

A COMMENT ON PROFESSOR KOJIMA'S
"JAPANESE TYPE VERSUS AMERICAN TYPE
OF TECHNOLOGY TRANSFER"[†]

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Introduction

In a recent paper, which is a companion piece to an earlier work, Professor Kiyoshi Kojima has suggested that Japanese overseas investments and international transfers of technology are more nearly in line with host country factor endowments than are the foreign investments and technology transfers of United States based multinational firms.¹ He reasons that Japanese technology transfers are therefore more beneficial than are U.S. technology transfers. The differences he sees between Japanese investments when compared with United States investments are:

- 1) Japanese investments are more export oriented
- 2) U.S. investments are more oriented toward domestic markets
- 3) Japanese investments are resource oriented and labor using oriented.

Kojima suggests that American firms invest abroad to protect markets whereas Japanese firms invest to serve international markets and hence Japanese investments come nearer the optimum of fostering trade and technology transfer based upon comparative advantage. His explanation for the differing patterns of investment when comparing the two countries is that the American economy is dichotomized into new (modern) oligopolistic (anti-trade) industries and traditional competitive industries. He further reasons that the traditional American industries (steel, textiles, clothing and leather goods, for example) do not invest abroad while the new oligopolistic industries do and hence the conclusion that there is an anti-trade bias in American investments and their attendant technology transfers. I should like to present an alternative line of reasoning with respect to American and Japanese technology transfers.

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¹ See Kiyoshi Kojima, "Transfer of Technology to Developing Countries—Japanese Type versus American Type," *Hitotsubashi Journal of Economics*, Vol. 17, No. 2 (Feb. 1977), pp. 1-14. The earlier article appeared in the same *Journal*, Vol. 14, No. 1 (June 1973) pp. 1-21 and was entitled "A Macroeconomic Approach to Foreign Direct Investments."

A Definition of Technology

For the purposes of this paper, we shall be referring mainly to the total transfer of operational technologies. Accordingly, we shall define *technology* to include not only physical capital but also that set of technical and managerial skills or software required to operate, maintain, and service that physical capital and effectively tie its output into a marketing and distribution system. Insofar as the enterprise is concerned, we then can refer to two types of technology, both of which are required for a successful technology transfer, i.e., embodied and disembodied.² Embodied technology is that which is engineered into physical capital or into an organization in the form of knowledge. One might call this the stock of technology available to the enterprise in isolation. Within this stock are certain types of physical capital and certain types of human capital. And technology transfer is complete when there is a one-to-one complementarity between physical and human capital. It is at that point that the technology becomes embodied so far as the enterprise is concerned. If there is not such complementarity, certain aspects of the technology remain disembodied and transfer is incomplete, i.e., there is continuing need for technology infusion either in the form of physical capital or new human capital from outside the enterprise.

Another way of examining this concept of technology is to view the firm as having certain competitive advantages which inhere in its ability to internalize a unique set of resources and in so doing it can choose to limit or even deny access by other firms to these resources. In this sense, the firm substitutes for the market and appropriates economic rents by controlling access to its own unique capabilities. In a perfectly competitive setting, such economic rents could not exist because atomistic enterprises would not create individually differentiated competitive strengths. Only Ricardian (fortuitous) rents can exist under perfect competition, i.e., rents from superior land, superior location and the like which are not consciously created by the firm itself. Appropriable rents, arising from superior factors created by the enterprise, include those arising from the application of technology to create products and services or by the sale of the technology itself. It is within this context that we shall discuss technology and its transfer across national boundaries.

Institutional Arrangements and Methods of Transferring Technology

Using the concepts developed above, we can then examine technology transfer in terms of the degree to which firms can control access to proprietary technological knowhow. Largely, this will depend upon how difficult (or costly) it is to duplicate or replicate the technology. The more costly, the higher are the barriers to entry in the Bainian³ sense and

² It should be recognized that the terms embodied technology and disembodied technology are being used somewhat differently here than they usually are in the literature. There, embodied refers to that which is engineered into physical capital while disembodied is human capital and knowledge. One can also view organizations as having knowledge engineered into them just as does a piece of equipment. Thus, until a piece of physical capital can be assimilated into an organization it can be looked upon as being disembodied until the complementary human capital required for its assimilation has been created.

³ J.S. Bain, *Barriers to New Competition*, Harvard University Press, Cambridge, Mass., 1956.

hence the greater will be the incentive to the owning firm to limit access to the technology. And obviously, at the other extreme, the easier it is for another firm to replicate the technology, the greater is the incentive for the owning firm to sell the technology outright. This set of conditions explains why there are a variety of devices used to apply technology. And they differ in terms of the degree to which the owning enterprise can maintain control over or limit access to the technology.

As with any economic decision, the firm must assess the costs of control against the economic returns of control. The degree of control then will largely depend upon the amount of appropriable, economic rent inherent in the technology. At one extreme, if there is little in the way of economic rent to be appropriated, the enterprise will not attempt to internalize the decision making capabilities of the market and will sell the technology competitively in the market place.⁴ At the other extreme, if appropriable economic rents are sufficiently great, the firm will attempt to deny other firms access to the technology by internalizing the decisions of the marketplace. Under these circumstances, the firm will invest abroad in the form of wholly owned subsidiaries.⁵ Thus we can examine the institutional arrangements for transferring technology in terms of where they lie between the extremes of free trade which offers little or no control, and direct foreign investment which provides the greatest amount of control but not necessarily complete control.

There are various institutional arrangements which can be used by international firms to move technology and technological knowhow across international boundaries. The institutional arrangements commonly used are:

1. Direct foreign investment (wholly owned)
2. Joint ventures
 - a. Foreign only (two or more foreign firms)
 - b. Majority foreign
 - c. Minority foreign
 - d. Equally foreign and local
3. Contractual agreements
 - a. Licenses and franchises
 - b. Technical aid agreements
 - c. Management contracts
 - d. Engineering and consulting contracts
 - e. Turnkey plants
 - f. Supply contracts
 - g. Resource concessions
4. Debt Financing
5. Combinations of the above

There is little need to discuss these arrangements at length. To those who are engaged in the study of international business, these are well known terms. But the types of tech-

⁴ For an interesting treatment of the concepts underlying this argument, see Benjamin Klein, Robert G. Crawford and Armen Alchian, *Vertical Integration, Appropriable Rents and the Competitive Contracting Process*, Working Paper, Department of Economics, UCLA, 1978.

⁵ Here we take a chapter from the late Stephen Hymer. We have cast the argument in somewhat different terms than those used by Hymer. See his doctoral thesis which is now available in book form. *The International Operations of National Firms: A Study of Direct Foreign Investment*, M.I.T. Press, Cambridge, Mass., 1976, p. 253.

nology transferred and depth of commitment of the transferrer and recipient may differ. This, as I have suggested elsewhere, will depend upon the arrangement used.⁶

The degree to which each of these arrangements limits access to the technology depends to a very great degree upon the nature of the technology itself. For example, the Coca Cola Company can limit access through a simple combination of franchising and a supply contract because Coca Cola controls the supply of the basic ingredient, i.e., the syrup. The formula for the syrup is a closely guarded secret. Coca Cola is therefore able, because of its monopoly position, to appropriate the economic rents through the price of the syrup, i.e., there is no need to undertake direct foreign investment in order to appropriate the economic rents. International Business Machines, on the other hand, serves its markets either by sales of business machines and computers (but not the basic technology) in international trade or by producing the machines in wholly owned subsidiaries operating abroad. It will not engage in joint ventures or licensing where the basic technology must be shared. In the cases of both Coca Cola and IBM in India, they refused to disclose details of their technologies upon demand of the Indian Central Government, preferring instead to close down their operations in India. Disclosures such as those demanded by India are tantamount to creating one's own competition and destroying the source of appropriable monopoly rents.

Operating Characteristics of Firms and Technology Transfer

It should be pointed out that the operating characteristics of the firm supplying the technology also have a great deal to do with the arrangements to be chosen for transferring technology because firms differ not only in terms of the extent of appropriable rents available but also in terms of the key strengths that allow them to create appropriable rents. Some firms' technology or knowhow requires sale of a final product in order to capture the rents. Most manufacturing firms fall into this category. General Motors, Ford Motors, and other automobile manufacturers prefer wholly owned subsidiaries in most instances, but will enter into other arrangements if necessary. Their preference for wholly owned subsidiaries is probably related to the greater extent to which they can capture the economic rents. However, half a loaf is better than none and these firms have been known to engage in licensing and other arrangements that provide less control. Of course, so long as the automobile firms supply most of the basic components and stampings, they are still in a position to capture most of the economic rents without resorting to ownership of the plants that assemble the final product. A simple supply contract suffices. In all of the situations with which I am familiar, once there is sufficient volume to warrant an integrated automobile complex including foundry, engine plant, transmission plant, axle plant, stamping plant, body plant and assembly plant, the companies end up with at least a majority joint venture or a wholly owned subsidiary. Only two developing countries come close to such a high level of integration. They are Mexico and Brazil. And in both countries, despite programs such as Mexicanization of ownership, ownership control continues to be exerted by the

⁶ R. Hal Mason, "Technology Acquisition in the Pacific Basin: Direct Foreign Investment vs. Unpackaged Technology," in R. Hal Mason (ed.), *International Business in the Pacific Basin*, D.C. Heath and Co., Lexington, Mass, Chapter 8, (1978).

multinational firms. Manufacturing firms such as these find their strength in the logistical and coordinative processes which tie an enormously complex set of technical production processes together into a functioning whole which must then be balanced against pressures of the market place. It is this ongoing total process that constitutes the competitive strength of such firms and yields the appropriable economic rents.

There are other types of firms that also engage in technology transfer. These are the large engineering / consulting firms such as Bechtel Corporation, Kaiser Engineers, Fluor Corporation, Babcock and Wilcox, and several others. They design and build chemical plants, cement plants, fertilizer plants and the like. Sometimes they set up management teams to run these plants and train nationals to take them over. When they do the latter, the plant is known as a turnkey plant. Seldom if ever would these engineering firms take a direct ownership interest. They do not create appropriable economic rents by being operating companies. Their economic rents are rooted in their ability to design, engineer and build complex plants. They have logistical skills of a different type than those of an operating company like General Motors. Their forte is that of bringing together what have come to be called temporary systems, i.e., they can marshall large groups of engineers, construction workers, machinery, technicians and managers to undertake projects which are one or a few of a kind. When the project is completed it is someone else's role to provide the operating knowhow. Engineering firms do transfer technology but it is someone else's technology. They do not transfer their own technology. They only transfer the end result of that technology, i.e., the plant or construction project. Thus, they normally do not need ownership, licenses, and the like to protect the technological knowhow that yields them their economic rents. An engineering or consulting contract is sufficient protection because the technology that can replicate the end product resides primarily in people rather than in physical capital.

It has been often noted that Japanese firms differ in their technology transfer practices when compared with American firms. They are much more willing on average to take minority ownership positions, i.e., they seem to actually prefer minority joint ventures. Tsurumi's examination of ownership patterns, by nationality of the parent, reveals that the majority of Japanese manufacturing operations overseas are in the form of minority joint ventures.⁷ But even in minority ventures, effective managerial control is almost always vested with the Japanese firms. Key managerial and technical positions are manned by Japanese expatriates on service contracts. Also there may be a supply contract either *de facto* or *de jure*. They wield control over the technology and extract their economic rents via the supply contract and service contracts and the pricing of Japanese supplied inputs, both physical and human. The local partner shares in the economic rents through some profit sharing and a liberal franchise to serve the local market. What the local partner supplies to the venture is his knowledge of the local market, ability to deal effectively with the local governmental bodies and the ability to handle public relations, industrial relations and the like. He is paid handsomely for doing so.

My own findings indicate that there is not all that much difference in ownership patterns

⁷ Yoshihiro Tsurumi, *The Japanese are Coming*, Ballantine Publishing Co., Cambridge, Mass., 1976, pp. 201-208.

when comparing Japanese and American firms producing the same products.⁸ Where the product is a high technology product such as electronics assemblies, semiconductors and to some extent automobiles, the Japanese seem to be as likely as American firms to hold a substantial majority ownership or even 100% ownership. The attitudes are also similar. One Japanese semiconductor manufacturer with a plant in Malaysia put it very bluntly. They essentially said that they would be willing to spin off a minority interest in what is now a 100% Japanese owned facility. But, if the Malaysian government should force them into a minority position, they would completely curtail any further transfers of either product or process technology to the Malaysian subsidiary. They would continue to produce existing products but would not allow the facility to share further in any new technologies. This is quite consistent with the framework presented above on the appropriation of economic rents. Firms may be willing to share these rents up to a point, if there is some form of *quid pro quo* which reduces their costs, for example. But they are not willing to share the technology that yields those rents.

It is my opinion that the reason so many Japanese firms are currently more willing than American or European firms are to enter joint ventures gets back to the underlying technological capabilities. Tsurumi has made this key point.⁹ The Japanese technology on average is less sophisticated than that of U.S. or European based firms. This does not mean that there are not some Japanese firms that are just as advanced as some U.S. and European firms. It merely means that, on average, Japanese manufacturing firms operating abroad are lower down on the technology scale than are European and American firms in ascending order. Consequently, there are fewer economic rents to be appropriated and relatively less in the way of technology to be protected. Moreover, Japanese manufacturing firms are, again on average, more likely to be in direct competition with local firms.¹⁰ The joint venture form, for this reason, may serve the purpose of protective coloration. This seems perfectly consistent when one considers that the large bulk of Japanese investments to date have gone to developing countries in relatively low technology industries such as iron and steel products, textiles, footwear, and leather products, machine parts, household appliances and the like. This may also explain why Japanese firms seem to be more flexible than their western counterparts in terms of the variety of institutional instruments they are willing to use in their overseas operations.

The countries recognize that some portion of the economic rents can be captured locally through joint ventures especially where the venture is designed to serve local markets. But joint ventures also may have little meaning if the international firm as partner controls the enterprise through the application of technology. On the one hand, since it has a minority share in the economic rents it has less incentive to continuously infuse new technology. This will become increasingly true as local content requirements are escalated because the primary avenue for the international partner to extract economic rents in a joint venture is through the imported inputs supplied by that partner. Ultimately, the international partner

⁸ Reported in R. Hal Mason, "Technology Transfers: A Comparison of American and Japanese Practices in Developing Countries," paper presented to the Japan Society's Business Educational Workshop, UCLA, June, 1978.

⁹ Tsurumi, *Ibid*, p. 172.

¹⁰ This point is made by Kojima but in a rather different context. See Kiyoshi Kojima, "Transfer of Technology to Developing Countries-Japanese Type versus American Type," *Hitotsubashi Journal of Economics*, Vol. 17, No. 2 (Feb. 1977), pp. 2-5.

may refuse to supply additional technology to the joint venture affiliate as this avenue is foreclosed by local content requirements. On the other hand, if there is no local content requirement, a joint venture may be different from a wholly owned subsidiary only in name. While the managing director will be a national and have a majority ownership, he may not share in the economic rents to any major degree because these rents are captured by the international partner through the transfer pricing mechanism.

Most international firms are unwilling to discuss transfer pricing practices. I suggest this is so because transfer pricing is an important mechanism designed to capture economic rents. For example, why are Japanese firms willing to operate in minority ownership positions with a national as managing director and with no licensing agreement? I suggest they accomplish their ends through transfer prices. The Japanese firms are managed differently than U.S. based firms. The Japanese control the technology by assigning more expatriates and not transferring the technological know-how to nationals at critical junctures in the system. Moreover, financial arrangements may include debt financing by the Japanese to the managing director so that he is able to put up his share of the paid in equity capital. On paper, a national owns a majority of the equity but his purchase of that equity has been financed by a loan from the Japanese minority partner. The economic rents continue to be captured by the Japanese minority partner through the transfer pricing mechanism. The only economic rent captured by the national majority partner is the salary he is paid as managing director—a position that is, as often as not, little more than that of figurehead. The actual decisions are taken by the resident Japanese advisors in consultation with headquarters managers in Tokyo or Osaka.

A Comparative Analysis of American and Japanese Technology Transfers

In line with the preceding analysis it might prove useful to examine some aspects of foreign investment by the United States and Japan as an indication of the types of technology they transfer to developing countries. As Table 1 indicates, there are substantial differences. We might surmise that these differences are largely the result of differing levels of technological capabilities and comparative advantage and hence are consistent with Vernon's product cycle hypothesis.¹¹ Of Japan's total overseas direct investments, some 55% has gone to developing countries with 42% of that being in manufacturing, but two-thirds or more of this manufacturing investment is in what could be called "low technology" industries.¹² Some 72% of Japan's total manufacturing investments are in developing countries. Moreover, of some \$6.5 billion worth of plant exports (machinery systems and knowhow) in 1976, some 70% went to developing countries.¹³ By comparison, only 21% of U.S. direct investment resides in developing countries, of which 39% is in manufacturing. But of this, over 60% is in the higher technology fields.¹⁴ Of the total foreign manufacturing investment worldwide, by U.S. firms, only 19% is in the developing countries.

¹¹ R. Vernon, "International Investment and International Trade in the Product Cycle," *Quarterly Journal of Economics*, Vol. LXXX, May 1966, pp. 190-207.

¹² Foodstuffs, lumber and pulp, textiles, iron and nonferrous metals.

¹³ Ministry of International Trade and Industry, *White Paper on the International Trade 1977*, Bulletin 29, Tokyo, Oct. 1977, pp. 78-81, and MITI Bulletin 24, *Japan's Overseas Investment 1977* Edition, June 1977, p. 4.

¹⁴ Chemicals, machinery and transportation equipment.

In terms of the overall distribution of investments in developing countries, Japan's pattern is skewed toward primary production and manufacturing. For the U.S., the pattern is skewed toward manufacturing and service industries.¹⁵ These data are merely indicative of the greater dependence of Japan on foreign sources of raw materials and the relatively lower level of development of the technological base. They are also suggestive of the United States' own structural change toward the tertiary or service industries. Professor Kojima suggests that foreign direct investment should be trade-oriented.¹⁶ But, under his reasoning, there would never be any direct foreign investment in industries which are characterized by high levels of technology. If this were in fact the case, the dynamics of shifting comparative advantage would be thwarted.

I think there is a better explanation for the pattern of Japanese and American foreign investments than that provided by Professor Kojima. Japan is a latecomer to both direct foreign investment and the creation of new technology. She is not at the forefront of the product life cycle; except in a few fields such as automobiles and consumer electronics. Also, she is highly dependent upon overseas sources of raw materials—more so than the U.S.

Looking at the situation historically, early American investments in developing countries, like Japan's now, were in the primary industries (petroleum, mining, and agriculture) and were designed to secure raw materials for a growing U.S. market. Times have changed. It is no longer permissible to own outright the resources themselves. However, U.S. based multinational firms, like others, maintain continuing relationships in the natural resource-oriented fields. These resources are about as secure as they could be in today's world.

TABLE 1. RELATIVE INVESTMENT POSITION OF THE U.S. AND JAPAN IN 1976:
DEVELOPING COUNTRIES

	U.S.	Japan
1. % of total investments which resides in developing countries	21%	55%
2. % of row 1 which is in manufacturing	39	42
3. % of row 2 which is in high technology industries	60	32
4. % of own total manufacturing investment which is in developing countries	19	72
5. Total dollar volume of manufacturing investment in developing countries	\$11.4 billion	\$4.1 billion
6. Total manufacturing investment worldwide	61.1	5.7
7. Total investment worldwide	137.2	17.8
8. Total investment in developing countries	29.1	9.8
9. % distribution of investment in developing countries		
Mining petroleum and primary industries	17.9%	34.7%
Manufacturing	39.1	41.8
Service Industries	33.7	13.3
Other	9.3	10.2
	100.0%	100.0%

Source: MITI Bulletin 24, *op. cit.* and U.S. Department of Commerce, *Survey of Current Business*, August 1977, p. 45.

¹⁵ Transportation, communication, public utilities, trade, finance and insurance for the U.S. Construction, commerce, banking and insurance and branch offices for Japan.

¹⁶ *Op. Cit.* "A Macroeconomic Approach . . ." p. 14.

The point is that Japan is duplicating, as nearly as possible in this new situation, what firms in the U.S. and some European countries had done two or three decades earlier. There has been much written about such investments. These were long ago dubbed "enclave investments" in the literature. Such investments tend to be capital intensive, may involve little training, often do not provide for processing of the raw material in the host country and often are manned by expatriates—at least in key positions. Such investments do generate export earnings, but they transfer little technology which can be diffused locally and create little employment. And while they may exploit comparative advantage, they have been historically the least liked by host countries and are now the most tightly controlled form of investments. This gets back to earlier sections of this paper dealing with economic rents.

In natural resource based investments, economic rents arise from the superior natural resource being exploited. It is quite evident that most developing countries are aware of the value of such resources. Accordingly, they have bargained down the share of economic rents going to foreign investors. Indeed, most deals these days are of the bilateral monopoly variety. Japan only differs from other countries with respect to the proportion of total investments that fall into this category. Relative to total overseas investments, Japan's proportion is larger but such investments are unlikely to be any different in kind to those emanating from other countries. Under any circumstance I should hardly classify them as "Japanese type" investments. Others have been at the game at least as long and perhaps longer than the Japanese.

The second type of investment classified as "Japanese type" by Kojima is the labor-oriented investment. Japan was hardly the pioneer here either. Many early U.S. investments were designed to exploit "cheap" labor. But because Japan was so highly protectionist and kept foreign investment out, U.S. firms went mainly to Europe to produce textiles, clothing, automobiles, typewriters, and many other labor intensive products for shipment back to the United States. Japan, on the other hand, did not allow foreign investment but did purchase foreign technology through licensing and thereby built up domestically owned industry to mount an export drive. It seems that Japan rather than the United States, is the country having a highly dichotomized industry structure with a highly modern oligopolistic sector that exports and a traditional sector that is losing its export advantage and in turn is moving to developing countries. A very large proportion of Japan's textiles industry, for example, has been moved to Korea, Taiwan and Southeast Asia.

It seems to me that Kojima ignores the historical differences between the development patterns of the United States and Japan and their relative levels of development today. Under the Vernon life cycle hypothesis, there is nothing inconsistent with these differing development patterns and the pattern of foreign direct investment. One can ask, "Why was it that firms in the textiles, wearing apparel, steel, clay and glass products, and other low-technology industries in the U.S. failed to invest abroad in line with the life cycle hypothesis? Some firms did, but they were few. One answer relies on Hymer's reasoning.¹⁷ In highly competitive industries there is no advantage to investing abroad, i.e., locally owned firms are as capable of applying the technology as are foreign owned firms. Moreover, local firms do not incur the extra costs of communication, exchange risk and the like which are inherent in operating across international boundaries. Foreign investment should be

¹⁷ Stephen Hymer, *op. cit.*

in line with the comparative advantage of the home country firms, i.e., they must be able to bring something which local firms do not possess such as superior managerial systems, superior technology, lower cost financing, or superior access to markets. Such characteristics do not exist in purely competitive industries.

That Japanese firms have invested abroad mainly in the low technology industries suggests one of three possibilities to me. The first is that the advantages of Japanese firms over local firms are contrived. Perhaps by buying into a substantial number of local firms or by transplanting their own plants, Japanese firms have been able to monopolize these low technology industries. I seriously doubt this possibility, because if Japanese firms could do it, firms of other nationalities could have done it also. A second possibility is that the Japanese firms have developed superior technology or some other advantage which firms from the U.S. or Europe have lost. This would be in line with the product cycle hypothesis if indeed the U.S. followed by Europe are higher up on the product cycle. There is nothing inconsistent in a country's losing its comparative advantage to another in certain industries. Firms across industries must allocate resources into research and development if they are to maintain comparative advantage over time. But they also compete with one another across industries for the services of scientists, engineers and technicians. Thus, in a reasonably competitive economy, the high technology, high profit industries will attract the innovative capability away from the low technology industries.¹⁸ But what is a high technology and what is a low technology industry will differ across countries. Perhaps for Japan, textiles, for example, is much higher up on the product cycle (technology) curve than it is in the U.S. Thus, in the U.S. textiles will lose innovative capability to other industries, while in Japan textiles will gain innovative capability, i.e., in Japan textiles can bid innovative resources away from other industries. The consequence would be that the United States followed by Europe would lose its ability to compete in textiles and other low technology investments abroad.

A third reason, related to the above, may be that Japan, simultaneously through its own experience, developed superior access to export markets. In combination, it now has superior technology to that of the U.S., Europe and the developing countries themselves in the low technology industries as well as superior access to advanced country markets (including its own) when compared with local entrepreneurs in the developing countries.¹⁹ As Kojima notes, the comparative advantage of Japanese firms in such industries appears to be short lived. He suggests that it is because the Japanese firms are transferring their technology. But it also may be simply that the technology is easily acquired, i.e., the technology does not represent all that much of a change for the local firms. Moreover, in line with the analysis of economic rents presented earlier, Japanese firms, because their technology is easily copied, and economic rents are small, have less to protect and hence are more willing to transfer the technology. This may further support the argument as to the widespread use of joint ventures by Japanese firms.

¹⁸ The low technology industries in Japan might have been forced by lifetime employment to be more innovative in order to remain competitive. Lifetime employment would reduce the economy's ability to reallocate employment from low technology, low-productivity industries into high technology industries.

¹⁹ Also the substantial move of textiles and consumer electronics from Japan to developing countries may well have been precipitated or at least vastly hastened by the voluntary quotas placed by the United States on such items produced in Japan. The move to developing countries may have been designed to sidestep these quotas.

As for Kojima's point about Japanese technology transfers being more beneficial than American transfers, this is debateable. Whether they are more beneficial depends not only on whether they are in line with existing comparative advantage but also on what they may do to assist developing countries to alter their resource base so they can transform themselves through development to achieve a changing comparative advantage. Everything hangs upon what is most beneficial. If it is more beneficial to fit in with existing comparative advantage of the host country, then Japanese investments are more beneficial. However, if it is more beneficial to assist with the development of new skills and technology that will alter the host country's comparative advantage, then Japanese technology transfers may not be the most beneficial.

It is probable that many U.S. based firms would not have invested in developing countries had there not been tariff protection. In this sense, U.S. firms' technology transfers may not be beneficial. But it is not strictly because they are trade diverting as Kojima suggests, but because they should not be there at all. Trade diversion via foreign investment can be just as beneficial as trade creation so long as the interests of efficiency are served. Unfortunately, this is usually not the case in developing countries. The trade diversion is caused by tariff protection. Foreign investment is merely the handmaiden of that policy. It is interesting that U.S. and European firms have been able to take advantage of import substitution policies in larger degree than have the Japanese. Even behind a tariff barrier there is competition and the Japanese high-technology industries seem not to have been able to compete effectively with the U.S. and European firms except in some industries such as automobile assembly, consumer electronics, household appliances, sewing machines and a few others. They are not heavily represented in processed foods, chemicals, electrical machinery and similar products. Perhaps it is that Japan still is at a lower level of capability in these industries. Perhaps it has to do with Japan's own unique system. Under any circumstance, there is need for further research into the patterns of development and technology transfer of the already advanced countries. Such research could tell us a great deal about the concept of comparative advantage and technology creation. It could also tell us much regarding how different cultures and societies cope with the changing world economic scene.