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ABSTRACT

When any resource-scarce country reaches a stage of growth where resource-intensive heavy industry becomes a leading growth sector (and lifestyles turn increasingly energy-consuming), it is compelled to seek out resources overseas by making investments in project-specific infrastructure (and even in general-purpose infrastructure to cultivate goodwill). In this regard, a reformulated "flying-geese" paradigm (a stages model) of growth can shed light on such an economic behavior. The advanced West and their TNCs were once aggressively engaged in their hunt for overseas resources and markets under colonialism at the height of their heavy and chemical industrialization during the 19th-to-the early 20th century. Japan too followed suit in its drive to build up heavy industry and secure resources abroad. Most recently, China has entered such a growth stage, exhibiting a similar hanker for resources and emerging as a primary financier and developer of infrastructure in developing regions, notably in Africa, as part of its resource-seeking diplomacy.

1. Introduction

Infrastructure is the backbone of economic development and growth. The faster the rate of growth, the greater the need is for infrastructure in support of both productive and consumptive activities. Infrastructure is basically a nontradable good, since it is location-bound. As in any other sectors of an economy, furthermore, infrastructure facilities have evolved in types and services, especially the way they are operated--pari passu with economic growth, technological progress, and changes in the modalities of production and consumption. They were traditionally provided as public goods by local and state governments in individual countries.

Many state-run infrastructure facilities, however, have turned out to be inefficient and costly. This is not so much because of the poor quality of the physical facilities *per se* but because *how* they are operated and maintained in providing services. In this respect, infrastructure-specific *software* (institutional setups including policies, regulatory framework, and oversight) is the decisive factor. Moreover, modern infrastructure requires sophisticated management and operational skills. *Without such requisite software provision, no physical infrastructure itself is capable of functioning effectively and efficiently.*

In the recent past, consequently, some types of infrastructure have been privatized, and transnational corporations (TNCs) have begun to increasingly engage in construction and management of infrastructure facilities in the host countries. After all, TNCs from the advanced countries possess valuable firm-specific knowledge, skills, and experiences to run the physical facilities efficiently and productively. And in doing so, they are making the nontradable sector *indirectly* "tradable" through direct local operations.[1]

As a matter of fact, TNCs' involvement in overseas infrastructure is nothing new. It was originated during the 18th to the early 20th century when Western powers pursued colonialism in hunt for natural resources and markets subsequent to the Industrial Revolution.[2] Some even argue that the early chartered trading and colonizing companies

[1] For instance, city water supply cannot be imported, but a foreign TNC in that business can set up a local operation. As is well known in the Heckscher-Ohlin trade theory, FDI (capital movement) is a substitute for trade (goods movement).

[2] Colonialism actually started much earlier by the Portuguese and the Spaniards but mostly for spices, precious metals, ivory, and slaves: "… an irresistible wave of imperialism spread out through the Atlantic

(such as the Russia Company, the East India Company, and the Virginia and Plymouth Companies) of earlier centuries (the 15th through the 19th centuries) were the predecessors of modern TNCs (McNulty, 1972). They established their "trading posts" abroad (the *first* trade-supporting infrastructure overseas). Most recently, however, China's diplomacy to obtain resources, notably in politically sensitive regions of the world such as Africa (notably Sudan), has become controversial and is causing frictions with the advanced countries that also import resources but use trade sanctions. In its efforts, furthermore, China is building high-profile infrastructure facilities like dams, power stations, railways, and ports in resource-rich developing countries—in collaboration with the existing political regimes under its "non-strings-attached" policy (whether or not they are oppressive and undemocratic). Interestingly enough, Japan too was once most actively engaged in its own resource diplomacy during the high-growth period of heavy and chemical industrialization (in the 1970s), causing frictions with the West. Its scramble for resources, however, has since then considerably subsided and stabilized as Japan's GDP became proportionately less resource-dependent.

The leitmotifs of this paper are (i) that *any resource-scarce country that has reached the stage of resource-intensive manufacturing aggressively searches for resources overseas by making whatever necessary investments in project-specific infrastructure (and even providing general-purpose infrastructure to secure local goodwill) in resource-rich countries,* and (ii) that *a structural stages model of growth (a reformulation of the so-called "flying-geese" theory of economic development) can shed light on such an economic behavior*. Section 2 briefly presents some key relationships between economic growth and infrastructure development; Section 3 introduces a structural stages model of growth (a restated "flying-geese" theory) as an analytical framework for evolutionary changes in a growing economy's needs for infrastructure; Section 4 looks at how Japan was once engaged in infrastructure development in resource-abundant developing countries, and then studies in comparative terms the on-going efforts currently made by China to secure resources under its diplomatic offensive for economic

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and Indian oceans, and by 1700 the Europeans controlled every current of trade touching Europe, as well as the salve trade from Africa to the West Indies and some flows of gold and ivory from West Africa to the East" (Hohenberg, 1968, p.49).

partnership by building a wide variety of infrastructure in developing countries, especially in Africa. And Section 5 concludes with final observations.

2. Economic Growth and Infrastructure Development

As might well be expected, aggregate spending on (or stocks of) a variety of infrastructure facilities is significantly correlated with growth. This relationship is, for example, empirically found in a World Bank study (1994) that used the variables of telephone main lines (per thousand persons), of paved roads (kilometers per million persons), households electricity (percentage of availability), and of the access to safe water (percentage of population)—all these infrastructure variables closely correlated with GDP per capita (in PPP dollars) in developing countries. Obviously the income elasticity of infrastructure provision differs across the types (as exhibited in different slopes of regression lines). The Bank's study also notes the changing shares (relative importance) of different types of infrastructure, depending on income levels. The share of *power, telecoms, and roads (inclusive of highways)* as a group becomes even greater in higher-income countries than that of *sanitation, water, irrigation, and railways*. Why does, however, this trend occur?

Although no explicit explanation was given, it is intuitively understandable that the latter group of infrastructure is largely of the more basic and elementary kind, while the former includes the more technologically advanced forms of infrastructure, embodying recent innovations. For instance, telecoms have lately (since the early 1990s) undergone the so-called "information & communications technology (ICT)" revolution, morphing from fixed-line to wireless transmission and from analogue to digital technology. And the Internet and the World Wide Web (www) have drastically altered the telecoms industry. At the start of the 1990s when the Bank's study was made, however, these new developments were still inchoate and not yet quite noticeable—hence could not be considered. Telecoms' share must have risen most noticeably since then with a steady and more recent trend of incessant technological innovation. Power generation has likewise experienced drastic, though perhaps less glamorous, changes towards the nuclear, solar, wind, ocean/river-current, and geothermal systems. Modern transport

(especially air), though not included in the Bank's comparison, surely belongs to the high-income-elastic group.

So, the questions to be asked are *how the new forms of infrastructure have come into existence, in what way their shares have changed over time, and why TNCs have begun to be involved in certain (modern) types of infrastructure development and operations overseas.* And perhaps more importantly, *why has China suddenly emerged as the major financier of infrastructure development in Africa?* To explore these and other related questions, the 'flying-geese' paradigm of economic development can be reformulated into a structural stages model of growth to provide an analytical framework for the issues of infrastructure development and TNCs' involvement.

3. The Structural Stages Model of Growth: A Restatement of the "Flying-Geese (FG)" Paradigm

3.1. Economic growth as structural upgrading: A leading-sector model

Originally introduced by Kaname Akamatsu of Hitotsubashi University, Japan, in the 1930s,[3] and more recently expanded by his close followers (*inter alia*, Kojima, 2000, 2003, 2004; Kojima and Ozawa, 1984, 1985; and Ozawa, 1992, 2001, 2005), the "flying-geese" theory of economic development has acquired some currency in academia and even popularity in the news media. In fact, the *1995 World Investment Report* (UNCTAD, 1995) featured the FG theory of economic development, since it has high relevance to the critical role of TNCs in catch-up development. Akamatsu's original model, however, was drawn with broad strokes of the brush and left unelaborated in many aspects—hence prompting elaborations and restatements both conceptually and empirically.

One reformulated version is a "leading-sector" structural stages model *a la* Schumpeter (Ozawa, 1992, 2005), in which a sequence of growth is punctuated by stages (five structural stages so far, as explained below) in the wake of "the perennial gale of creative destruction" (Schumpeter, 1934). This model is also in line with what Rostow (1960) emphasized: "For some purposes it is useful to characterize an economy in terms of its leading sectors; and a part of the technical basis for the stages of growth lies in the

[3] To get the gist of his theory, see Akamatsu (1935, 1961, 1962).

changing sequence of leading sectors" and in terms of "economic history as a sequence of stages rather than merely as a continuum, within which nature never makes a jump" (p.14). This conceptualization is thus *in sharp contrast to* the neoclassical view of growth as a smooth incremental accumulation of capital.

The world economy has so far seen five tiers of leading growth industry emerge in wave-like progression ever since the Industrial Revolution in England. This industrial progression is illustrated in Figure 1, with each structural stage of distinctive features. They are (i) "Heckscher-Ohlin" endowments-driven (represented by textiles and apparel in labor-abundant countries or by primary exports in resource-rich countries), (ii) "non-differentiated Smithian" resource-driven (steel & basic chemicals), (iii) "differentiated Smithian" assembly-driven (automobiles), (iv) "Schumpeterial" R&D-driven (microchips & computers), and (v) "McLuhan" Internet-based (information services). This transformative progression traces out the experiences of the currently advanced countries over more than two centuries. The initial half of these leading industries were spawned first under the hegemonic leadership of Great Britain (notably during the Golden Age of Capitalism of 1870-1913) and the more recent leading sectors under that of the United States (especially since the end of World War II). Indeed, it defines what is called "the ladder of economic development," the notion popularly and casually used in economics but so far never clearly specified.[4]

INSERT FIGURE 1

In connection with the topic of this study, i.e., TNCs' role in infrastructure development abroad, it is worth noting that, as shown in Figure 1, prior to the rise of *market capitalism* the advanced West early on exercised *bourgeois capitalism* and then

[4] It is worth noting here that when a country experiences growth, a usual S-shaped growth curve is observable. Growth is initially based on the labor-driven phase, marking Rostow's "take-off" period. Its inflection point (i.e., the highest rate of growth) occurs during the non-differentiated Smithian stage of scale-driven heavy and chemical industrialization in which capital investments in physical facilities serve as a growth engine. This corresponds to Rostow's "drive to maturity" stage. This is the phase in which industrial activities are most intensive (per unit of output) in the use of mineral and energy resources (such as ores, coal, petroleum, and electricity), as well as heavily dependent on physical capital accumulation (such as large-scale production facilities including heavy machinery and equipment). As will be detailed below, this is also the stage where resource-related infrastructure in developing countries is in great demand, calling for TNCs' involvement. Then, the drive to maturity in growth means rapid increases in per capita GDP, and economic activities become ever more strongly oriented to satisfying the rising needs and wants of consumers. Economic maturity is characterized by the era of Rostow's "high mass-consumption," though the rate of economic growth tends to slow down and remains moderate along the logic of a S-shaped growth curve.

imperialism/colonialism as it entered into the Stage-II growth of resource-intensive heavy and chemical industrialization, and that Western powers' outward thrust was basically designed to secure resources and markets abroad.

Latecomers to industrialization can benefit greatly from the experiences of more advanced countries (first-comers) and climb the ladder more quickly over a shorter span of time. Postwar Japan, for example, swiftly caught up with the advanced world in four decades. The NIEs were able to replicate their catch-up growth within even a much shorter period. The ASEAN-4 (Thailand, Malaysia, Indonesia, and the Philippines) likewise soon followed, though more gradually and somewhat falteringly. At present, China is pacing its growth and structural transformation even faster than any other country, trying to introduce *all* the leading sectors almost simultaneously. Most characteristically, however, China is currently about to graduate from the first stage of labor-driven development (Stage-I) and is building up Stage-II heavy and chemical industries—with all the implications of this ongoing transition to its resource-seeking involvement abroad. Vietnam has most recently joined the global game of catch-up, attracting FDI in its labor-intensive industries as a starting point.

In contrast to the East Asian countries that rapidly moved *up* the ladder from the lowest rung (i.e., labor-driven stage), India—from the very start of its present catch-up growth--plunged first into the most advanced phase of growth, the McLuhan stage of Internet-based industry development, capitalizing on its low-cost, well educated, skilled labor suitable for outsourcing of information services (notably call centers and back-office works), and then only recently started to move *down* the ladder towards less skill-intensive, low-wage manufacturing. India's and other Asian countries' recent experiences represent latecomers' advantages as they are able to follow *in the footsteps of more advanced countries* by absorbing knowledge mostly through the medium of foreign, as well as their own, TNCs. And herein lies the causes for the "history repeats itself" phenomenon.[5]

[5] For a more detailed analysis of how the follower countries replicate in their catch-up growth what the more advanced ones have previously accomplished, see Ozawa, 2005. The role of FDI in economic development was analyzed in terms of the FG theory in Ozawa, 1992 and UNCTAD, 1995.

3.2. The FG paradigm of infrastructure development

Given the fact that catch-up growth in developing countries emulates the experiences of more advanced countries, infrastructure development and TNCs' involvement can be similarly examined in terms of the restated flying-geese model—that is to say, *changes in infrastructure development are evolutionary and stages-delineated, and TNCs play the role of knowledge transplanters to facilitate the structural transformation of developing countries.* Infrastructure development necessarily accompanies the progression of industrial upgrading as technological innovations spawn new leading sectors. This is summarized in Figure 2.

INSERT FIGURE 2 HERE

Historically speaking, the labor-driven stage (initiated by the Industrial Revolution in England) *once* required only basic infrastructure provision such as water, sanitation, basic transport (roads and canals), and power (first only animal power and wind/water mills but steam engines soon afterwards). Farm labor was mobilized as industrial labor in the factory system such as textile factories and foundries (as a result of the "foreclosure" movement that turned peasants into low-wage laborers). In those days any economy was largely production-oriented with a extremely skewed income distribution (without a dominant middle class). *The labor-driven stage was thus the very first stage of industrialization. The infrastructure associated with this stage was largely designed to support production and meant only tangentially for consumptive purposes. And in modern times this stage has come to be replicated repeatedly in labor-abundant developing countries, particularly after World War II—albeit with newer types of infrastructure.*

It was at the next stage of heavy and chemical industrialization that more modern physical infrastructures, notably power (coal-powered and hydroelectric), transportation (rails and sea), and conventional telecoms, came to play a pivotal role in supporting the resource-processing operations of heavy industry and the shipping of raw materials and bulky outputs. Paradoxically, resource-poor countries (notably England) were among the very first ones that underwent this second stage (Stage II) of growth, importing raw materials and exporting heavy industry goods—and that actively made investments in *resources-extractive and market-exploiting infrastructure in their colonies* (e.g., power,

rails, shipping, and dock facilities). Soon afterwards, other newly emerged imperial powers followed suit:

> For both economic and political reasons, British, French, Belgian and Dutch manufacturers preferred to source their raw materials from their colonial territories. American firms favoured Canada, Mexico and Chile for minerals and agricultural products (Lewis, 1938), while Japanese firms owned valuable iron ore deposits and coal mines in China. On several occasions, particularly in colonial territories, MNEs themselves built roads, railroads, docks and warehouses facilities, and supplied the necessary housing and educational facilities for their workers (Dunning, 1993, p. 110).

As noted earlier, this intensively resource-based stage has recently been repeated in successfully catching-up countries (such as postwar Japan, the NIEs, and now China and India) with high growth rates (8 to 12% per year). High growth is the hallmark of Stage II, leading to rapid *urbanization*, thereby requiring more *urban infrastructure* (such as urban transport, electricity, and sewerage). Present-day Stage-II countries, like their European counterparts in the past, act strategically in order to secure resources overseas by investing in project-specific infrastructure (and also in "goodwill-diplomacy" projects) in resource-rich developing regions. Therefore, they are the eager developers of infrastructure in resource-exporting regions like the Middle East, Latin America, and Africa, as the latter themselves in turn enjoy an opportunity for resource-driven growth. (This stage-specific development will be detailed below in terms of a comparative analysis of Japan's and China's resource-seeking efforts.) Heavy and chemical industrialization also causes environmental and ecological problems (pollution in air, water, and soil) that require infrastructure for environmental clean-up and betterment. Environmental consciousness, which was practically nonexistent in the early days of industrialization during the 19th century and the early 20th century, has lately been elevated to the global level. The Kyoto protocol is one indication of the new consciousness.

The arrival of the stage of assembly-based manufacturing (as best exemplified by automobiles) revolutionalized land transportation. Highways, along with bridges and

tunnels, began to be used not only for commerce (material transport and goods distribution) but also for more consumption (personal uses). It was at this juncture on the path to growth that production (supply) became *consumer-focused more strongly than ever before*, since the growth of an economy had reached the stage of "high mass-consumption" (Rostow, 1960). Model-T cars and Fordism-cum-Taylorism symbolized the beginning of this new era. Motorization led to a brand-new culture of car-based lifestyle and consumption, as seen in the births of gas/service stations, motels, drive-in theaters, drive-in fast-food restaurants, shopping malls with huge parking lots, and drive-in banks--first in the United States but now spreading to other countries. And all these *infrastructure facilities* for consumers were normally provided as *private goods.* The phenomenon that more infrastructures for consumptive purposes come into existence pari passu with economic growth is schematically illustrated in Figure 3. Some types of infrastructure are obviously of *dual* use, namely for both production and consumption. Rising per-capita incomes require more and more consumption-supportive infrastructures.

INSERT FIGURE 3 HERE

Just as America's mass production replaced Europe-originated craft production, the post-WWII innovation of "lean or flexible production" (originated as the Toyota production system) drastically altered the auto-assembly operations and other assembly-based manufacturing activities, especially through the adoption of the "just-in-time" delivery method for parts, components, and accessories on the factory floor. What matters most in lean production is the *logistics* of parts procurement from suppliers. And *"just-in-time" logistics became a critical form of soft-infrastructure for transport and distribution (as opposed to hard-infrastructure such as rails, highways, and warehouses).*[6]

In the meanwhile, ever-rising consumerism spurred R&D activities, first in the United States and then in other advanced countries, in an intensive search for new products for

[6] In the recent past Japanese companies made FDI in Russia, which is eager to build up Stage-III industries. Japan's carmakers (such as Toyota, Nissan, and Honda) set up assembly plants mostly in the St. Petersburg area. It now takes 30-40 days for cargo to get from Japan to St. Petersburg via Europe. If a Trans-Siberian rail route via Vladivostok (on the Sea of Japan) is developed, it will be able to cut down the time by 5 to 15 days. Mitsui & Co. is reportedly in talks with Russian Railways to invest in and operate a network of warehouses and other logistics for shipping parts and components, thereby saving on inventories. "Mitsui nears deal to offer Russia freight services," *Nikkei Weekly*, July 23, 2007, p. 6.

consumers. This was an early post-WWII peacetime phenomenon, since pent-up consumer demand existed. As a consequence, R&D-driven, high-tech "Schumpeterian" industries came to represent Stage-IV growth, innovating in rapid succession a myriad of *knowledge-based* consumer goods, such as antibiotics, computers, semiconductors, TV sets, washers & dryers, dishwashers, microwave ovens, tape-recorders, and the like. For the first time, new jargons such as "marketing" and "market research" appeared in business lexicon. In the 1950s and the 1960s, many large companies in science-based industries began to set up corporate R&D centers. Notable were IBM's Watson Labs and AT&T's Bell Labs. "Created" assets started to increasingly substitute for and replace "endowed" assets. Large R&D-focused corporations were the first group of enterprises that turned transnational. Their suddenly acquired role in knowledge creation and dissemination across borders was well captured in the product-cycle theory of trade and investment (Vernon, 1966; Hirsch, 1967). Soon afterwards, the importance of "high-tech industrial districts, *a la* Marshall," as typified by the success of Silicon Valley, was recognized as *a new type of industrial infrastructure*, and many local governments began to promote the development of *high-tech parks*.

This stage of knowledge-based economic growth in the advanced world was once coincided with the development of air transport infrastructure (commercial airlines and consumer-oriented airports) and *containerization* of cargo shipping with all its accompanying infrastructure provision (e.g., ports with containers loading and unloading facilities). What is more, since R&D-based knowledge creation is the linchpin of this growth phase, protection of intellectual property rights are all the more required, and the institution of a legal system serves as *intangible (soft) infrastructure*.

The latest stage of growth was ushered in by the ICT revolution with the introduction of the Internet, the World Wide Web (www), and multi-functional cellular phones. Accordingly, new types of infrastructure came into existence. At the basic level, *cellular phones require transmission towers (the backbone of every cellular network) and their accompanying power source*. In the wake of continuous and fast technological advances that enable the use of the Internet for phone calls and online videos, interestingly enough, it is said that *its infrastructure may be already fast obsolescing*. Internet pioneers, such as Larry Roberts and Len Bosack, themselves are reportedly striving to redo the same

technology, as they believe it is far behind the times—and are striving to innovate *new routers* to carry the ever-heavier traffic.[7] The infrastructure for the Internet age involves high technology, which is *a private industrial property*. Google's competitive advantage lies in how computers are *arranged* to form a unique network, that is, Google's *own firm-specific infrastructure*—rather than the algorithms behind its search tools.[8] Understandably, therefore, Google keeps secret the number of computers deployed in its vast clusters.

Because of the technology-intensive nature of the Internet-driven phase of growth, its infrastructure is provided by technology-owning corporations--usually if not totally then at least jointly in developing countries that often treat telecoms as a strategic industry. The transfer of knowledge, especially when it comes to private property, involves high market transaction costs. Hence it is normally implemented *internally* (via intra-firm transactions) instead of *externally* (via market transactions).

In sum, different new types of infrastructure have emerged pari passu with economic growth and structural transformation, each type compatible with and consistent to the needs of each growth stage. These stage-specific infrastructures have increasingly become more sophisticated in technological and organizational characteristics and proportionately more software-intensive and more firm-specific in management and operation (that is to say, economic growth has turned increasingly dependent on "soft infrastructure," as reflected by a rising ratio of software to hardware infrastructure in Figure 2). At the same time, as might be easily expected, the infrastructure that supports consumption has gained in importance relative to that devoted solely to production. The sequential phenomenon of urbanization→suburbanization→ super-urbanization (inclusive of re-urbanization in the core cities) has also concurrent with economic growth (Figure 3).

3.3. Summary: The structural stages model of infrastructure development, *a la* FG

As seen above, the structural stages model of infrastructure development is useful in understanding the stages-specific needs of infrastructure and how fast-growing Stage-II

[7] As reported in "Its Creators Call Internet Outdated, Offer Remedies," *Wall Street Journal*, Oct. 2, 2007, B1.
[8] "The Unsung Heroes Who Move Products Forward," *New York Times* (on the web), Sept. 30, 2007.

countries are engaged in infrastructure building, both at home and abroad. More specifically, it helps us understand (i) why the shares of different types of infrastructure change pari passu with economic growth; (ii) that when the advanced West early on underwent Stage-II growth, it pursued colonialism in search of resources and markets, resulting in the first wave of infrastructure development abroad; (iii-a) that prewar Japan (which succeeded in heavy and chemical industrialization with an eye on bolstering its military strength), too, followed suit in Manchuria, Korea, and Taiwan; (iii-b) that when Japan repeated Stage-II growth by rebuilding and modernizing heavy and chemical industries in the 1960s and the 1970s, Japan's TNCs again had to strenuously seek overseas resources (such as oil in the Middle East, copper in Latin America, and iron ore and coal in Australia by offering resource-extractive infrastructure); (iv) why China, which is in the midst of Stage-II growth—and India, too, though somewhat in a delayed fashion--is currently active in the quest for oil, natural gas, and minerals abroad by similarly developing infrastructure in the host countries; and (v) that resource-exporting (Stage I) countries in the Middle East, Africa and elsewhere are, in turn, presently benefiting from the rise of Stage-II countries, especially China, attracting TNCs' involvement in infrastructure projects, especially in telecoms, transport (sea, land, and air), and urban infrastructure.

4. Stage-II Quest for Overseas Resources: Japan vs. China

As seen above, Stage-II growth is most intensive in the use of raw materials and energy and strategically engages in the development of overseas resources and related infrastructure. As emphasized above, any economy, but especially those resource-indigent ones, that goes through this stage struggles to secure stable supplies of resources abroad. At present, China is most conspicuously active in its effort to obtain overseas resources and its voracious appetite is driving up the price of commodities in the world markets--from copper and steel to petroleum to natural gas in the world markets. The recent swift rise of China's middle class is also contributing to the global price hikes of corn and other kinds of grain as its consumption of meat and other high-income-elastic goods increases. China's resource-seeking efforts in Africa, Latin America and the Middle East are now often the target of criticism from the advanced countries, notably

the United States and the EU. Though perhaps not widely known, China closely studied the postwar Japanese experience of Stage-II resource procurement during the 1960s and the 1970s. In fact, Japan's search for raw materials and energy abroad once caused political tensions with the West. In those days Japan was compared to the United States as a resource-hungry giant in a well-known study, *Two Hungry Giants: the United States and Japan in the Quest for Oil and Ores* (Vernon, 1983). Japan was then an unwelcome upstart that suddenly emerged as a rival to the West in the global commodities markets, just as China has only recently entered this phase.

4.1. Japan's resource diplomacy during its high-growth period

Stage-II growth made the Japanese economy become so much dependent on overseas resources. In the late 1960s Japan ranked second only behind the United States in the consumption of such basic industrial resources as petroleum, copper, zinc, aluminum, nickel, and crude steel. From 1964 to 1968, for example, Japan's demand for petroleum expanded at an average annual rate of 17.6 per cent, more than twice the growth rate of the non-Communist countries taken as a whole; for copper at 11.7 per cent, more than seven times as much, and for zinc at 8:0 per cent, four times as much--and for aluminum, 21.0 per cent; for nickel 25.2 per cent, and for crude steel, 20.0 per cent, each far exceeding the average rate of the Free World countries at that time.[9] Interesting enough, furthermore, most of these growth rates were overall much greater than that of Japan's GNP (10.6 per cent per annum over the same period). This circumstance reflected a rapid shift in Japan's industrial structure away from light manufacturing (Stage I) to heavy and chemical industries, sectors that are both more resource-intensive and more energy-consuming (Stage II). The upshot was again reflected in the fact that among the OECD member countries Japan's share of trade in iron ore climbed from 23.7 per cent in 1964 to 39.3 per cent in 1969; in coking coal from 15.8 per cent to 41.6 per cent; in timber from 15.4 per cent to 29.9 per cent; in copper from 9.5 per cent to 19.1 per cent; and in crude oil from 12.6 per cent to 15.6 per cent.[10] (Ozawa, 1979).

[9] Economic Council (1970).
[10] MITI, Tsuho Hakusho, 1971.

Conversely, Japan's increased reliance on overseas supplies had resulted in an equal or even greater dependence upon the Japanese market by some of the major resource-exporting countries, making economic dependence a two-way problem of interdependence. In 1971, for example, practically all of Malaysia's export of bauxite and 96.3 per cent of that of Indonesia went to Japan. In the same year, Australia sent 84.6 per cent of its iron ore exports to Japan and India 96.3 per cent. Canada sold 93.5 per cent of its exports of copper ore to Japan, the Philippines 92.7 per cent.[11]

The sharp increases in crude oil prices announced by OPEC in 1974 and 1979 heightened Japan's sense of insecurity and vulnerability to any disruption in resource inflows into its industry. Japan's search for stable supplies of resources was, of course, nothing new: Japan, being indigent of natural resources, had been striving to secure them from abroad ever after the start of the modernization of its economy in 1868. Japan's imperial aggression into Manchuria, for instance, mirrored its dire need for raw materials in the prewar period. Yet, Japan's successful Stage-II development of heavy and chemical industries in the 1960s and the 1970s exhibited a renewed national sense of urgency, calling for new resource diplomacy. And there clearly developed a strengthened triumvirate connection between Japan's economic aid to industrialization in resource-exporting developing countries, the assured supplies of resources to itself secured in exchange for such aid, and the simultaneous use of assistance as an internal aid to the overseas investment activities of Japanese industry in large-scale resource development ventures abroad. These activities were usually carried out through the formation of consortia or group investments involving a large number of Japanese firms as joint ventures. Once an overseas venture is designated as a "national project," government aid took the form of participation by the Overseas Cooperation Fund (OECF), Japan's official aid agency, as the major stockholder of a semi-public investment company set up by the consortium involved in such a project. The Japanese government also provided low-interest concessionary loans both to the Japanese partner and to the host government from the Export-Import (Ex-Im) Bank of Japan, loans often used as equity capital by both parties. In addition, another aid agency, the Japanese International Cooperation Agency

[11] MITI, Tsusho Hakusho, 1973.

(JICA) gave support to infrastructure development, both hardware (such as port facilities) and software (via technical and managerial training).

This new form of economic assistance—*simultaneous aid* to *both* the host country and corporate Japan—evolved into, and came to be established as, "the Asahan formula," a formula originally worked out in connection with a regional development project in Indonesia. It took the characteristic of being a national project entailing a political commitment of the Japanese government, and set the precedent for Japan's resource-related ventures in other developing countries (Ozawa, 1979, 1980).

4.1. l . The Asahan formula

The Asahan project involved the construction of *a large dam, a hydroelectric power station* on the Asahan River and *an aluminum refinery* that would use the power generated and related infrastructural facilities in Sumatra, Indonesia. The idea was first brought by the Indonesian government to the attention of Sumitomo Chemical, which organized a feasibility study team in August 1970—in collaboration with two other Japanese smelters, Nippon Light Metal and Showa Denko. Soon afterwards, the group was expanded to include Mitsubishi Chemical Industries and Mitsui Aluminum, thus becoming a collaborative venture among Japan's top industrial groups.[12]

The Asahan project was the first most significant "show case" venture of Japan's postwar resource diplomacy undertaken by its government and industry in close collaboration with the host government. Even before the final agreement was signed between the two countries in July 1975, the project had long been publicized in Indonesia as "the TVA [Tennessee Valley Authority] of the Suharto Government." Several big Western aluminum companies that had initially participated in an international bidding withdrew when they learned of the desire of the Indonesian government to seek a comprehensive project that included a power station, an aluminum refinery, and all the related infrastructure facilities (seaport and land transportation) in a regional development plan. For a while, the project seemed likely to become a joint venture with Aluminum Company of America (Alcoa) and Kaiser Aluminum & Chemical, as they both expressed interest in joining the project. However, those American companies, too, decided in the

[12] This description of the Asahan project is partly based on Stockwin (1976), Ozawa (1979), and "Asahan Aluminum Project Lunched," *Oriental Economist*, August, 1975, pp.15-17.

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end to withdraw as the estimated project costs doubled quickly from the initial $400 million to $800 million (and later even more), and as world demand for aluminum precipitously declined in 1974. From then onwards it became a mammoth project that Japanese industry was left alone to undertake.

The five Japanese companies comprising the initial consortium subsequently enlisted participation of their respective *keiretsu-affiliated trading companies* as co-investors, joint-project coordinators, and trade intermediaries: Sumitomo Corporation joined Sumitomo Chemical; Marubeni Corporation with Showa Denko; Mitsubishi Corporation with Mitsubishi Chemical; Mitsui & Co. with Mitsui Aluminum; and three other trading companies, C. Itoh & Co., Nishimen Co. and Nissho Iwai Co. with Nippon Light Metal. And this new twelve-company consortium sought long-term, low-interest funds from the government-affiliated financial institutions.

The refinery was initially 90%-owned by Japanese interests, but in 1980, 25 per cent of ownership was transferred to the Indonesian government. The hydroelectric power station, with a capacity of 510,000 kilowatts, was to be turned over to the Indonesian government after thirty years of operation. The latter was thus a long-term version of BOT.

Capital investment on the Japanese side was fully backed with credit from both official and private sources. The official sources covered approximately 70 per cent of the total cost of the project—the fund for the power station from the OECF; for the aluminum refinery from the Ex-Im Bank of Japan; and for port facilities, service roads and other infrastructures from the JICA. The balance consisted of loans from Japanese commercial banks. The twelve participating Japanese enterprises formed an investment company, Nippon Asahan Aluminum Co., in which the Japanese government became the major shareholder (50%), through the stock ownership by its agency, OECF. A comprehensive training program for the Indonesians to operate the power plant and smelter was also arranged at both the project site and Japanese aluminum plants. In the end, rising labor and material costs turned the venture into a more than $2 billion investment.

In the 1970s, Indonesia was the second largest supplier of petroleum to Japan; the first having been Saudi Arabia. Japan's economic cooperation for the Asahan project

was clearly based on the significance of the host country in that capacity. The project also created a favorable environment in which all *other* Japanese investments in practically all areas were welcomed by Indonesia. No wonder, then, that Japan's FDI, which had lagged behind that of the United States in both Indonesia's manufacturing and extractive industries until 1973, expanded with an astonishing swiftness and captured the lion's share of FDI in the host country.

4.1.2. Other Asahan-formula ventures

The Amazon project in Brazil, another large Japanese investment in aluminum, was actually modeled on the Asahan project. It was also a regional economic development project pursued between Brazil and Japan, involving an aluminum project in the Amazon basin.[13] It called for construction of a dam, a hydropower plant, and a smeltery with an annual production capacity ultimately reaching 340,000 tons. Forty-nine per cent of the ownership was taken up by the Japanese side and the rest by Brazil's state-owned mining company, Companhia Vale do Rio Doce (CVRD). (Ozawa, Pluciennil, and Rao, 1976). The Japanese group, consisting initially of five major smelters, expanded into another semi-governmental investing company, Nippon Amazon Aluminum Co., with as many as thirty-two private enterprises as co-investors and capital participation by the OECD as the major stockholder. Although the Japanese corporations were the actual participants who implemented the plan, negotiations basically were carried out between the two governments.

When the recession that followed the first oil crisis of 1973 delayed Japan in making a firm commitment, Brazil approached European nations and succeeded in securing a promise from France for extension of a loan to be used for the hydropower plant. Fearful of losing to its European competitors, Japan's government and industry huddled together to make all the necessary arrangements for a final commitment. Japan's Minister of International Trade and Industry Komoto was dispatched to Brazil in July 1976 to work out details with the Brazilian government. And corporate Japan as represented by *Keidanren* [the Federation of Economic Organizations] announced its all-out support for the project (then estimated to cost at least $1 billion), urging the Japanese government to provide ample financial assistance. The final contract was then signed by the two

[13] This section is partly based on Ozawa (1979), pp. 135-136.

countries on the occasion of Brazilian President Geisel's visit to Tokyo in September 1976. The Japanese government gave the project a $490 million loan from the OECF and a $140 million from the Ex-Im Bank of Japan.[14]

Subsequent to the Amazon project, the Asahan formula was again applied to a petrochemical venture in Singapore in the late 1970s. The project, initially conceived by Sumitomo Chemical, involved an $800 million petrochemical complex on a small island off Singapore. The core plant would use locally refined oil to initially produce 300,000 metric tons per year of ethylene, which were expected to spawn downstream production of plastics and other chemical-based products.

Keen on the petrochemical project as it symbolized a more advanced stage of economic development, the Singapore government, working closely with Sumitomo Chemical, maneuvered to secure funds from the Japanese government. From the start, Sumitomo's plan needed cooperation from other Japanese firms as well as from the Japanese government. Both Sumitomo and the host government publicized it as the most significant development project for Singapore. The host country, though a resource-poor city-state, is situated on the Malacca Strait, the critical sea-lane through which pass the tankers transporting the vital supply of oil needed to keep Japan's industrial wheels rolling. A stable and friendly Singapore was a logistic necessity for Japan's resource diplomacy.

Whenever then Prime Minister Lee had an opportunity to talk with Japanese political leaders either in Singapore or in Tokyo, he never failed to seek a commitment from the Japanese government to the project. In the meantime, Sumitomo Chemical recruited other large Japanese companies, including Mitsubishi Petrochemical, Showa Denko, Idemitsu Petrochemical, Mitsui Toatsu Chemicals, Mitsui Petrochemicals, and Asahi Chemical Industry. Thus, again, all major industrial groups came to be represented in the consortium. Because of concerted pressure exerted by these powerful industrial groups and the Singapore government, the Japanese government finally moved in May 1977 to support the project with funds from the OECF and the Ex-Im Bank of Japan. Later on, the Japanese consortium further expanded to become a group of twenty-three companies, forming the Japan-Singapore Petrochemicals Company. Again, the OECF became its

[14] Ministry of International Trade and Industry (MITI), Japanese Government (1976).

major shareholder, acquiring 30 per cent of the initial capital investment.[15] The basic civil engineering work to make the island suitable for a petrochemical complex was first finished and then the completion of the petrochemical plant followed in 1982.

About the same time the Singapore project was given financial support by the Japanese government, another huge petrochemical project planned by the Mitsubishi group in Saudi Arabia similarly secured Japan's official commitment. The plan called for construction of a petrochemical complex, including an ethylene plant with an annual capacity of 341,000 tons, at Al Jubaylah in northern Saudi Arabia. In 1976 the Mitsubishi group decided to suspend its plan for three years because of the poor prospects for marketing ethylene. Because of a fear of losing Saudi Arabia's confidence in Japan's economic and technical cooperation, however, the Japanese government stepped in and made a commitment in 1977 to help the Mitsubishi group finance the project with funds from the OECF and the Ex-Im Bank of Japan. The project, thus adopting the Asahan formula, was considered to be a key element in Japan's extension of economic cooperation to Saudi Arabia. As many as fifty-four Japanese companies joined together to form an investment company, Saudi Petrochemicals Development Co. This Japanese company--again, with the OECF as its major shareholder—and the host country's Saudi Arabian Basic Industries agreed to share equally the project's total cost of about $1.25 billion. [16]

Similarly, with an eye to securing Mexico's oil, Japanese industry made a proposal to construct *harbor facilities* and *an oil pipeline* in Salina Cruz on the Pacific coast, a project reportedly welcomed by Pemex, Mexico's state-owned oil corporation. The plan was formally made official on the occasion of a visit to Mexico by the president of the Industrial Bank of Japan in October, 1978. It was developed into a more specific form of economic cooperation with the visit to Mexico of an economic mission headed by Toshio Doko, president of *Keidanren*, as well as with the visit to Japan of Mexico's President Jose Lopez Portillo soon afterwards. The Industrial Bank of Japan was soon joined by two big trading companies, Mitsubishi Corporation and Mitsui & Co. in "laying down the

[15] "Singapore venture will start work on petrochemical complex," *Japan Economic Journal*, December 26, 1978.
[16] "Japanese Concerns Study Saudi Project for Petrochemicals," *Wall Street Journal*, January 23, 1979.

foundation for concrete talks with Mexican authorities."[17] The rest followed along the familiar lines of Japan's other resource projects.

4.1.3. Development of "infrastructure inputs" industries

Japan's economic cooperation was also extended to help the host countries develop what may be called "infrastructure-inputs" industries such as cement, steel, trucks and the like that would be used as necessary inputs/materials in the construction of infrastructure facilities including highways and bridges, pipelines, ports (sea and air), and warehouses. As summarized in Table 1, Japan's TNCs were once actively engaged in building cement plants, steel mills, and steel-pipe plants in the Middle East—in addition to local infrastructures such as LNC stations, telecoms, and desalination plants.

INSERT TABLE 1 HERE

As vital partners for Japan's resource diplomacy Japanese TNCs also turned their attention to resource-rich Latin America, notably Brazil, and invested in infrastructure-inputs industries for iron and steel, hydraulic turbines, electric generators, telecoms equipment, trucks, earthmoving equipment, and ships (Ozawa, Pluciennik, and Rao, 1976). Infrastructure development thus not only backs up industrial expansion and economic growth but also can provide backward linkages to stimulate upstream heavy industry in terms of input-output relations.

This approach has most recently been redeployed in 2007 when Japan offered economic cooperation to India to assist the latter's 5-year plan to modernize power and transport infrastructure, especially the Delhi-Mumbai rail system. India's Stage-II rapid growth (around 9-10%) is outpacing infrastructure development, which is said to be set up for 5-6% growth (Kumra, 2007). Kawasaki Heavy Industries will set up a joint venture with Indian Railways to produce 1,900 freight cars over the next 15 years. Mitsubishi Heavy Industries will invest in local production of boilers, while Toshiba Corporation will make generators and turbines in India. Komatsu is already locally producing hydraulic excavators and dump trucks to be used at coal mines, and also plans to produce construction equipment for infrastructure development.[18] All these outputs

[17] "IBJ and traders seek big oil deal with Mexico," *Japan Economic Journal*, December 19, 1978.
[18] "Japan firms step up India investment," *Nikkei Weekly*, August 20, 2007, p. 1.

will be used as inputs for the construction and development of India's power supply and transport service.

4.1.4. Problems of Stage-II growth: Concluding observations

The above analysis of the Asahan formula as it emerged as a recognizable pattern of Japan's resource diplomacy during the 1970s is meant only to illustrate how resource-indigent Japan once endeavored to secure natural resources at the height of its Stage-II growth, in which heavy and chemical industries became the leading sector of the Japanese economy at that time, thereby intensifying the use of minerals, petroleum, and natural gas. In 1970, for example, the resource requirements of Japan's industrial structure were once the world's highest, despite the fact that Japan is one of the most resource-poor countries. Japan, compared with the United States and Germany (West), yet exhibited the *highest* concentration of industry in the sectors consuming the most resources and the lowest concentration in the sectors consuming the least resources (Ozawa, 1979), a clear sign of its Stage-II growth. Small wonder, then, that Japan was then compelled so aggressively to secure resources overseas.

Although Japan's economic cooperation was welcomed by resource-rich developing countries, its resources requirements also had to be additionally satisfied by stepped-up resources imports from the advanced countries with rich natural endowments such as Canada and Australia. These advanced countries, however, felt uncomfortable watching their trade relations with Japan evolve into the old colonial pattern—exporting natural resources and importing manufactures. This feeling was clearly expressed by a high-ranking Canadian official during the Trudeau administration:

> It is not much of an exaggeration to say that Japanese governments have looked upon Canada in recent years as a large open-pit mine; as an endless and reliable source of raw materials to satisfy the Japanese industrial appetite… it will be necessary for Japan to recognize the quality and the competence of Canada in a variety of economic and non-economic fields; to do more than, as is now the case, regard Canada primarily as an object of its "Resource Diplomacy."[19]

[19] Head (1974).

A similar resentment was also felt in Australia and the United States which developed a trade pattern of importing manufactured goods such as automobiles and electronics, while selling primary goods for a large part of their exports.

In the meantime, however, Japan as the world's resource-processing workshop importing raw materials and then exporting finished products—and as a geographically small archipelago country—was quickly bumping up against the environmental limits of concentrating on pollution-prone heavy and chemical industries at home. Indeed, the environmental decays in Japan had already reached intolerable levels by the early 1970s, and its quest for overseas resources brought about tensions with the advanced West, whose oil majors and other resource-extractive companies were then controlling and governing the world markets for those commodities.

With the above developments as a backdrop, the Japanese government adopted an epoch-making policy to restructure Japan's industry, a proposal made by the Industrial Structure Council, the MITI's consultative organ. The policy emphasized a shift from "pollution-prone" and "resource-consuming" heavy and chemical industries towards "clean," "knowledge-intensive" and "consumer-oriented" industries, and assigned overseas investment a new role—that of a catalyst to "houseclean" the economy by way of transplanting resource-processing activities where resources are located (as exemplified by FDI in aluminum smelting). The Japanese popularly described this shift as a move away from "*ju-ko-cho-dai* [heavy-thick-long-big]" goods such as steel, ships, and heavy machinery (Stage-II goods) and a push for "*kei-haku-tan-sho* [light-thin-short-small]" goods, as best represented by Japan's fuel-efficient subcompact cars (Stage-III goods) and miniaturized consumer electronics such as transistor radios, portable TV sets, and transistorized CVRs (Stage-IV goods).

As Japan's industrial structure was successfully upgraded to climb the ladder of economic development, as predicted by the FG paradigm, its resource requirements began to mitigate *relative to* the ever-rising GDP levels, if not in absolute terms. In fact, Japan soon transformed itself into one of the most efficient users of energy. Its energy and resource saving innovations, too, helped accelerate this development. Japan's dependence on overseas resources, therefore, accordingly declined relative to its GNP. As illustrated in Figure 3, when viewed from a resource-exporting country's standpoint

(as is the case with Australia), Japan's share as a resource export market began to decline considerably (as its per capita GDP rose), while other catching-up countries quickly replaced Japan as they entered Stage-II growth. This vicissitudinous pattern is appropriately called the "boomerang" effect. But it also represents a flying-geese pattern of tandem growth among the Asian countries: Japan was followed closely by Taiwan and Korea (NIEs, while Hong Kong and Singapore mostly skipped Stage-II), and then by the ASEAN-4. China and India are now about to trod on the same path. All this is meant just to illustrate that a country's excessive resource dependency (relative to GDP) is a *transitory* stage-specific phenomenon which eventually moderates at higher mature stages of growth.

INSERT FIGURE 4

In short, the resource diplomacy pursued by Japan during the height of Stage-II growth can be summarized as follows:

(i) Close collaborative efforts between industry and the home government, though usually initiated by the private sector, in search for stable supplies of overseas resources.

(ii) Such joint efforts were crafted as good-will diplomacy of economic cooperation to assist *regional* economic development in partnership with the host government, and its implicit selling point was that Japan was in an ideal position to offer advice on industrialization since it had only lately succeeded in a miraculous catch-up growth (i.e., the "Japanese model").

(iii) The Ex-Im Bank of Japan played the role of the major financier, along with other foreign aid agencies, OECF and JICA. The Ex-Im Bank provided financing of machinery exports that were needed for a project and extended long-term concessionary loans to the host government, while OECF became the major shareholder of a Japanese investment company (consisting of a consortium of Japanese firms) specifically set up for the overseas project involved. JICA gave technical and managerial training to the local partners and provided assistance and funding for the development of project-specific infrastructures. The participating Japanese corporations were able to secure funding from their *keiretsu*-affiliated banks, whose liquidity was in turn augmented by the Bank of Japan, which was under the purview of the Finance Ministry in those days.

(iv) Japan's economic cooperation focused not only on infrastructure per se but also on developing "infrastructure inputs" industries such as cement, steel, rolling stocks, machinery, and others that could contribute *directly* to both the construction of infrastructural facilities and the long-term industrialization of host countries.

(iv) Japan's resource diplomacy was also supported by its effort to reduce excess foreign exchange reserves (i.e., to recycle trade surpluses by investing overseas) so as to ease upward pressures on the yen—that is, exchange rate management. When Japan was in the midst of Stage-II growth during the 1970s, it was enjoying ever-growing trade surpluses and hence rising foreign exchange (mostly U.S. dollar) reserves. Japan tried to avoid any abrupt rise in the value of the yen after the collapse of the IMF system in the early 1970s, and encouraged overseas investment as part of the "yen defense" program.

4.2. China's quest for overseas resources

Now that China is in the midst of Stage-II expansion, its growth is registering inflection-point rates hovering 10 to 12% a year, and its efforts to acquire resources overseas are exhibiting many similar characteristics just as Japan's. At this point in time, China still has one leg in (though about to graduate from) Stage-I labor-driven manufacturing, but has the other leg also in Stage-II industries. Being highly export-oriented, China has been accumulating a huge amount of foreign-exchange reserves (about $1.3 trillion by the end of 2007). Being desperately in need of raw materials and energy, therefore, China is thus in a fortunate position to exercise its enormous purchasing clout in procuring resources overseas. Realizing that even resource-scarce Japan successfully rebuilt and modernized heavy and chemical industries in the postwar period, Chinese officials visited and studied Japan's approach to resources acquisition abroad. Hence, there are, as might be well expected, some near-identical parallels between the two countries' approaches; these include an offer of advice and aid for economic development in the host countries by each using their own successful catch-up model as a key selling point, the role of each country's Exim Bank as the major financier of resource-extractive projects, a collaborative endeavor between the state and the private sector, and the use of abundant foreign-exchange reserves as the source of funding overseas investments (and as a way of moderating upward pressures on their currencies—and all this against the

backdrop of some serious growth-caused environmental problems at home. As detailed below, nevertheless, China's approach is far more different in political aspects and impact than Japan's.

Over a short span of time China has already emerged, at an amazing speed, as the world's largest producer of steel, cement, flat glass, and aluminum. In addition to a rapid buildup of heavy industry, the recent rise in China's standard of living means more western lifestyles geared to high energy consumption. For example, the Chinese quickly abandoned bicycles and are eagerly buying automobiles. China is now the world's second largest producer of cars and trucks only after the United States, surpassing Japan. All this is, furthermore, accompanied by headlong infrastructure development, whose facilities are highly intensive in the use of steel, cement, chemicals, and energy. These changes in industrial structure and lifestyle quickly translate to an explosive rise in demand for more raw materials and energy. What makes China's needs for resources unnecessarily even more urgent, moreover, is that its heavy industry plants, shopping malls, and residential houses do not operate as efficiently, or control pollution as effectively, as their counterparts in the advanced world. The *New York Times* (Kahn and Yardley, 2007), for example, reports, citing the World Bank as a source of statistics:

> Chinese steel makers, on average, use one-fifth more energy per ton than the international average. Cement manufacturers need 45 percent more power, and ethylene producers need 70 percent more than producers elsewhere… Each year for the past few years, [moreover,] China has built about 7.5 million square feet of commercial and residential space, more than the combined floor space of all the malls and strip malls in the United States… Chinese buildings rarely have thermal insulation. They require, on average, twice as much energy to heat and cool as *those in similar climates in the United States and Europe*… A vast majority of new buildings—95 percent, the bank says—do not meet China's own codes for energy efficiency (p. 8, emphasis original)

These inefficient uses of energy surely leave a lot of room in conservation that allows for reducing energy requirements--and simultaneously alleviating the environmental problems.

Be that it may, it should be kept in mind that *China's current aggressive search for minerals, petroleum, natural gas, and other commodities is nothing but a replay of what the advanced West was once engaged in and what Japan likewise more recently exhibited in its resource diplomacy, though their modus operandi are expectedly quite different.* Interestingly enough, as Japan risked the criticism of its neocolonial trade pattern, China is now similarly criticized for reviving a colonial relationship in Africa, as seen below.

4.2.1. No-strings-attached

The most controversial feature of China's scramble for resources abroad is that it eagerly extends good-will diplomacy of economic cooperation to the local regimes whether or not they are dictatorial, authoritarian, and/or corrupt. This "no-strings-attached" approach is understandably welcomed by the local regimes in Africa, Latin America, and elsewhere in the Third World. In contrast, the United States and Europe—and the international organizations such as the World Bank—tie loans and aid to the sensitive issues of human rights, democracy, and governance. However, *China separates, business from politics, as it does at home. After all, capitalism, newly permitted and tolerated at home since the 1978 open-doors policy, merely serves as a means of bolster national wealth and power under communism.* This unique "Chinese model" of catch-up is marketed in combination with commerce and aid--all in return for resources. The model shows that *market capitalism can be made compatible with any non-democratic political regimes (including authoritarianism) in the developing world*. This is the *core* of China's pragmatic state (communism)-led capitalism.

In addition, China has remarkably succeeded in reducing poverty to a significant extent (more than 100 million people out of absolute poverty), a valuable experience that led China to set up in 2005 a development center, the International Poverty Reduction Center, in China with the support of the United Nations and World Bank. The Center trains about 300 anti-poverty officials, mostly from Africa.[20]

In comparison, Western aid to the developing countries is centered on *intangible* general public areas such as education and health (notably combating malaria and AIDS). China's aid is, on the other hand, focused on *tangible* bricks-and-mortar infrastructures

[20] "Experience in poverty reduction to be shared," *China Daily*, June 22, 2006, p. 1.

such as dams, power plants, railroads, highways, port facilities, succor stadiums, technical institutes, farming parks--and even presidential palaces and satellite launching.

At present China's no-strings-attached partnership is most extensively and intensively offered to Africa where China early on established ideological solidarity against Western colonialism during the Cold War, carving out its sphere of influence. Maoists used to give hospitals, football stadiums, and railways to win Africa's hearts. Now China just likes to win African resources by building on its past partnership. China's recent stepped-up involvement in Sudan, a civil war-torn country with the humanitarian catastrophe in Darfur, is a prime example:

> China is Sudan's biggest investor and buys two-thirds of its oil. During his visit there [in early 2007], Hu [Jintao] offered a $12.9 million interest-free loan to build a presidential palace for Sudan, wrote off $70 million in debts to China, reduced import tariffs on Sudanese goods, and offered a $77.4 million loan for infrastructure and a grant of $40 million.[21]

Similarly, other telling examples are China's cooperation programs with Angola and Nigeria:

> Across Angola, Chinese workers are busy rebuilding roads, railways and technical institutes. The work is financed by a US$2 billion low-interest loan from China Ex-Im Bank. One of the key Chinese-funded projects is the reconstruction of the 1,300-kilometre railway from the west coast city of Benguela to Angola's eastern border with the Democratic Republic of Congo.[22]

> [China is] helping Nigeria to launch a second satellite into space. Some officials, *disillusioned with the Western development model*, say that *China gives them hope that poor countries can find their own path to development* (emphasis added).[23]

[21] "China bolters ties with Africa: Beijing's sway worries U.S.," *Japan Times*, Feb. 8, 2007, p. 4.
[22] "Energy partnership based on equality," *China Daily*, June 22, 2006, p. 1.
[23] "China in Africa: Never too late to scramble," *Economist*, Oct. 28, 2006, pp. 53-56.

And in addition to China's big state-owned oil and mining companies, whose investments in Africa, the Middle East, Central Asia, and the Americas are sparking political frictions with the U.S. and Europe, its private businessmen are also joining the hunt for resources abroad by adopting a consortium approach:

> Private Chinese companies are looking to places such as Indonesia and Ecuador. In April [2007], 40 such companies traveled to Pakistan and signed deals to develop oil fields, refineries, pipelines and coal mines worth a total of more than 10 billion yuan ($1.28 billion)… The highest-profile member of that delegation was Gong Jialong, chairman of Great United Holding Co., a consortium of several dozen private Chinese companies involved in small-scale oil production and refining.[24]

In short, China's search for resources is focused on the developing world at the moment, often involving in those countries that are shunned by or even sanctioned by the West for political reasons. To cite major examples, China is scrambling for oil in Africa (Angola, Somalia, Sudan, Zimbabwe, Ethiopia, Libya, Nigeria, and Gabon), the Middle East (Saudi Arabia and Iran), and Latin America (Venezuela); for copper and cobalt in the Democratic Republic of Congo and Zambia; for uranium in Namibia; for bauxite in Guinea; for iron ore in South Africa and Brazil; for timber in Gabon, Cameroon and Congo-Brazzaville.

4.2.2. New colonialism?

China's enormous appetite for resources has significantly contributed to high commodity prices, which are no doubt benefiting resource-exporting Stage-I countries. This has been a boon to most of Africa in particular. Yet China's charm offensive is not always welcomed by ordinary African people, though surely appreciated by incumbent politicians and government officials. There is reportedly a spreading grass-root backlash against Chinese investments, goods, and the settlers who create a Chinese diaspora. Sudan alone hosts more than 30,000 Chinese businessmen and construction workers who

[24] "Feeding China's Oil Thirst: Entrepreneurs Join Hunt for Resources," *Wall Street Journal*, Jan. 2, 2007, p. A10.

are catered by their restaurants, supermarkets, and recreational facilities.[25] Chinese workers, rather than local workers, are mostly employed to construct infrastructure facilities. These situations often cause local frictions and backlash, and more are expected as China steps up its effort to lock in resources even in the remotest corners of Africa. "A Chinese diaspora in Africa now numbers perhaps 80,000, including labourers and businessmen, who bring entrepreneurial wit and wisdom to places usually visited only by Land Cruisers from international aid agencies." [26]

Resentment by local populace is said to be the strongest in Zambia--mainly because of the tragic explosion of a Chinese-owned factory that produced explosives for the region's mining industry, killing 46 Zambian employees in April 2005, and the way the factory handled the post-accident affairs.[27] And even when South African President Thabo Mbeki signed on and launched the China-South Africa economic trade and cooperation, he warned that China might be risking "to replicate in Africa a 'colonial relationship' of the kind that existed under white rule."[28]

A colonial pattern of trade is rather a natural outcome of China's resource offensive. Besides, China may be entrapping Africa in the familiar "resource curse," that includes what may be called the "Chinese disease,"[29] to paraphrase the Dutch disease, in which the bid-up price of commodities and the cheap price of manufactured imports from China crowd out the local manufacturing sector for investment and discourage labor-driven economic development. Resource extraction may also be carried out in environmentally incorrect ways. The *Economist* editorializes on these issues:

> China is doing its bit to improve infrastructure, building roads and railways. But it could do more to open up its own markets. China is quite open to yarn, but not jerseys; diamonds, but not jewellery. If it has as much "solidarity" with Africa as it claims, it could offer to lower tariffs on processed goods. Chinese firms have also ignored international initiatives to make project finance greener

[25] "Chugokujin, Sudan de Seiko [Chinese succeed in Sudan]," *Asahi Shimbun*, Nov. 23, 2006, p. 15.
[26] "Africa and China: Wrong model, right continent," *Economist*, Oct. 28, 2006, p. 17.
[27] "In Africa, China's Expansion Begins to Stir Resentment," *Wall Street Journal*, Feb. 2, 2007, p. A1.
[28] *Ibid*., p. A1.
[29] Other causes of the curse include a long-term deterioration in terms of trade vis-à-vis industrialized countries (i.e., the Plebisch-Singer effect); the instability of revenues from primary exports; the Laffer effect of the "feast and fast" cycle in government spending; and compelled specialization in the primary sector that is more likely to diminishing returns than the manufacturing sector.

(the "Equator Principles") and to make mining industries cleaner (the "Extractive Industries Transparency Initiative"). Even with China's backing, these outside efforts might not succeed: honesty and greenery come from within. Without it, they will certainly fail.[30]

It is in the same vein that China's infrastructure projects overseas, notably in Africa, are criticized as gaps are revealed "between China's commitment to international standards regarding good governance and environmental protection and actual practice on Chinese projects" (Bosshard, 2007, p. 1).

Interestingly enough, most of African countries being the former colonies of Europe, the EU has recently taken the initiative to forge an EU-Africa-China dialogue on infrastructure (Wissenbach, 2007). No doubt, the EU must have felt strongly that it was tarnished as the former colonizer of Africa and sidetracked by China's resource diplomacy. In 2007 the European Commission gathered together 180 delegates from the three parties at a conference as the first step towards establishing rules of engagement in, and forming a tripartite partnership for, Africa's economic growth and infrastructure development.

4. History Repeats Itself: Summing Up

History does repeat itself, particularly in the context of economic development and growth. The reason is clear: In the history of global growth have there been, and are, always a leader and a group of emulators and laggards in economic growth, innovation, and infrastructure development. Leaders have usually been replaced as others catch up. At any moment, nevertheless, a *hierarchy* of countries prevails, as they are differentiated by per capita income and stage of growth. Any catching-up country's development is basically a *derived and emulative* process and *cannot be self-contained and autonomous*. Latecomers necessarily *emulate and learn* from early starters, often reaping "latecomers' advantages" (a phrase introduced by Thorstein Veblen, 1915). Expectedly, therefore, latecomers' behaviors normally replicate what their earlier starters have done before (Ozawa, 2005). And this process is all the more facilitated by the present ICT revolution

[30] "Africa and China: Wrong model, right continent," *Economist*, Oct. 28, 2006, p. 18.

that substantially diminishes the constraints of time and distance in knowledge diffusion—and by the current trend of trade and investment liberalization that attracts more operations of TNCs as transferors of firm-specific industrial knowledge. All this universal evolutionary development is expounded on in the FG theory presented above.

The advanced West early on went through Stage-II growth and carried on the hunt for resources and markets overseas under colonialism. Western TNCs were once engaged in infrastructure development and institution building in their colonies. Extant railways, sea ports, administrative institutions, and cultural heritages (including common languages) are the major remnants that still serve their useful purposes in the former colonies, though limited in many respects for modern times. Japan likewise ventured out on a similar path--both before WWII (under its own brand of colonialism) and after the war (under its resource diplomacy during the 1970s). And necessary infrastructure and institutions were built by the Japanese in those developing countries that were able to supply resources. China's current scramble for resources overseas is understandable and predicable from the FG model, since it is in the midst of Stage-II growth. Its "no-strings-attached" approach is controversial. So was, nevertheless, surely colonialism--and though to a lesser extent, so was Japan's resource diplomacy as well. Indeed, history repeats itself, albeit in a modified fashion at each time.

In essence, the current mode of economic catch-up in the developing world is basically preprogrammed in terms of the growth experiences of the advanced West. The ladder of economic development (as seen in Figure 1) has been built by hegemonic countries in the past and is now held up as a model for any aspiring developing country to emulate. Yet this model of growth is embedded in high energy and resource consumption, especially petroleum, and leads to a host of environmental problems, especially when a catching-up country happens to be in Stage-II growth. No wonder, then, that China is currently in the spotlight of world attention and criticism. The rapid growth of heavy and chemical industries accompanied by pollution and China's hunt for resources, however, are merely divulging the structural weaknesses of the (hegemon-provided) ladder of economic development. As one study puts it,

> …the chief economist of the International Energy Agency predicted in April 2007 that China would become the world's largest emitter of carbon dioxide

> were still vastly lower than those of the United States at 19.6 tons per capita and year. As China is increasingly catching up, these figures demonstrate that *the development model pursued by Western societies is not globally sustainable*. If the consumption patterns of the industrialized world are the model for poorer societies, even the strictest environmental policies of financial institutions will not contain the environmental damage that the resource extraction required for this will cause (Bosshard, 1970, pp. 18-19; emphasis added).

At the moment, however, the Western development model is the only viable one, if not first-best. Its alternative option, the Soviet-style centralized-regime model of growth proved to be a failure. However imperfect it may be, capitalism is highly malleable and capable of constantly evolving in adaptation to the changing socio-politico-economic conditions around the world–yet always with private property and market competition as its distinctive foundations. Capitalism is an amazing machine of innovation (Baumol, 2002); hence it will be likely able to cope with the environmental problems over a long haul. For example, although Japan experienced probably the world's worst case of pollution around the late1960s, it has ever since been quite successful in introducing pollution-control innovations to help clean up the environment.

Furthermore, a particular country may be in Stage-II growth, thereby displaying its *stage-specific* attributes (the intensity of resource use and a voracious appetite for overseas resources). As it moves up the ladder of economic development, however, such attributes in their pronounced form are to disappear at higher growth stages. China's frantic search for resources is transitory, and its economic behavior will alter as it joins the ranks of the advanced countries. India, too, is presently bent on bolstering heavy and chemical industries, and it will go through the similar stage-delineated experiences as it moves up the ladder of economic development.

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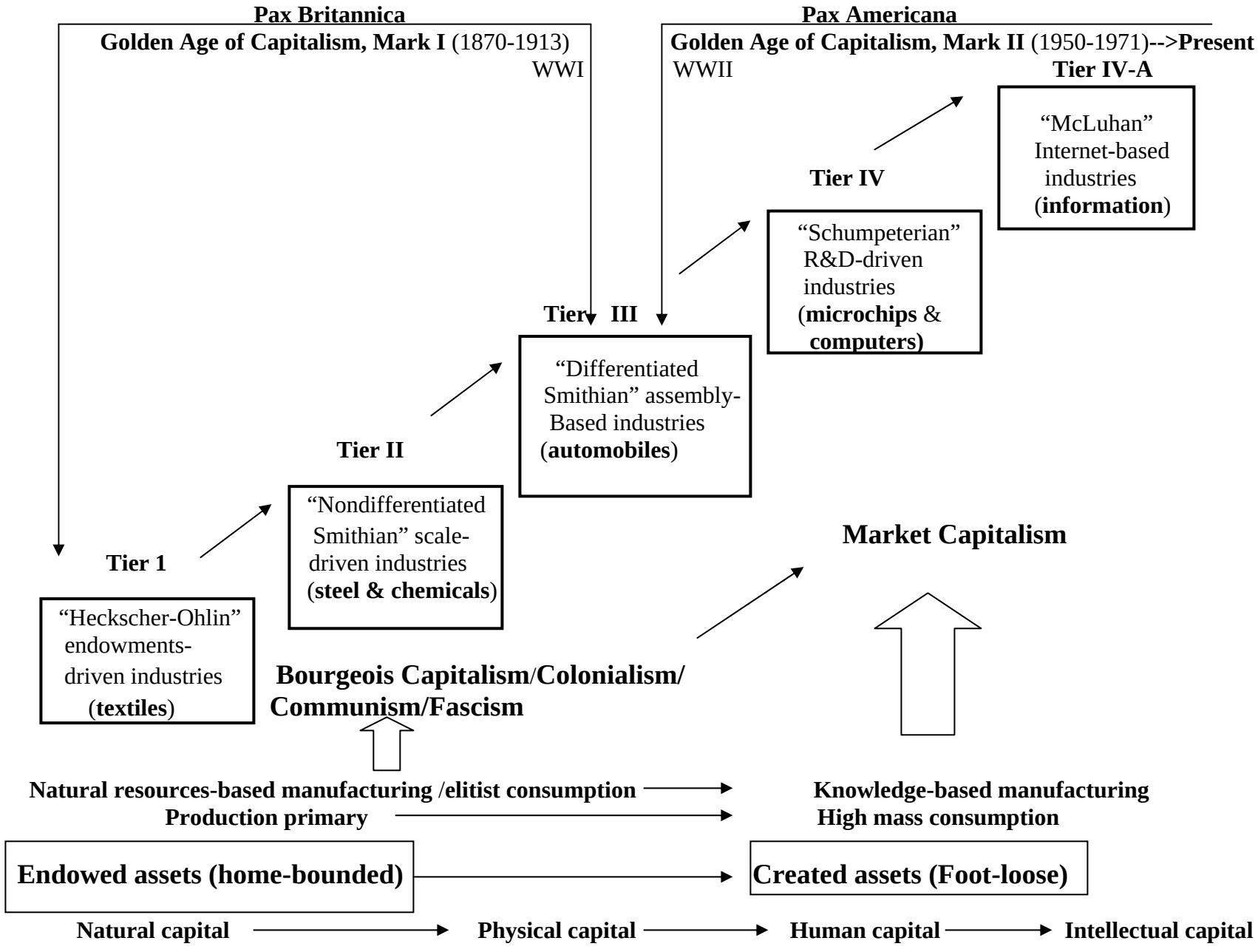
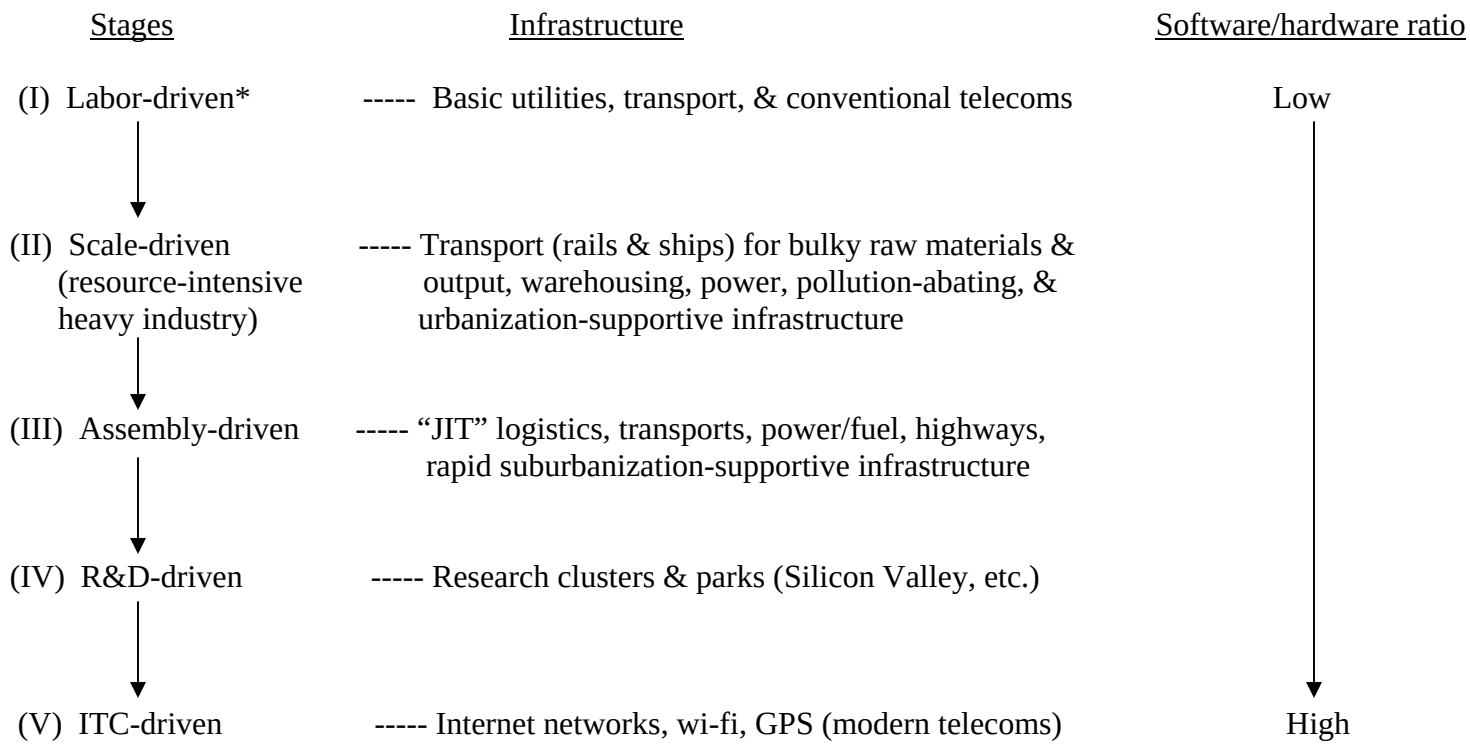
Figure 1 Structural upgrading under Pax Britannica-led and Pax Americana-led macro-clustering



Source: based on Ozawa (2005)

Figure 2 Stages of growth and infrastructure development



*At stage one (i), resource-rich developing countries normally pursue "resource-driven" (in lieu of labor-driven) growth exporting primary goods such as petroleum, natural gas, minerals, timber, and agricultural goods. Phase-II countries (as is currently the case with China and India) eagerly seek resources overseas, thereby creating strong demand and driving up the price of resources. This promotes growth in resource-rich countries. The infrastructure required are basic utilities (including desalination in the Middle East), transport, pipe lines, ports, and LNG stations.

Figure 3 Infrastructure for production vs. consumption purposes (shares, %)

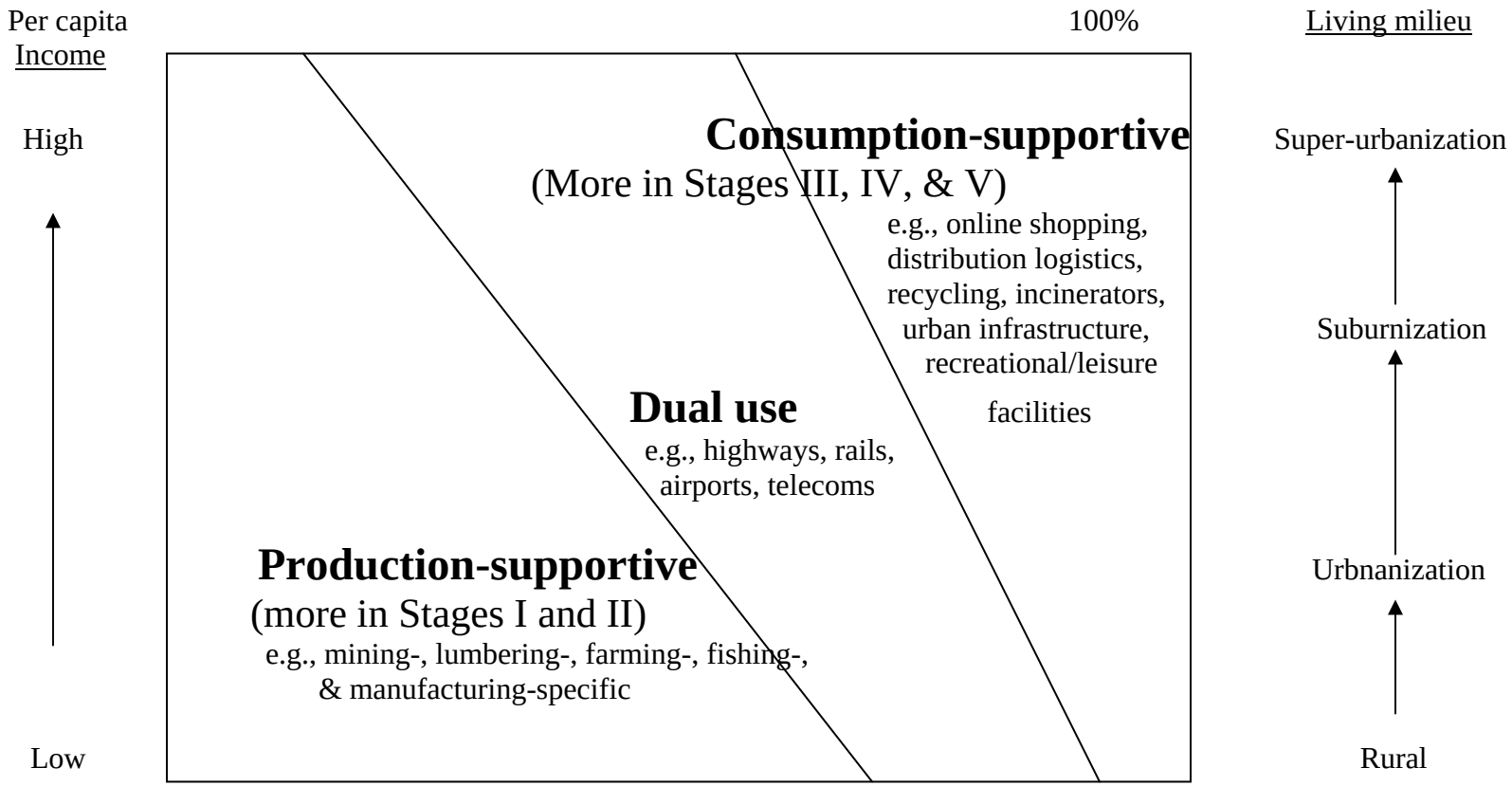
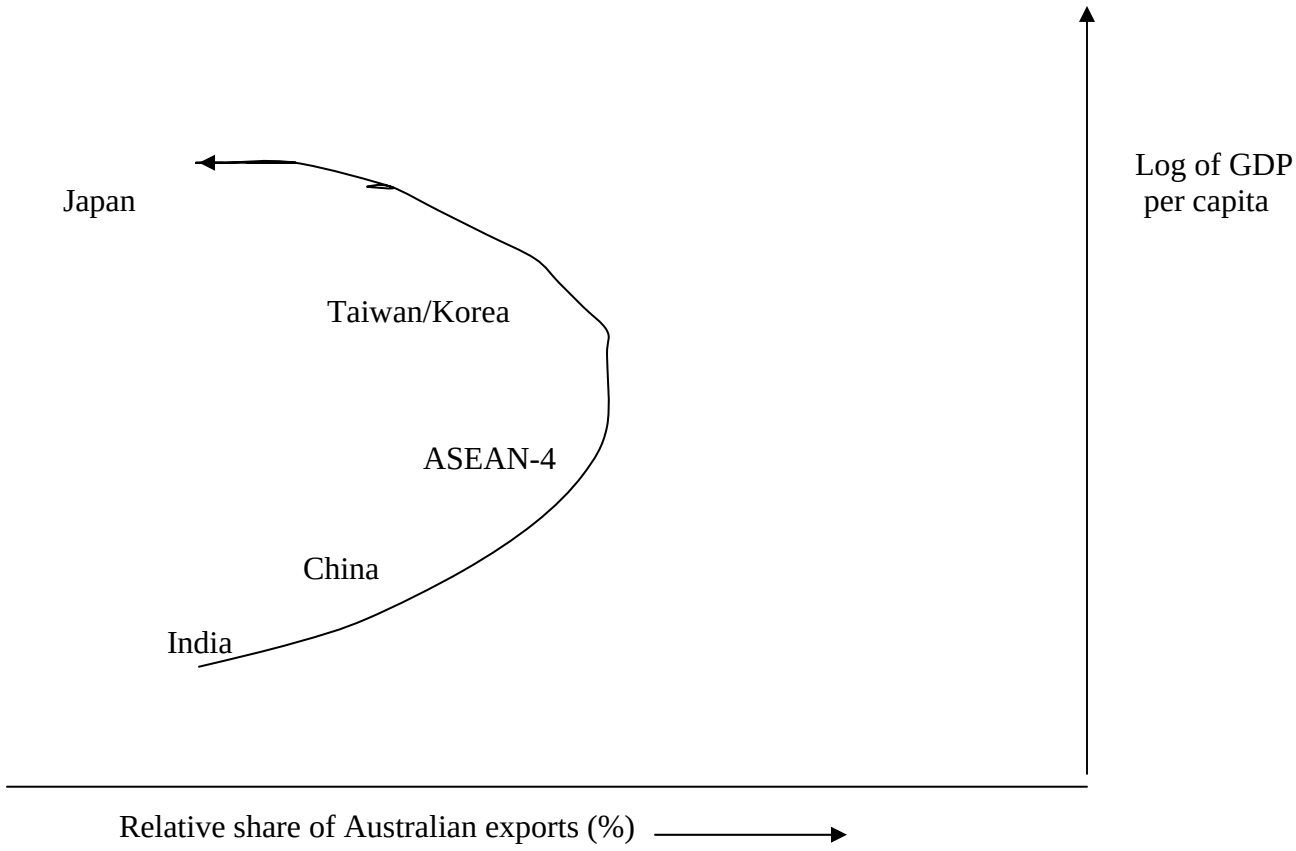


Figure 4 "Boomerang" – Demand for Australian resources exports



Source: Based on Chart 5 in "A survey of Australia," *Economist*, May 7, 2005, p. 10.

Table 1 Japan's projects in return for oil and natural gas in the Middle East immediately after the first oil crisis of 1973

Host countries	Projects
Abu Dhabi:	an LNG station and a cement plant
Algeria:	2 cement plants, an oil refinery, an ethylene plant, and telecoms
Iran:	3 cement plants and a steel-sheet plant
Iraq:	3 fertilizer plants, an LNG plant, and an oil refinery
Kuwait:	2 desalination plants and a power plant
Saudi Arabia:	2 oil refineries, 2 cement plants, and a steel-pipe plant
Syria:	an oil refinery
Qatar:	a steel plant
Egypt:	a steel plant

Notes: In addition, economic development advisory was offered to Algeria, and Agricultural development planning to Saudi Arabia. Projects were mostly joint ventures but infrastructures (e.g., power plants and desalination plants) were BOTs.

Source: Ozawa (1976); information gathered from newspaper articles and government reports.