the political economy effects of the growing mnc role in countries like Kenya, Nigeria, Senegal, the Ivory Coast or Zaïre, are even more uncertain. (63) That can only underline the main plea of this paper : for more probing, systematic, critical and ongoing analysis of the mnc impact in African countries. While mnc investment in that continent is only an aspect of the ongoing dynamic of world capitalist change, it is, for many African countries, clearly a rather central aspect.

NOTES :

(1) See P. Streeten, « Technology Gaps Between Rich and Poor Countries », in *the Frontiers of Development Study*, London, 1972, and S. J. Patel, « The Technological Dependence of Developing Countries, « *Journal of Modern African Studies* », (12, 1, 1974) etc.
(2) *Ibid*, p. 1.
(3) See, for example, G. L. Reuber, *Private Foreign Investment in Development*, Oxford 1973, pp. 185-189 ff.
(4) This follows the approach in Streeten, *op. cit.*
(5) See K. E. Boulding, « The Economics of Knowledge and the Knowledge of Economics », *American Economic Review*, (56, 2, 1966) pp. 1-13.
(6) K. J. Arrow, « Economic Welfare and the Allocation of Resources for Invention », in D. M. Lamberton. ed., *Economics of Information and Knowledge*, Harmondworth : Penguin, 1971, p. 148.
(7) See *Ibid*, *pp.* 141-146.
(8) C. Freeman, *The Economics of Industrial Innovation*, Harmondsworth : Penguin 1974, pp. 215-221 ff.

(9) See R. Kaplinsky, « Technology for Development » *Scienza and Technica*, April 1974, in which the dominance is traced of a small number of large corporations in R & D expenditures in the North Atlantic economies ; eg., the 20 largest firms account for 57 % of such expenditures in the U. S., over 47 % in France and Britain, and over 65 % in Italy and the Netherlands.

(10) See, for instance, H. G. Johnson, « The Efficiency and Welfare Implications of the International Corporation, « in J. H. Dunning, ed., *International Investment*, Harmondsworth : Penguin, 1972, pp. 455-462.

(11) R. E. Baldwin, « International Trade in Inputs and Outputs », *American Economic Review*, (60, 2, 1970) ; see also H. Crockell, « The Transmission of Technology Across National Boundaries », *Business Quarterly*, (Autumm, 1973) ; J. McManus, « The Theory of the International Firm », in G. Paquet, ed. *The Multinational Enterprises and the Nation State*, Don Mills, 1972.

(12) As discussed in C. V. Vaitsos, « Transfer of Resources and Preservation of Monopoly Rents, « Harvard University Development Advisory Service, Report 168, 1970.

(13) G. Helleiner, « The Role of Multinational Corporations in the Less Developed Countries' Trade in Technology », *World Development*, (3, 4, 1975).

(14) By which is meant economic effects — either opportunities or constraints — that are not absorbed by the mnc entrepreneur, but do affect the society. Pollution is the classic damaging externality — while positive externalities can include breaking supply bottlenecks that have prevented other firms' growth.

(15) See R. C. O'Brien, *White Society in Black Africa : The French of Senegal, London*, 1971, chap. 6.

(16) See R. Kaplinsky, « Accumulation and the Tranfer of Technology », *World Development*, forthcoming.

(17) In I. G. Shivji, « Capitalism Unlimited : Public Corporations in Partnership with Multinational Corporations, « *The African Review* », (3, 3, 1973), pp. 336-77.

(18) See UNCTAD, « Major Issues Arising from the Transfer of Technology to Developing Countries », TD/E/AC. 11/10/Rev. 1, April, 1974, p. 19. But see the considerable emphasis on reduction of expatriate levels in W. Tims, *Nigeria :Options for Long-Term Development*, Baltimore, 1974.

(19) These data and others used in this article were generated from an interview survey of 81 mnc subsidiaries in Kenya conducted by the author in the 1972/73 period. A total of 94 subsidiaries was included in the original sample, covering all mnc manufacturing subsidiaries with 50 or more employees, plus most major subsidiaries in commerce, banking, oil distribution, advertising, mineral extraction and transport ; of these 94, some 86 % agreed to the interview, though not all of these were prepared to provide all the information requested. All details of the study are reported in S. W. Langdon, « Multinational Corporations in the Political Economy of Kenya », D. Phil. thesis, University of Sussex, 1976.

(20) See particulary the dramatic data from Colombia, where Vaitsos shows that overpricing of inputs sold from parents to subsidiaries mean effective mnc after-tax returns on capital employed were much higher than reported ; Chudnovsky shows that for a representative group of subsidiaries over 1966-70, transfer pricing meant profits averaged 52 % of net worth instead of the 16 % the reported. See C. V. Vaitsos, « Transfer of Resources and preservation of Monopoly Rents », *op. cit.* ; D. Chudnovsky, « Foreign Manufacturing Firms' Behavior in Colombia », D. Phil. thesis, Oxford, 1973, pp. 128-129.

(21) For transfer-pricing examples, see J. Carlsen, « Danish Private Investment in Kenya », Institute of Development Research, Paper 73, 1, 1973, p. 53 ; International Labour Office, *Employment, Incomes and Equality*, Genève, 1972, pp. 454-455 ; UNCTAD, 1974 *op. cit.*, p. 17 (re : Ethiopia).

(22) See *Ibid.*, pp. 40, 45.

(23) See S. Langdon, « Multinational Corporations, Taste Transfer and Under-development : A case Study from Kenya, « *Review of African Political Economy* », (2, 1975), pp. 24-25.

(24) See, for instance, M. J. H. Yaffey, *Balance of Payments Problems of a Developing Country : Tanzania*, Munich, 1970, p. 186 ; D. J. Morgan, *British Private Investment in East Africa*, London, 1965, p. 15 ff B. Campbell, « Neo-colonialism, Economic Dependence and Political Change : A case Study of Cotton and Textile Production in the Ivory Coast 1960 to 1970, « *Review of African Political Economy* », (2, 1975), pp. 43-52.

(25) Streeten stresses that this is an open question ; referring to wider mnc social effects, he says, « far from being able to quantify these effects, we do not even know, in général, their direction ». See P. Streeten, « The Theory of the Development Policy », in J. H. Dunning, ed., *Economic Analysis and the Multinational Enterprise*, London, 1974, p. 257.

(26) See, for example, G. Arrighi, « International Corporations, Labour Aristocracies, and Economic Development in Tropical Africa, « in R. I. Rhodes, ed., *Imperialism and Underdevelopment*, New York, 1970.
(27) See, for example, W. Chudson, « Africa and the Multinational Enterprise », in H. R. Hahlo et al, eds., *Nationalism and the Multinational Enterprise*, Dobbs Ferry, New York, 1973, pp. 150-153.
(28) See H. Pack, « Employment and Productivity in Kenyan Manufacturing », *Eastern African Economic Review*, (4, 2, Dec. 1972), pp. 29-52 ; outside of the African context, see also F. H. Mason, « Some Observations on the Choice of Technology by Multinational Firms in Developing Countries » ; *Review of Economics and Statistics*, (Aug. 1973) ; L. N. Willmore, « The Performance of Foreign-Owned Firms in Costa Rica », mimeo, Universidad de Costa Rica, June, 1974.
(29) F. Stewart, « Choice of Technique in Developing countries », *Journal of Development Studies*, 1972, pp. 109-112 ff.
(30) For details, see Langdon, *op. cit.*
(31) A Wilcoxon matched pairs statistical test was used to examine data from 10 pairs of subsidiaries, each pair in the same industry, and showed differences in labour intensity by size to be significant at the 019 level (of probability of wrongly rejecting the null hypothesis, in a one-tailed test). On the nature of this approach, see S. Siegel, *Nonparametric Statistics for the Behavioral Sciences*, New York, 1950, pp. 75-83.
(32) See Stewart, *op. cit.*
(33) See L. Schatzel, *Industrialization in Nigeria : A Spatial Analysis*, Munich, 1973, pp. 45, 23.
(34) See World Bank, *Senegal : Tradition , Diversification and Economic Development*, Washington, 1974, p. 154.
(35) See for example, A.O. Hirschman, *The Strategy of Economic Development*, Boston, 1958.
(36) See R. M. Bell, « Backward Linkage and Technology — A Note », Science Policy Research Unit, Sussex, mimeo, 1971.
(37) Multiple regression analysis is used to illustrate this for 30 subsidiaries providing detailed data. A Wilcoxon matched pairs test for 10 industries (see note 31) shows the same relationship.
(38) For Similar evidence in the soap case, see Langdon, *op. cit.* ; for more on the restricted linkage associated with mnc technology transfer in Kenya, see Carlsen, *op. cit.*, pp. 38-39 ; also R. Kaplinsky, « Technological Change and the Multinational Corporations : Some British Multinationals in Kenya », mimeo, 1975, pp. 58-62.
(39) See E. C. Edozien, « Linkages, Direct Foreign Investment and Nigeria's Economic Development », *Nigerian Journal of Economic and Social Studies*, July, 1968, p. 202.
(40) See US Government, Area Handbook for Senegal, 1974, p. 306.
(41) See A Coulson, « The Fertilizer Factory », University of Dar Es Salaam, mimeo, 1972.
(42) See, for example, P. Marris and A. Somerset, *African Businessmen*, London, 1971 ; D. Steele, « Hindrances to the Programme to Encourage the Rise of African Entrepreneurship in Kenya » *Development Trends in Kenya*, University of Edinburgh, 1972.
(43) See E. Penrose, « Foreign Investment and the Growth of the Firm », in J. H. Dunning, *op. cit.*
(44) See K. A. Ng'eny, « Industriael Estate as an Instrument of Economic Development », *East African Management Journal*, (Sept. 1972), pp. 22-24.
(45) For details, see Langdon, *op. cit.* The subsidiaries spent some 6 % of their turnover on advertising compared to less than 1 % spent by local firms.
(46) For details, see S. Langdon, « Export-Oriented Industrialization through the Multinational Corporation — Evidence from Kenya », in L. and R. Idris-Soven, eds., *The World as a company Town : Multinational Corporation and Social Change*, (forthcoming, 1976).
(47) B. Van Arkadie, « Private Foreign Investment : Some Limitations », in P. A. Thomas, ed., *Private Enterprise and the East African Company*, Dar Es Salaam, 1969.
(48) See J. C. de Wilde, *The Development of African Private Enterprise*, Vol. 2, IBRD, 1971, p. 1.
(49) See O. Teriba, E. C. Edozien and M. O. Kayode, « Some Aspects of Ownership and Control structure of Business Enterprise in a Developing Economy : The Nigerian Case », *Nigerian Journal of Economic and Social Studies*, (14, 1, 1972), p. 18.
(50) See Chudson, *op. cit.*, pp. 147-151 ff.
(51) See C. V. Vaitsos, « The Changing Policies of Latin American Governments Toward Economic Development and Direct Foreign Investments », in R. B. Williamson et al, eds., *Latin American-US. Economic Interactions*, Washington, 1974.
(52) See UNCTAD, *op. cit.*, p. 22.

(53) See O'Brien, *op. cit.*, p. 17. See further evidence from Africa in S. R. Dixon-Fyle, « Economic Inducements to Private Foreign Investment in Africa », *Journal of Development Studies*, (IV, 1, 1967).
(54) O'Brien, *op. cit.*, p. 197.
(55) In only one case, out of the many subsidiaries interviewed, did a firm report that its location in Kenya was influenced by state bargaining pressures.
(56) Evidence of this priority elsewhere in Africa is suggested by L. L. Rood, « Foreign Investment in African Manufacturing », *Journal of Modern African Studies*, (13, 1, 1975) pp. 29-33.
(57) See, especially, C. Leys, *Underdevelopment in Kenya*, London, 1975.
(58) See Rood, *op. cit.*, p. 27, for evidence of mnc concentration of attention on Nigeria, Zaïre, Kenya, the Ivory Coast and Ghana.
(59) One notable feature in these benefits is the policy of many larger mnc's in equating salaries to African executives to those paid men in similar positions in Western Europe and North America.
(60) Average monthly earnings in 1972 for wage workers in 24 manufacturing subsidiaries providing details were 611 shillings ($ 90), compared to a statutory minimum in Nairobi of 175 shillings monthly — and 70 shillings in rural areas. For evidence of how such wages have defused union political protest see A. Amsden, *International Firms and Labour in Kenya*, 1945-1970, London, 1971 ; for the same labour aristocracy argument, in Senegal, see L. K. Jakande, ed., *West African Annual*, Lagos, 1973, p. 321-2.
(61) See International Labour Office, *op. cit.*, p. 101.
(62) See O. Sunkel, « Transnational Capitalism and National Desintegration in Latin America », *Social and Economic Studies*, (22, 1, March 1973) ; the usefulness of this framework for African analyses has been tested in some detail in E. M. Godfrey and S. W. Langdon, « Partners in Underdevelopment ? The Transnational Thesis in a Kenyan Context », *Journal of Commonwealth and Comparative Politics* (14, 1, 1976), pp. 42-63.
(63) Leys, *op. cit.*, has at least initiated consideration of such longer-run effects.

RÉSUMÉ

L'écart dans le domaine de la technologie entre pays riches et pays pauvres a été souligné par beaucoup d'auteurs ces temps derniers. L'on a par exemple soutenu qu'il suffirait que les connaissances technologiques actuellement disponibles soient transférées vers les pays moins développés pour que « leur transformation socio-économique s'opère rapidement ». En même temps, le rôle capital des sociétés multinationales dans le développement et le transfert de ces connaissances a été reconnu. Et l'on a considéré ce rôle comme justification de l'attitude des pays les moins développés qui consiste à encourager les multinationales a intervenir dans leur économie.

L'article de Steven Langdon examine la validité de ce raisonnement dans le contexte africain. Il nous dit :

— premièrement, qu'il y a des facteurs économiques particuliers expliquant le rôle capital des multinationales dans le transfert de technologie ;
— deuxièmement, que ces facteurs sont à l'origine de problèmes importants causés par le transfert de technologie par des multinationales vers les économies africaines ;
— et troisièmement, que ces problèmes sont eux-mêmes à la base d'initiatives de politique économique qui elles-mêmes freinent et détournent un progrès économique considérable et équilibré dans beaucoup de pays africains.

La plupart des faits cités à l'appui de la thèse de l'auteur sont tirés du Kenya, en particulier de l'histoire du colonialisme, des colons et celle des hommes d'affaires asiatiques dans ce pays. Ces faits, typiquement kenyans, ne sauraient être généralisés à tout le continent. Ces conclusions doivent donc être nécessairement considérées comme non définitives.

Cependant, quelques points capitaux apparaissent. Tout d'abord l'examen de la conception particulière que les multinationales ont du savoir technologique permet de comprendre leur rôle en Afrique. Nous pouvons ainsi comprendre pourquoi les coûts du transfert de technologie par les multinationales en Afrique sont si élevés, et aussi pourquoi les multinationales *reproduisent* en général leur technologie en Afrique. Cette reproduction est à l'origine de la limitation de l'emploi et aussi de l'effet de dépendance caractéristique du transfert de la technologie de production et de consommation par les multinationales pour ce qui est des alternatives. En même temps, il est clair que le succès du transfert de technologie par les multinationales est préjudiciables à ces alternatives, celles-ci étant basées sur l'initiative locale.

Cette conception économique du savoir explique aussi pourquoi le marchandage par l'Etat peut être considéré comme une réaction socialement payante face au monopole technologique des multinationales. C'est cependant l'analyse des réalités de cette situation qui révèle clairement la nécessité d'un cadre plus élargi. Car cette situation apparaît plutôt comme un moyen de renforcer les privilèges des multinationales que comme un instrument de concrétisation de priorités sociales. Une analyse poussée révèle une symbiose entre l'Etat et les multinationales pour ce qui est du transfert de technologie. Il est clair que ce transfert contribue à perpétuer des régimes qui façonnent des inégalités internes naissantes qui elles-mêmes font du transfert de technologie une opération commerciale rentable pour les multinationales. Cette symbiose semble être au cœur même d'une nouvelle relation de dépendance transnationale dans laquelle soit attirées les économies africaines.

Dans ce contexte élargi, il serait naïf d'examiner dans une conclusion les stratégies que les gouvernements africains pourraient adopter face au transfert de technologie par les multinationales étant donné son coût et les problèmes soulevés par ses conséquences sociales externes. Dans le cas de certains pays comme la Tanzanie, ce genre de considérations pourrait être utile (et apparaît d'ailleurs clairement dans la décision de compter beaucoup moins qu'ailleurs sur le transfert de technologie). Mais pour la plupart des pays africains, la question critique prioritaire serait de savoir comment établir un régime qui déterminerait réellement face aux multinationales une stratégie destinée à servir les intérêts de la majorité pauvre des Africains. Dans la dialectique

de la lutte des classes qui doit nécessairement mener à une réponse à cette question, les effets du transfert de technologie par les multinationales sont importants mais probablement pas déterminants. Le transfert de technologie par les multinationales est actuellement à l'origine d'inégalités croissantes et de dualisme structural, mais elle engendre aussi la formation de classes sociales ce qui à moyen terme affaiblit toute possibilité de réaction politique contre cette polarisation.

En fin de compte, les effets sur la politique économique du rôle croissant des multinationales dans des pays comme le Kenya, le Nigéria, le Sénégal, la Côte d'Ivoire ou le Zaïre sont même moins certains ; ce qui ne fait d'ailleurs que confirmer l'appel lancé dans cette communication en faveur d'une analyse plus fouillée, plus systématique, plus critique et soutenue de l'impact des multinationales dans les pays africains. Alors que les investissements des multinationales dans ce continent ne sont qu'un aspect du changement dynamique du système capitaliste mondial, ils constituent néanmoins pour beaucoup de pays africains, un aspect central et primordial de leur vie.