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EAST ASIAN INDUSTRIAL PIONEERS: JAPAN, KOREA AND TAIWAN

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East Asian Industrial Pioneers: Japan, Korea and Taiwan

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Many scholars have attempted to fit the East Asian industrialization experience into what is often called the “flying geese pattern” of development. Japan in this view was the leader and innovator and the other economies of East Asia followed the leader. When this model was applied to all of East and Southeast Asia, however, it fit poorly. Hong Kong and Singapore followed a much more laissez faire approach and while many Southeast Asian economies at times attempted an approach similar to that of Japan, the results were often failures. Korea and Taiwan, however, were colonies of Japan (from 1910-1945 and 1895-1945 respectively) and there is no doubt that their post 1960 industrial development policies and the nature of the supporting institutions were influenced by the Japanese experience, probably more so in Korea than Taiwan. Korea’s post independence leadership, for the most part, grew up under Japanese rule while Taiwan’s political leadership after 1945 came from the Chinese mainland.¹

When Japan initiated its industrialization drive, however, it faced a different context from that facing Korea and Taiwan a half century or more later. Japan was a true pioneer in that it was the first non European/North American economy to achieve sustained industrialization and modern economic growth. In a broader sense, of course, Japan was a follower country that learned from the first pioneers of industrialization, notably England. The context Japan faced in the latter decades of the nineteenth century and the first decades of the twentieth, however, was very different from the context that faced England and the United States although it had more in common with Germany.²

When Japan began to modernize its economy, it faced a world dominated by British free trade views and practices. Japan was forced to accept those views in the treaty that opened up the economy—mercantilist policies where exports were pushed and imports tightly restricted were impossible until much later. Japan’s economy was influenced by World War I that cut off Asia from most trade with Europe followed by a decade of comparative prosperity in much of the industrialized world that then turned into the Great Depression of the 1930s and the Second World War. Facing a similar world situation after 1914, many economies in South America began an industrialization drive based heavily on import substitution behind high trade barriers. Japan followed a very different path, one that initially took advantage of the world’s open trading system followed then by the trade protection provided by World War I but done without recourse to high tariffs and other trade restrictions. Japan changed course during the trade wars in the 1930s and this change was further reinforced by the country’s decision to become a major colonial power in Asia with the help of the Japanese military.

The international context in which Korea and Taiwan began their industrial drive was different from that facing Japan earlier in a number of ways. To begin with, a quarter century had

¹ These issues are discussed at length in Dwight H. Perkins, *East Asian Development: Foundations and Strategies* (Harvard University Press, 2013).

² For a comparison of the German and Japanese development experience, see David Landes (1965).

passed from the time when Japanese industrial development was governed by and then destroyed by war. During that time there had been steady industrial expansion and technological innovation particularly in North America. The backlog of untapped technology available to newly industrialized nations was thus substantially larger than it was in the mid-1930s. Japan itself took advantage of this backlog and it is likely that it accounts for a significant part of the rapid growth spurt that Japan experienced between recovery from the Second World War usually dated as 1953 and its slowdown to more normal high income country growth rates in 1973. The backlog of technology available to Korea and Taiwan had accumulated not just for twenty-five years but for more than half a century and it was a major reason why industrialization in those two economies, once it started, grew at double digit rates for three decades.

Korean and Taiwan's industrialization, unlike that of the early Japanese experience, did not face a Great Depression and they could export into the wide open economy of the United States during their first growth spurt. They also, unlike Japan, were not subject to a treaty prohibiting them from raising protective barriers for their domestic markets. Mercantilist policies that promoted exports and limited imports were possible in Korea and Taiwan in ways that were not available to Japan before the Great Depression both because of Japan's treaty obligations on tariffs until 1899 and then the implicit rules of the inter-war world economy. Nor did Korea and Taiwan face anything remotely comparable to the trade wars and buildup to all out war in Europe and Asia that characterized the 1930s. South Korea and Taiwan, however, controlled territories that were determined by the outcomes of post-1945 civil wars, civil wars that to this day have not been formally ended. Industrialization policies in both economies as a result were heavily influenced by the possibility that economic failure could lead to their being swallowed up by the opposing sides in their civil wars.

In what follows we begin with a discussion of the Japanese industrialization experience before the Second World War. That is then followed by an analysis of the industrialization of Korea and Taiwan after the Second World War.

Japan

Among the countries in the industrial periphery in the twentieth century, Japan was unique in starting its industrial development in the late 1800s and successfully maintaining its momentum over the following decades to become fully industrialized in the first half of the next century.³ This transition is even more remarkable given the country's political fragmentation; agrarian economy; reliance on handicraft and traditional techniques for manufacturing; and relative isolation from international markets. By the early 1900s, however, the country had an integrated domestic market connected by railroads; was a leading exporter of textiles and light manufactures; and had burgeoning modern sectors in metal processing, machinery, and chemicals. Institutional and political change was also vigorous, with the country adopting foreign practices like central banking (1882), commercial (1893) and civil (1897) codes, the gold standard (1897), and an overseas empire following wars with China (1894-95) and Russia (1904-05).

³Pre-conditions for modern industrial growth preceded the Meiji Period during the Tokugawa era (1603-1868), including a well-developed internal market for commodities and finance and significant human capital in terms of education and literacy; see Crawcour (1974, 1997a) and Lockwood (1954).

While the contours of Japan's transition from a traditional to an industrial economy have been studied in great detail, identifying turning points in the process remains an active subject of scholarship.⁴ Moreover, there is revived interest in the factors contributing to the country's successful industrial performance and their relative importance.⁵ This chapter adds to the literature by providing an overview of Japan's pre-war economy, but focusing on the changes to its industrial structure and other features coinciding with the country's development.

I. Early modern period and historical background

The historical context of modern Japanese economic growth is well-known: following the opening of the country to western commerce in the mid 1800s, the Tokugawa, then the Meiji government rapidly adopted foreign technologies for national defense and to "catch-up" with leading industrial nations like the United Kingdom and United States.⁶ Physical infrastructure via railways was coupled with political centralization in the hands of the Tokyo-based Meiji government also contrasted with the semi-autonomy exercised by domains in the Tokugawa Period, facilitating the spread of literacy, legal institutions, and finance.⁷ Universal primary education, funded by local authorities, was announced in 1872 and made compulsory in 1890, and institutes were established to disseminate agricultural and technical best-practice.⁸ The tax and land reform in 1873, which also discontinued samurai stipends in lieu of government bonds, provided a more reliable public revenue stream to finance industrial projects like the infrastructure, a conscript army, and model enterprises in engineering, arsenals, shipbuilding, and textile production.⁹ However, only after the Matsukata deflation in the early 1880s did public finances stabilize, which followed a period of currency debasement and experimentation with a national banking system.¹⁰ Major policies pursued by successive administrations included promulgating a constitution with limited suffrage (1889); colonization of Taiwan (1895) and Korea (1910); and renegotiating treaties with western nations to regain legal jurisdiction over foreign nationals on Japanese territory (1899) and tariff autonomy (1911).

Strained finances in the late 1870s from trade deficits, modernization costs, and civil unrest suppression forced the government to privatize many of its model enterprises, providing a fillip to the private sector. Entrepreneurs like Shibusawa Eiichi and the zaibatsu conglomerates of Mitsui and Mitsubishi led the expansion of industry and technology while many ex-samurai used their

⁴ E.g., Lockwood (1954), Ohkawa and Rosovsky (1973), and Ohkawa and Shinohara (1979). Historical data collections include the *Estimates of Long-Term Economic Statistics of Japan Since 1868* and those produced by the Japanese Statistics Association (1987).

⁵ Rousseau (1999), Morck and Nakamura (2007), Mitchener and Ohnuki (2009), and Tang (2011, 2013).

⁶ The regime change from the Tokugawa (1603-1868) to Meiji Periods and its underlying causes are discussed in Lockwood (1954), Gordon (2009), and Crawcour (1997a). Much of the following discussion is based on these sources.

⁷ The current division of the country into 47 prefectures dates from 1871, when nearly 300 hereditary domains were consolidated and assigned governors (initially, many of the former lords) chosen by the Meiji government.

⁸ Taira (1997), pp. 273-274, and Crawcour (1997b), p. 67. Pre-Meiji literacy rates were unusually high, approximately 40 and 10 percent for males and females, respectively, and implicated in the country's economic growth.

⁹ Crawcour (1997a), pp. 43-44. Japan also accessed international capital markets, with its first bond offering of one million British pounds in 1870 used to finance the first railway and other public outlays.

¹⁰ Ibid, pp. 46-47.

commutation bonds to invest in the nascent banking sector.¹¹ These banks and other intermediaries in turn provided local sources of financing for modern enterprises.¹² Private business also benefitted from public investment in infrastructure and heavy industries, with the government's share of capital investment averaging 30 to 40 percent of the national total between the late 1890s until World War I, at which point the country had emerged as an industrial economy.¹³

2. Timing of Japan's Industrialization

To date the onset of Japanese industrialization, scholars have used various metrics including growth rates for national output, industrial value-added, and capital formation.¹⁴ Based on these measures, Japan entered its "modern economic growth" period in the early 1880s, the 1890s, or the early 1900s, respectively.¹⁵ All these series have strengths and weaknesses, but share the objective of timing significant shifts in Japan's economic performance. National and per capita output by themselves abstract away from the composition of production, while industrial value-added and capital formation growth rates are both relative measures that do not adjust for developing countries' varying initial stocks of industrial output and investment, especially when compared against leading economies when the latter made their transition in an earlier, but more developmentally similar, period of time.

An alternative approach, with an interest in marking the country's full-fledged arrival to industrialized status as opposed to its take-off, would be to compare industry output share against industrial leaders at a time when the latter would be recognized as being industrialized.¹⁶ For example, using the United States as the reference leading country and its average share of output in manufacturing and construction to total output in between 1895 and 1914, Japan reached a similar stage of industrial performance in 1897, when its share exceeded 11 percent based on a five-year moving average. Similarly, Japan's share of machinery and transport equipment to total manufacturing exceeded 5 percent in 1907, which was the average for the United States in the pre-WWI period, as shown in Figure 1.¹⁷

Figure 1: United States and Japan Industry Shares, 1885-1914

¹¹ Morikawa (1992), Odagiri and Goto (1996), Tang (2011), Yamamura (1997).

¹² Tang (2013).

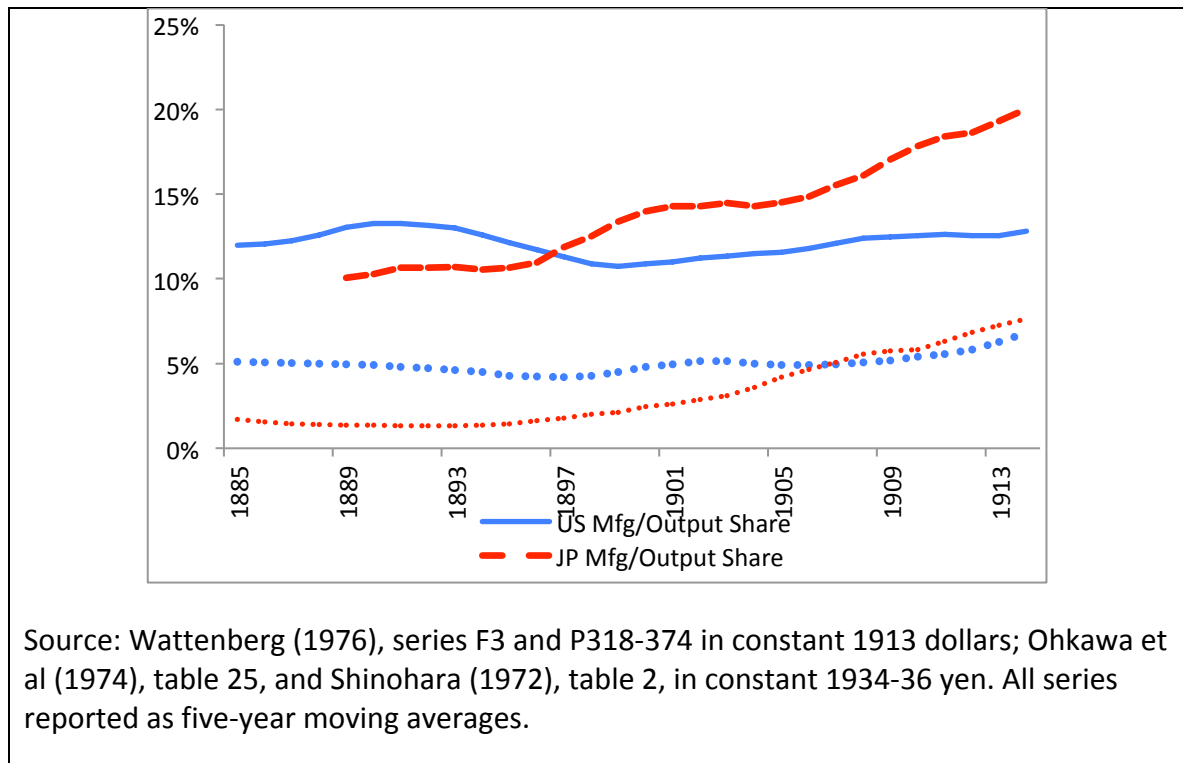
¹³ Crawcour (1997b), p. 52.

¹⁴ Ohkawa and Shinohara (1979), Benetrix et al (2015), and Ohkawa and Rosovsky (1973), respectively. These studies relate to the economic convergence literature, such as Barro (1997) and Rodrik (2013).

¹⁵ Ohkawa and Shinohara (1979), p. 12; Benetrix et al (2015), table 3; Ohkawa and Rosovsky (1973), p. 31.

¹⁶ Benetrix et al (2015) identifies 1899 as the year when Japan joined the "modern growth club," based on having ten years of average industrial growth exceeding five percent.

¹⁷ For Japan, manufacturing comprises ten subsectors: food products; textiles; lumber and wood products; chemicals; stone, clay and glass products; iron and steel; nonferrous metals; machinery; printing and publishing; and other manufacturing (Shinohara 1972). For the United States, manufacturing and construction materials include 44 categories, which are then mapped into the broader industry classification equivalent for Japan (Wattenberg 1976).



The decade spanning 1897 and 1907 coincides with existing studies and highlights a familiar pattern of industrial development. Heavy industries like machinery in Japan followed the same trajectory as the United States, with the two countries shifting toward more capital and resource intensive sectors over the sixty years leading up to the 1930s. In the case of the United States, the shift was from processed food products and textiles to lumber products and wood furniture, with a dramatic increase in machinery output share in the early 1910s coinciding with World War I. Similarly, Japanese food processing declined relative to higher value products like silk and cotton textiles. At the same time, stone and mineral processing and chemical manufactures grew steadily, with the former and machinery accelerating in trend starting in the early 1900s.¹⁸

While Japan remained far behind the United States in absolute and relative output of heavy sectors up through the pre-WWII period, its industrial structure increasingly corresponded with those of leading countries than to the industrial periphery. This is true only in the share of output among industrial sectors, but also in the relative speed with which they grew to economic importance. In particular, the rates of technological diffusion in manufacturing for Japan were faster than the United States in the late nineteenth century, which is striking given the former's much lower initial per capita output.¹⁹ To explain these industrial dynamics, the remainder of this section presents evidence suggesting a confluence of international trade; domestic investment; and exogenous shocks to both the domestic and global economy.

3. The Impact of Trade

¹⁸ See also Crawcour (1997b), pp 51-52. The three subsectors of stone, clay, and glass products; iron and steel; and non-ferrous metals are grouped together in the Japanese data as they individually overlap with their more detailed American equivalents, which are also aggregated to the higher level of classification.

¹⁹ Tang (2015).

Although not colonized, Japan was subjected to numerous predations on its sovereignty, especially in its economic relations.²⁰ In addition to extra-territorial privileges for foreigners residing in its eight treaty ports, Japan had to relinquish tariff autonomy that opened its domestic market to foreign manufactures and reduced potential revenues from its exports.²¹ Import tariffs averaged 3.75 percent between 1868 and 1898, but after regaining autonomy the following year, it rose to an average of 7.65 percent until the eve of World War I.²² In consequence, trade grew rapidly over the course of the Meiji Period, averaging a quarter of national output in the early 1900s and increasing thereafter.

Given its undeveloped manufacturing sectors, Japan initially ran persistent trade deficits as foreign firms vigorously competed against domestic producers and imported capital equipment that were unavailable locally.²³ This changed, however, as the economy shifted toward higher value-added goods and was reflected in its composition of exports and imports. As shown in Table 1, starting from the Meiji Period up to World War II, there is a marked decline in exports of processed food products while textiles grew rapidly to become the top foreign exchange earner for virtually the entire half century. Machinery exports also increased, albeit more modestly. The pattern for imports is more ambiguous: textiles were steadily replaced by food products in the last two decades before the turn of the century, and then by stone and mineral products as well as miscellaneous commodities afterward.²⁴ This suggests that even as domestic industries were increasingly producing more valuable goods for export at the inter-sectoral level, demand within the economy may have been shifting from household consumption toward intermediate products used by firms and capital equipment. However, given the growth of domestically made machinery and its relatively constant import share over this period, Japan was moderately successful in substituting away from foreign capital goods.

Table 1: Disaggregated Trade Shares by Manufacturing Sector, 1880-1930						
Exports	1880	1890	1900	1910	1920	1930
Food Products	39.0	27.5	14.3	12.8	10.9	9.1
Textiles	44.8	44.4	52.4	55.1	57.1	70.4
Chemicals	3.1	4.7	5.4	4.4	4.5	2.2
Stone and Mineral Products	6.4	14.0	15.0	12.7	10.7	5.3
Machinery	0.9	0.9	0.8	2.1	6.0	2.8
Printing and Publishing	0.2	0.6	0.8	1.2	1.6	1.6
Other Manufacturing	5.5	7.8	11.3	11.7	9.2	8.7
Imports	1880	1890	1900	1910	1920	1930

²⁰ Gordon (2009), p. 51.

²¹ Tariffs were set at a maximum of 5 percent ad valorem until 1899, when Japan began to successfully renegotiate its treaties; full autonomy was not negotiated until 1911, before which Japan could set a maximum of tariff of 15 percent (ibid, p. 117).

²² Yamazawa and Yamamoto (1979), table 22. Exchange rates did not play a significant role in period between 1897 and 1914 as Japan was on the gold standard.

²³ Japan's low-tariff, high-growth experience in the pre-war era contrasts with that of most other countries; see Clemens and Williamson (2004).

²⁴ Note that the food products category for trade does not directly correspond with that for industry output in that the former also includes unprocessed food items like grains and livestock.

Food Products	18.2	25.8	27.4	20.0	11.8	19.8
Textiles	57.1	44.3	40.2	39.0	40.6	36.4
Chemicals	4.8	5.0	5.1	7.2	7.2	7.6
Stone and Mineral Products	7.3	5.9	7.6	11.5	21.3	13.3
Machinery	5.6	12.7	12.9	10.7	6.9	8.4
Printing and Publishing	1.1	1.2	1.4	2.3	1.4	1.5
Other Manufacturing	5.8	5.1	5.3	9.3	10.8	13.1
Source: Japan Statistical Association (1987), table 10-2-a in current yen. All series reported as five-year moving averages.						

This movement into more capital-intensive, higher value-added production during Japan's industrialization is highlighted by the evolution of two major sectors: textiles and metal processing. Since trade data are available at a more detailed level than those reported for industrial output, one can examine shifts in domestic demand and supply of traded goods to infer broader structural change among industries and the economy as a whole. For instance, Table 2 shows the trends for the three categories of products in textiles, which indicate that exports moved progressively away from yarn and thread toward finished cloth starting in the 1870s up to World War II. The changing shares were particularly rapid in the two decades prior to 1900, coinciding with period when Japan's share of overall manufacturing to national output matched the threshold of that for the United States. After 1900, the third category of clothing and accessories began to increase its share, although the overall contribution remained in the single digits for most of the pre-war period.

Table 2: Disaggregated Trade Shares in Textiles and Metal Goods, 1880-1930							
Textiles		1880	1890	1900	1910	1920	1930
Yarn and thread	Exports	99.5	93.4	73.3	68.4	62.5	59.2
Fabric		0.3	6.2	25.5	27.8	29.0	37.0
Clothing		0.1	0.5	1.2	3.8	8.5	4.8
Yarn and thread	Imports	31.7	49.9	66.0	75.3	95.0	93.2
Fabric		66.1	47.3	32.9	23.5	4.7	6.4
Clothing		2.2	2.8	1.1	1.1	0.3	0.4
Metal goods		1880	1890	1900	1910	1920	1930
Ores	Exports	87.8	83.8	85.1	75.9	63.2	22.8
Metalwork		12.2	14.7	11.0	10.6	12.9	34.0
Machinery		0.0	1.6	3.8	13.5	23.9	43.2
Ores	Imports	48.6	32.9	30.7	46.9	70.5	52.4
Metalwork		9.3	25.0	18.8	14.4	7.3	7.1
Machinery		42.2	42.1	50.5	38.7	22.2	40.5
Source: Japan Statistical Association (1987), table 10-2-a in current yen. All series reported as five-year moving averages.							

For the heavier industry of metal goods and processing, the three subcategories of metal ores, metal products, and machinery show a similar, but slower, pattern of increasing value added over time. As Table 2 shows, the export share for machinery rose gradually in the 1880s before a

rapid increase in the late 1910s, mirroring large decreases in exported metal ores in the same years. Import trends are less clear, with metal ores having high shares in the 1870s, then falling in the next two decades before rising thereafter. In contrast, machinery imports were highest in the 1880s and 1890s before declining until the 1920s. World War I boosted domestic machinery exports, but continued a rising trend from the previous decade. The war's impact on imported metal manufactures is also apparent, but much shorter lived.

Taken together, while capital and energy intensive sectors like machinery were important for Japan's sustained development into a mature industrial economy, the country relied on exports of its lighter manufactures to industrialize within the global economy. In addition, the decomposition of textiles and metal goods trade indicates that Japan moved away from import-substitution manufacturing to internationally competitive exports around the turn of the century. For textiles, the value of raw material imports exceeded that of finished cloth and clothing in the late 1890s while for metal goods the change occurred in the 1910s. As discussed later in the chapter, both import and export shares by trade partner region also remained largely constant during this period, indicating the country's success in competing within these markets.

4. Domestic Factors

Shifts in the composition of industries and trade are consistent with domestic trends in capital investment, firm size, and labor. Japanese firms grew in capitalization and workers, particularly in manufacturing. In terms of overall capital shares, there appear to be three distinct phases: before 1900, there was major investment in the transport and manufacturing sectors, led by railroads and textiles; dramatic growth in commercial services like banking and trade in the early 1900s; and a resurgence of manufacturing after 1910, led by heavier industries like metal processing and machinery.²⁵ Average firm size also indicates the relative concentration of capital in the transport and mining sectors while both manufacturing and commerce grew in firm numbers and capitalization over time.

The distribution of the labor force also changed during this period, with the share engaged in agriculture steadily decreasing in the four decades straddling the turn of the century in favor of manufacturing.²⁶ Coupled with increased output in manufacturing, this indicates rising labor productivity in industrial sectors and may owe to the greater availability of capital, albeit starting from a low base and remaining below levels in more advanced industrial economies.²⁷ Lower Japanese industrial productivity, however, was mitigated by lower pay, with a high wage differential between male and female workers, and labor repression in the form of legislation curtailing unionization and strikes.²⁸

5. Changing World Conditions

²⁵ See Rousseau (1997) and Tang (2013, 2014). Data for capital investment and firms by major industry are from Japan Statistical Association (1987), tables 10-5-a and 10-5-b.

²⁶ Data for industry labor shares from Umemura et al (1988, tables 5, 10, 12, 13, and 18.

²⁷ Gordon (2009), p. 97.

²⁸ Ibid, p. 99.

The timing of the shifts in Japanese industrial structure may have owed in part to conditions outside the control of domestic policymakers. While Japan's involvement in the global economy and relatively free trade were externally imposed, exports (and to a lesser extent, capital inflows) helped finance its modernization program and build the capacity to produce more sophisticated goods over time.²⁹ The unexpected victories in the Sino-Japanese and Russo-Japanese wars also boosted domestic investment in related sectors and increased access to nearby markets.³⁰ The reparations paid by China in the 1895 Treaty of Shimonoseki enabled Japan to finance its adoption of the gold standard while the integration of Taiwan, Korea, and parts of northern China provided primary products to supply its developing heavy industries and feed the population.³¹

Similarly, World War I was also fortuitous for the Japanese economy in leaving the country physically unscarred while providing opportunities for its manufacturers and traders. European withdrawal from their East Asian operations during the war meant Japan could readily substitute for shipping services and exports to the region, including India, Southeast Asia, and Oceania.³² Shown in Table 3, Japanese exports to its colonies and the rest of Asia rose quickly in the 1910s, eclipsing those to industrial markets in Europe and North America shortly after. Japanese imports similarly shifted toward the Asia-Pacific trade partners as its economy took in greater quantities of raw materials, continuing the trend from the turn of the century. As a share of total output, manufacturing nearly trebled over the 1910s, with rates of growth exceeding even the United States. The resumption of international peace tempered export growth, with its share of national output not returning to the pre-WWI high until after World War II. Higher machinery exports, however, persisted and demand for imported metal ores resumed after a downturn in the 1920s.

Table 3: Export and Import Shares By Region, 1880-1940							
Export Shares	1880	1890	1900	1910	1920	1930	1940
Korea		1.6	3.5	5.6	5.6	12.2	21.5
Taiwan			2.5	4.9	4.0	5.5	7.3
Northern China				3.3	5.1	4.4	19.4
Rest of Asia*	24.6	22.8	37.9	31.5	37.0	31.8	22.8
Europe, North America	74.5	73.1	54.0	51.9	42.8	41.0	19.8
Rest of the World	0.9	2.4	2.1	2.7	5.4	5.4	9.2
Import Shares	1880	1890	1900	1910	1920	1930	1940
Korea		2.9	2.8	2.5	6.7	11.9	15.6
Taiwan			1.2	6.3	6.7	8.2	10.3
Northern China				2.1	6.0	5.6	8.6

²⁹ Import tariffs comprised a minor share of government revenues: less than 2.3 percent before Japan regained tariff autonomy in 1899, and less than 6 percent from then until the war with China in 1937; see Yamazawa and Yamamoto (1979), table 22.

³⁰ The 1872 Treaty of Kanghwa gave Japan access to three Korean treaty ports, which allowed for a significant expansion of bilateral trade (Gordon 2009, p. 113). Korea was later annexed in 1910, while Taiwan was colonized in 1895 following the war with China.

³¹ Matsukata (1899). Japan dominated Korean and Taiwanese trade, with about 90 percent of Korean exports going to Japan in the 1870s and remaining high thereafter; Taiwanese exports grew from under 30 percent in 1900 to 80 percent in 1910, and exceeded 90 percent for most of the 1930s (Gordon 2009; Odaka et al 2008, table 9.1).

³² Lockwood (1954), p. 38.

Rest of Asia*	22.3	31.5	37.8	35.9	34.3	27.2	20.3
Europe, North America	77.6	65.3	57.6	51.8	39.5	40.6	35.5
Rest of the World	0.1	0.3	0.6	1.3	6.7	6.6	9.8
Source: Yamazawa and Yamamoto (1979), tables 13 and 14 in current yen. All series reported in five-year moving averages. Rest of Asia includes China, Hong Kong, Asiatic Russia, Southeast Asia, and other parts of Asia; Korea, Taiwan, and northern China (Kwantung and Manchuria) separately reported over time.							

Unlike industrialized economies in the interwar period, Japan's experience of the 1920s and 30s was neither roaring nor depressed. In March 1920, the Japanese stock market fell sharply due to investor uncertainty about continued post-WWI growth and was immediately followed in April by a series of bank runs.³³ The rest of the decade was punctuated by the 1923 Kanto earthquake, which killed an estimated 100,000 to 140,000 Japanese in the greater Tokyo region and destroyed large numbers of industrial facilities and residences, and a financial panic in 1927 stemming from a reconstruction boom, bad loans, and bank failures. Compounding the problems was government interest in readopting the gold standard (abandoned in 1916), which motivated fiscal austerity and tighter monetary policies.³⁴

Recovery began in the early 1930s, in part due to the dramatic expansion of exports and industrial production in the first half of the decade. While Japan's military aggression in China was the most obvious feature of this period, the economy also experienced significant changes, starting with the depreciation of the yen in 1932 to 42 percent of its value from the year before.³⁵ This devaluation came months after the government reinstated an embargo on gold exports, promoting import substitution and industrial rationalization, and was followed by increased government spending on the military and public works as well as looser monetary policy. While the value of exports and imports doubled between 1932 and 1936, the volume of exports increased six-fold compared to imports and the overall trade balance remained in slight deficit over these years. Exacerbating this trend were the shift in textiles from silk to cotton goods since the latter required raw materials imported from abroad; the need for metal ores and fuel for heavy industries; and the rise in protectionism against Japanese products.³⁶ Nevertheless, the patterns of economic restructuring and composition of trade persisted in that textiles remained important but were steadily replaced by even higher value-added products like metal products and machinery. Hostilities with China and later the United States meant capital-intensive sectors supporting the war effort received considerable investment at the expense of consumption, with the greater government intervention to rationalize production.

³³ Shizume (2009).

³⁴ Nakamura (1987), pp. 59-61.

³⁵ Ibid, pp. 62-64.

³⁶ Ibid, pp. 68-69.

Korea and Taiwan

Japan surrendered its control of Korea in 1945 and the southern half of the Korean peninsula regained its independence in 1948 when the brief US occupation came to an end. War between the north and south broke out in June 1950 and continued for three years. During that time Seoul and Pyongyang and most other cities on the peninsula were reduced to rubble. Most of the physical infrastructure built by the Japanese colonial administration prior to 1945 was also destroyed. Most Japanese built industries were in the north as were what few mines existed on the peninsula. The south was cut off from these even before they were destroyed during the war. What South Korea inherited from the Japanese colonial period was mostly some human capital resulting from the Japanese colonial education system and some experience working in enterprises many of which were owned and managed at the upper levels by Japanese. The Japanese colonial education system, for all of its inequities and its emphasis on the Japanese language, together with Korea's traditional high Confucian values placed on education, clearly gave the nation a stronger human capital base than found in most low income countries in the early 1950s. This base made it possible at the high end as early as the 1960s to send thousands of students to top universities abroad for advanced degrees in fields such as engineering and the natural sciences. At home it made possible the rapid expansion of an education system of steadily increasing quality at all levels.

There have been suggestions that import substituting industrialization occurred during the period 1945-1962 that was prior to the reforms that generated Korea's high growth decades, and that laid the foundation for what followed. Hyundai Corporation, for example, was founded in 1947 and did a great deal of construction work rebuilding what war had destroyed. Samsung began even earlier (in 1938) as a small export company in Taegu selling dried fish and vegetables. Daewoo, however, was not founded until 1967. Thus much of the experience gained during the 1945-1962 period was in business but not particularly in starting and operating industrial enterprises. Nevertheless there were workers and even a few lower level managers that had acquired experience in the few manufacturing establishments that did exist in the south before the Korea War and others with experience in the north who migrated south at partition or during the war.

There were some modern food processing and textile mills and a few other light industries but the total value of manufacturing value added as late as 1961 was only 8 percent of GDP. There were also traditional village handicrafts and food processing but there is little data on these and no reason to think that their activities played a role in the development of modern manufactures. Total power generation capacity for the entire economy was 367 megawatts (in 1961), less than 2 percent of total capacity in 1990. Cement at 790 thousand tons (in 1962) equivalent to one medium size plant in the US was one of the larger products, not surprising given the massive need for reconstruction and the fact that bulky low valued cement and its resulting high cost of transport per unit of value gave it a certain amount of natural protection. Most other industrial enterprises, however, suffered from the overvalued exchange rate that lasted throughout most of this period.³⁷ There were virtually no exports of

³⁷ The exchange rate was kept overvalued by the Rhee government mainly to extract as many US dollars as possible from US payments to Korea for providing certain kinds of goods and services to the UN military forces and other US activities at the time in Korea.

manufactures and very few exports of any kind while imports were mostly financed with US aid. Thus there was some experience gained running and working in industrial establishments but the total manufacturing work force as late as 1963 was only 610 thousand and that was mostly unskilled labor. The Korean chaebol and many other businesses would soon demonstrate that they could build and operate a much larger and more complex industrial economy but the experience most of them brought from this earlier period was experience in how to do business, to buy and sell for a profit and to mobilize construction crews.³⁸

Taiwan did not suffer the same amount of destruction of its physical infrastructure although destruction during the Second World War from Allied bombing was considerable, but the years from 1949 until 1960 were mostly dominated first by the retreat of the Kuomintang from the Chinese mainland and the settlement of 1.6 million mainlanders that accompanied that retreat. As in the case of Korea, most of the cost of imports was paid for by US foreign aid, and the NT\$, like the Korean won, was seriously overvalued. Installed electric power capacity in 1960 was 260 megawatts up from 61.5 megawatts in 1954. Manufacturing did grow rapidly after 1952 averaging 16 percent per year but from a tiny base, and led by sugar, canned pineapples, alcoholic beverages, cement, cotton yarn, and cloth (Economic Planning Council 1974). There were a few industrialists, notably those from the state run China Petroleum Corporation plus a few private entrepreneurs, who had joined the retreat of the Kuomintang government to Taiwan but most of the business people were local Taiwanese, some of whom may have gained some relevant experience during the Japanese colonial period. All of these firms were very small in scale and that remained true for sometime after the reform period began.

Taiwan's change in policies beginning in 1959-1960 that led to the manufacturing and export boom of the 1960s and after was driven by a number of considerations some of which were similar to what Korea faced two or three years later, but the Taiwan change was more complex. There was no change in government in Taiwan, the Kuomintang and Chiang Kai-shek were in charge before during and after the changes. The government economic officials who had come from the Chinese mainland were mostly from the state enterprise sector and many were imbued with a state led planning model of growth that emphasized import substitution. President Chiang himself was primarily interested in recovery of the mainland and in military preparations to that end, but the US Seventh Fleet not only protected Taiwan from invasion from the mainland, it also effectively blocked any move by Chiang to attempt a military invasion in the opposite direction. Even if the ultimate objective was to recover the mainland, Taiwan had little choice but to first try to create a model that would be more appealing to mainlanders.

The main changes in policy that ultimately had the most influence were those dealing with improving incentives for the private sector, unifying the multiple exchange rates then in force, reforming the banking system, and introducing measures to increase exports. The motivation for this last point was the desire to become less dependent on US aid. No one at the time, however, had any idea of how this last goal would come to dominate all of the others. And it was immediately apparent that this meant mainly the export of manufactures. Taiwan had few minerals to speak of and land reform along with other measures had reduced rice exports, a major export during the colonial period, to 3 percent of total exports by 1960.

³⁸ The Korea data in this paragraph are mainly from Economic Planning Board (1980) .

Thus a whole series of policies were introduced, and some of them, such as the devaluation of exchange rate, began before 1960. In addition there were import tax rebates, low interest loans for exporters, export processing zones, and the “Statute for Encouraging Investment”. This latter measure included everything from tax deductions for exporters to easing the then difficult process of obtaining land for manufacturing establishments. The export processing law was not in place until 1965 but many of the other changes were implemented almost immediately.³⁹

The changes in policy in Korea were if anything even more abrupt. Student demonstrations had brought down the Syngman Rhee government in 1960 and that was followed by a democratic election that brought Chang Myon briefly to head the government that was followed a few months later in 1961 by a military coup. General Park Chung-hee became President Park but immediately came under heavy pressure from the US to restore democratic elections and civilian government. US pressure did lead to a semblance of civilian democratic rule, but it also greatly reinforced the Korean government’s desire to become less dependent on US aid. Even more clearly than in the case of Taiwan, increasing exports meant manufactured exports. Land reform in Korea had led the former rice surplus to be consumed domestically, Korea did not have a semi-tropical climate that could grow sugar and pineapples, and there were no minerals in the southern part of the Korean peninsula. That left only manufactures and Korea began to promote the export of manufactures with a series of measures that will be described in the next section. Korea also introduced banking and interest rate reform and a variety of other economic reform measures.

The governments of both Korea and Taiwan thus reached a decision to fundamentally change the direction of their economic development policies at roughly the same time (Taiwan a bit earlier) and for many of the same reasons. Both wanted to reduce their dependence on US aid. Both had few natural resources or agricultural products that could increase exports sufficiently to accomplish this goal of reduced dependence. It is also the case that both had experienced four to five decades of Japanese colonial rule. While Korea deeply resented this period and Taiwan did not, they both saw what Japan had accomplished decades earlier with a policy of industrialization that had export of manufactures as a major component. Finally both understood that they had to create a more modern and efficient economy and society if their governments and their own very existence were to survive. It was therefore the political logic of the situation they found themselves in that led Korea and Taiwan to pick the development strategy that they then implemented. It was certainly not the dominant paradigm of development economists at the time.

1. Export Led Industrialization: Korea, the first phase

The changes in policy that led to the boom in manufactured exports and the accelerated rate of growth of manufacturing were similar in both Korea and Taiwan although there were differences in the specifics. The two key characteristics that the reforms had in common began with the fact that both economies began the export push with a major devaluation. The second common feature was that neither country pursued broad liberalization of foreign trade. Their policies were geared to the promotion of exports through specific interventions that would overcome the many barriers to

³⁹ For a more in depth discussion of the process that led to the change in development policies since Li-min Hsueh, Chen-kuo Hsu, and Dwight H. Perkins (2001).

exporting that previously existed. Imports and the use of foreign exchange remained tightly restricted. Import substitution for a wide range of industrial sectors remained in place.

Devaluation of the Won and the NT dollar came first. The changes in the exchange rate were dramatic. The NT\$ lost half of its value relative to the US dollar and the Korean Won at its peak in 1964 lost two thirds of its value relative to the US dollar. Both maintained this level of devaluation through the 1960s and most of the 1970s. Neither the overvalued nor the undervalued exchange rates should be thought of as equilibrium rates. In addition to that, both systems remained riddled with state interventions in their international commerce on both the import and export side. The exchange rate that resulted from the devaluations of the late 1950s and early 1960s was in a sense undervalued and it remained that way through the 1960s and 1970s. Undervalued in this context, however, only means that both Korea and Taiwan probably could have promoted exports with a less pronounced devaluation. It was some time (the mid-1980s) before either economy could be said to be in a balance of payments equilibrium and at that point both economies experienced revaluation vis-à-vis the US dollar.

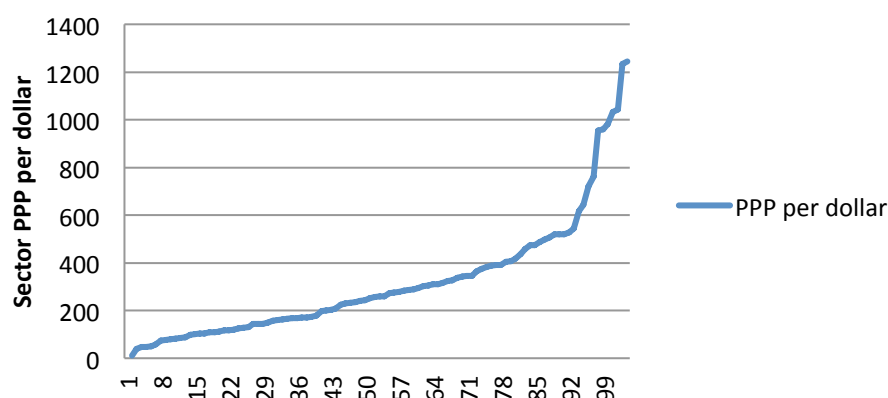
Given the numerous state interventions in international trade in both Taiwan and Korea, it is perhaps surprising that some analysts have argued that basically these two economies “got their prices right,” that is they recreated what amounted to free market prices in a very un-free market environment. This argument was made in the book on Korea by Frank, Kim and Westphal that was part of a set of studies on foreign trade regimes and economic development.⁴⁰ The alternative argument, made notably by Alice Amsden, was that Korea deliberately “got the prices wrong”—that is Korea used trade barriers and other measures to ensure that infant industries, notably in the heavy industry sector, were protected from international competition and received prices well above world market prices for those products.

Frank, Kim, and Westphal’s conclusion was based on a careful calculation of the effective rate of protection on a wide range of Korean products. Given the number of export subsidies and trade restrictions in Korea this was a formidable undertaking. Their primary concern was to determine whether all of these restrictions and subsidies led to efficient or inefficient allocation of resources for economic development. Since Korea’s overall economic performance and its performance in industry in particular during this period and the period that followed involved very high GDP growth rates, their conclusion that these restrictions and subsidies led to a relatively efficient outcome is no doubt correct. Their implicit argument that trade interventions produced a domestic price structure that was similar enough to the world price structure to produce a similar outcome is more questionable. There is not room to address their full analysis here, but other data developed for a different purpose were published around the same time.

As part of the early efforts to calculate the purchasing power parity GDP of various countries, the UN compared the prices in Korea with world (basically US) prices for 103 sectors in Figure 2. As the figure makes clear, the domestic prices of

⁴⁰ The influential book by the World Bank,(1993), Chapter 6, like Frank, Kim and Westphal (1975) earlier, makes a similar argument that while a number of East Asian economies did promote import substitution, basically they distorted prices much less than in most other developing economies.

Figure 2: Sector PPP per dollar for Korean Tradable Sectors (1970)



Note: The official Won/US\$ exchange rate in December 1970 was 316.65Won/US\$1.00 and the rate in December 1969 was 304.45Won/US\$1.00.

Source: The data for this Figure are from Irving Kravis, Alan Heston, and Robert Summers,(1978), pp. 146-152.

roughly two thirds of the tradable products listed had domestic prices below, often far less than world prices. The ratios at this end of the spectrum included virtually all clothing items and all shoe categories with PPP exchange rates often below 200Won/\$1. At the other end of the spectrum were passenger automobiles (761won/\$1), ships and boats (519won/\$1), communications equipment (543won/\$1), construction machinery (387won/\$1), and refrigerators and freezers (980won/\$1). Alice Amsden's research focused particularly on the steel industry. Steel is not in the list because it is an intermediate product and purchasing power parity calculations use only final demand consumption and investment products, but steel was highly protected at this time. Many of these highly protected sectors became the focus of the Korean Heavy and Chemical Industry Drive of the 1970s and many of these highly protected sectors by the 1980s were a major component of Korean exports and no longer required protection.

This suggests that what Korea was pursuing was a classic infant industry strategy where the government provided protection for industries in the learning phase but expected them to bring their costs down steadily and become exporters. The various measures used to promote exports in the 1960s, in addition to devaluation, were numerous. Some involved taking advantage of the fact that some domestic prices were substantially higher than world or border prices. Generous wastage allowances for imports of items such as cotton, for example, allowed producers of cotton textiles to produce enough to meet their export goals and still have enough cotton left over to produce an amount for the domestic market that could be sold at a large profit. Exporters also had easier access to credit than companies that did not export. A unique feature of these early years was that President Park held monthly meetings with the leaders of the various industrial sectors at which most of the economics related ministers would be present. These meetings gave the industrialists the opportunity to explain

difficulties they were having with one government bureaucracy or another and often get redress on the spot.

There was a major change in Korea's approach to industrial development in the 1970s. Government interventions in the 1960s were generally designed to help all exporters. The government did not target particular exporting firms or exporting industries. Most of the subsidies were available to anyone who met the criteria. This approach changed in a dramatic way with the Heavy and Chemical Drive of the 1970s.⁴¹ That drive was initiated by President Park who empowered a government official, Oh Won Chol, to form a Blue House committee of government officials to draw up a plan for a drive by Korea to promote a range of major heavy industrial products beginning with steel, shipbuilding, certain types of machinery, petrochemicals and other chemicals. The government first specified what industries appeared to be most promising at this stage of Korean growth but then also specified the scale of the industrial plants that were to be set up in these favored sectors. The scale was typically set at a level that would produce considerably more than the domestic market demanded thus requiring the companies to become exporters in order to make full use of their capacity and bring their costs down and profits up. It was at that point that the government went to individual companies, typically the large chaebol such as Hyundai and Daewoo, and asked one of them to take on the task of developing one of these industries.

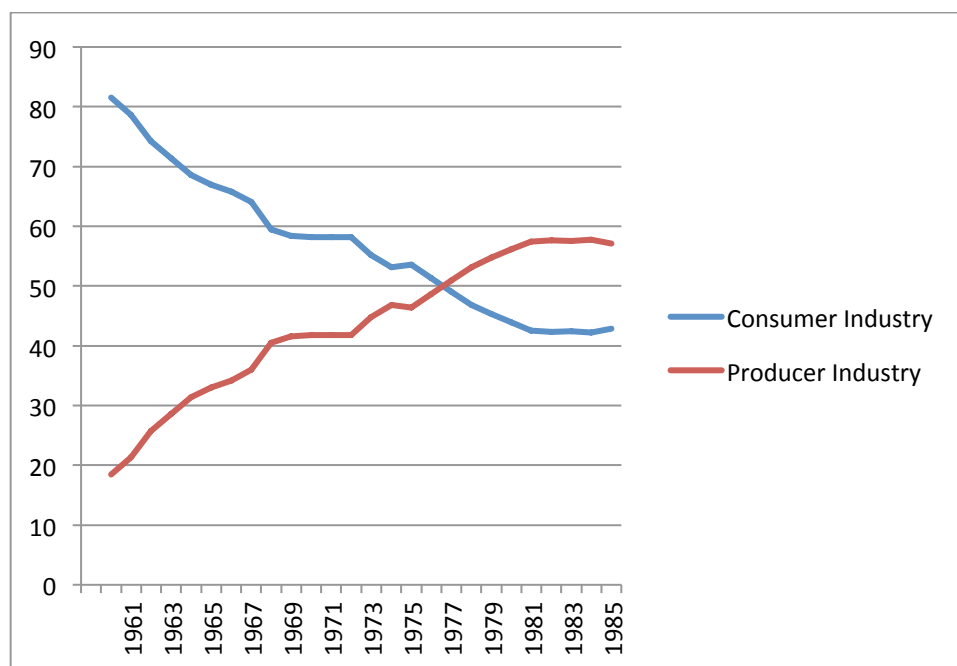
When asked, the companies usually agreed to take on the task. The incentives to do so were considerable. The government had already decided to provide much of the related infrastructure through the construction of a heavy industry industrial park, loans at below market rates were available, and in many cases the chaebol were given temporary monopolies over the domestic market for the particular item. Added to specific support measures was the general proposition that given the active role played by government in directing and controlling the economy, companies wanted and needed to be seen as cooperative by that government. The relative power of the government versus the chaebol was to change in subsequent years as the chaebol came to dominate the economy and acquire a degree of independence from the government. Thus government industrial policy decisions during the 1960s and 1970s were made mostly using technocratic criteria. That was to change as the country moved beyond the 1970s.

The performance of Korean manufacturing throughout the 1960s and 1970s was impressive by any standard. GDP grew at 9.2 percent per year (1979/1961) while manufacturing grew at 17.9 percent a year and the share of manufacturing in GDP rose from 13.5 percent in 1961 to 27.7 percent in 1979. Total exports from Korea in nominal US dollars grew at 42.7 percent a year (1979/1964) and the share of manufactures in these exports rose from 55 percent in 1964 to 89.9 percent in 1979 (Table 4). The US market took 29 percent of these exports in 1979, the Japanese market took 22.3 percent, and the next largest economy, Germany, took only 5.6 percent.

There were also rapid and large changes in the structure of industry and exports (Figure 3). Producer goods industry by the late 1970s surpassed the consumer goods industry and the exports of machinery and transport equipment surpassed the more labor intensive consumer industries. The dominance of machinery and transport equipment exports increased further in the 1980s and beyond.

⁴¹ This discussion of the heavy and chemical industry drive is based mainly on Joseph J. Stern, Ji-hong Kim, Dwight H. Perkins, and Jung-ho Yoo, (1995).

Figure 3: Korea: The Share of Producer and Consumer Goods Industry (in %)



Note: The data up through 1979 are for light and heavy industry and only after that are derived from data on producer and consumer goods industry.

Sources: Economic Planning Board, (1980), p. 281; and Economic Planning Board, (1986), p.104

Table 4 Korea Exports by Sector

	Food, Beverage, Tobacco	Manufactured Good classified by material	Machinery and Transport Equipment	Mscelaneous Manufactures	Other
1967	14	31.7	4.4	30.4	19.5
1970	9.6	26.4	7.4	42.2	14.4
1975	13.2	29.4	15	35.8	6.6
1980	7.3	35.7	20.3	29.9	6.8
1985	4.1	23.3	37.6	27.6	7.3
1990	3.3	22.1	39.3	28.6	6.7

Sources: Economic Planning Board (1987), pp. 213-214; and National Statistical Office, (1993), pp.250-251

Sources: Economic Planning Board, (1986), p.227-228 and (1993), pp. 250-251.

2. Industrial Development in Taiwan, 1960-1979⁴²

Taiwan's manufacturing experience in the 1960s had many features in common with Korea some of which, notably the devaluation of the currency and unification of the multiple exchange rates have already been discussed. Taiwan put up high tariff walls on products mainly produced for the domestic market and introduced a variety of subsidies and other incentives for exporters. The motive of the government was to earn foreign exchange. Any firm that could contribute to that end was given access to the various export support measures. Taiwan made somewhat greater use of Export Processing Zones but in 1971 all of the zones together accounted for only 7.9 percent of total exports and twenty years later that share had fallen to 5.2 percent. The real value of such zones is when they provide lessons in how to create a supporting environment for private exporting firms in the country at large and they probably played that role in Taiwan.

Taiwan exporting industrial firms as in Korea mainly produced labor intensive products such as shoes, textiles and garments and most were very small in these early years. In 1974 there were 111 "big business groups" with an average of 7 firms in each group but with an average employment of only a little over 300 per firm. And these business groups were the larger economic organizations on the island. There were over 25 thousand registered factories on Taiwan in the late 1960s most of them quite small. But many and perhaps most of these factories, however, were not completely autonomous enterprises. Most were subcontractors to a central enterprise or to several enterprises that would assemble the various components into a product that could be exported.

Taiwan began to move beyond labor intensive consumer manufactures at much the same time as Korea began its Heavy and Chemical Industry drive. Government economic ministers and economists, like their Korean counterparts, felt it was time for Taiwan to move up the industrial ladder to the more complex heavy industries. This heavy industry push in the 1970s was called the "Ten Major Development Projects". Petro-chemicals were a priority as was steel. Machinery and electronics remained mostly in the hands of small private enterprises. All of these government efforts in the heavy industry sector involved the establishment or expansion of state owned enterprises. The China Petroleum Corporation which had been founded on the mainland but had moved to Taiwan was given a monopoly over upstream naptha cracking plants and the corporation built two large plants in 1975 and 1978. The government also created two new state owned enterprises, the China Petrochemical Development Corporation and Chung-Tai Chemicals to produce mid-stream petro-chemical products. There were also private firms in the sector, mainly involving mid-stream synthetic fibers, but 43 percent of all investment in petrochemicals went to the state owned firms. China Steel Corporation was set up in 1971 with 45 percent of the investment from the government and 20 percent from Krupp Steel of Austria with 35 percent from the private sector. By the time the mill was completed in 1977, however,

⁴² The discussion in this section is drawn mostly from Li-min Hsueh, Chen-kuo Hsu, and Dwight H. Perkins, (2001).

the private sector only accounted for about one percent of the total financing. The China Steel Corporation became a state owned enterprise and it was given substantial protection from imports into the 1980s and no private steel mill was allowed to expand between 1978 and 1983.

The efforts to develop a ship building industry were less effective. A state enterprise, the Taiwan Shipbuilding Corporation, already existed but could only build 100,000 ton cargo ships. The goal was to become a major producer of oil tankers of several hundred thousand tons and to that end the government provided 45 percent of the investment to a new state enterprise, the China Shipbuilding Corporation with the rest provided by foreign investors. Despite a variety of subsidies provided by the government, however, China Shipbuilding Corporation never became internationally competitive. Korea's shipbuilding effort ran into similar head winds in the late 1970s but the Korean government made a decision to provide what amounted to subsidies to companies that imported petroleum into Korea on Korean made tankers. That saved Hyundai, the builder of the first super tankers, and Hyundai and Korea went on to become one of the largest shipbuilding countries in the world. A similar measure by Taiwan (to persuade ship owners flying the Chinese Nationalist Flag to buy Taiwan made ships) was not successful.

The government on Taiwan also made efforts to build an automobile industry to replace the small scale producing units that already existed starting in the late 1960s but these were only one step up from the assembly of imported parts that constituted the automobile sector in so many developing countries (there was a 60 percent local content requirement in the Taiwan case beginning in 1965). Unlike Korea, Taiwan never became a producer of an internationally competitive product. These efforts in Taiwan, however, did produce an internationally competitive automobile parts sector. Automobile parts, as contrasted to name brand complete automobiles, probably fit the then small scale of most manufacturers on the island. In addition, the parts sector was largely private and producers either became efficient or went out of business.

The impact of these changes on the structure of Taiwan's industrial sector and its exports was rapid. By the late 1970s the share of machinery and transport equipment plus chemicals and petroleum far surpassed the share of textiles and apparel whose share had begun to decline (Table 5). The shift in the structure of exports to the producer goods sector was not quite as rapid as in Korea but by the mid-1980s these sectors combined had passed the share of the consumer goods sectors combined (Table 6).

Table 5: Taiwan Shares of Industrial Sectors in Industry and Mining (in %)

	1961	1966	1971	1976	1981	1986
Food Beverages and Tobacco	21.4	14	9.2	9.7	6.5	6.1
Textiles and apparel	12.8	12.8	20.8	19	15.7	13.8
Lumber bamboo	3	2.4	3.3	2.5	2.5	3.1
Paper Printing	5.6	3.8	3.3	2.1	2.8	3.2
Chemicals, petroleum rubber	17.1	22.2	22.2	20.6	21.1	24.8
Machinery, electrical machinery, transport equipment, metal products	6.9	10.8	17.3	22.5	26.1	25

Electricity Gas Water	8.8	9.8	8.8	6.6	8.2	7.7
Construction	1	3.1	3.7	5	5	2.4

Note: These shares are based on the weights used to construct the Taiwan's industrial output index.

Source: Directorate General of Budget, Accounting and Statistics (1990), p. 288.

Table 6 Taiwan Sector Export Shares (%)

	Agriculture	Food Beverages Tobacco	Textiles Wood Paper	Electrical Machinery	Metal Products Machinery	Transport Equipment	Other
1952	8.6	83.6	0.8	0	0	0	6.9
1955	5.7	84.6	2.4	0	0	0	7.3
1960	9.8	58.5	17.1	0.6	0.6	0	13.4
1965	14.9	39.1	26.2	2.7	2.4	0.4	14.2
1970	8.4	13	42.2	12.3	5.1	0.9	18.1
1975	5.1	11.2	37.6	14.7	6.1	2.1	23.1
1980	2.5	6.7	31.1	18.2	8.1	3.2	30.2
1985	1.7	4.5	27.6	21	9.8	4.1	31.3
1990	0.8	3.3	17.5	27.3	13.5	5	31.1

Source: Council for Economic Planning and Development, (1994), pp.192-193.

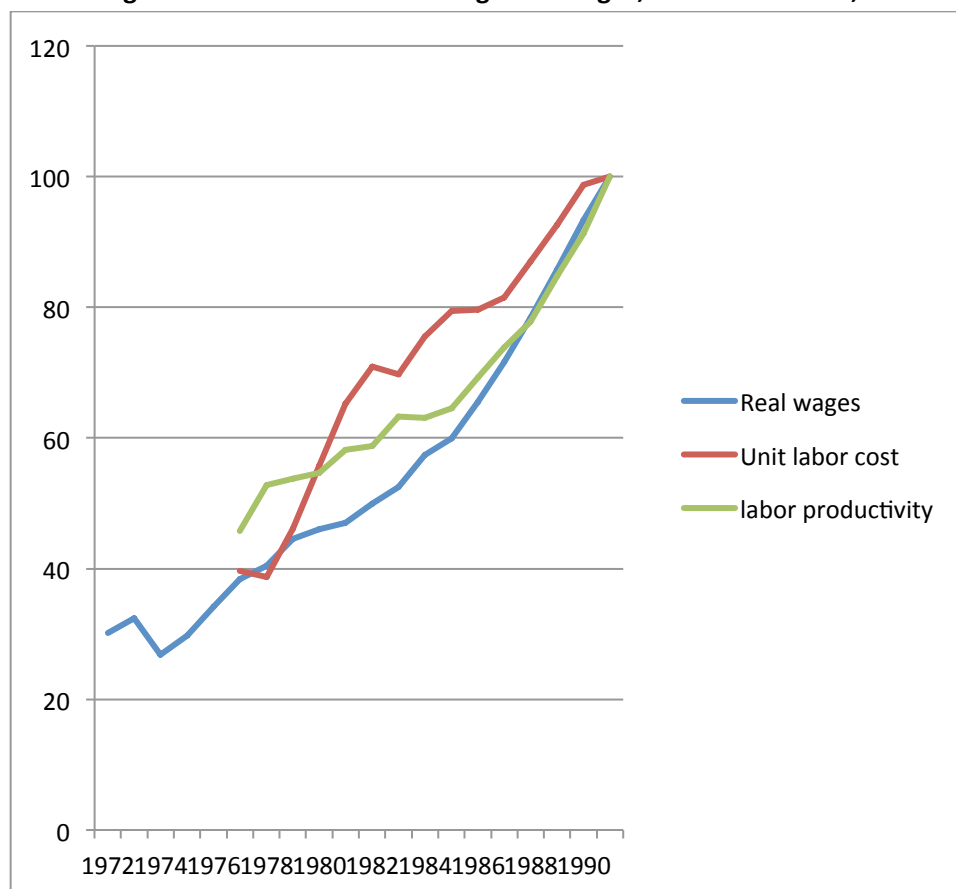
3. The Beginning of Liberalization in the 1980s

Opposition to the highly interventionist approach to industrial policy peaked in the 1970s in both Taiwan and Korea. The 1970s industrial policy that targeted specific industries and individual firms within those industries was the first to decline sharply in use although not to disappear altogether. The transition in Taiwan, unlike that in Korea, did not involve a major change in personnel or policies since

most of the economic decision makers were the same only with different titles. Taiwan's weakened international political situation together with the OPEC price increases of 1978 and 1979, however, did lead to concern by the government that Taiwan's heavy industry oriented industrial policy in the 1970s was making the island overly dependent on petroleum imports that could be cut off or sharply reduced. By the mid-1980s opposition to petrochemical plants also became a source of major demonstrations against new plants as Taiwan was making the transition to a more democratic and open political system.

A second consideration was that real wages in manufacturing were rising rapidly in both Taiwan and Korea although not as rapidly as GDP and, while labor productivity rose rapidly as well, for a time wages and unit labor costs in manufacturing grew even faster. The rate of increase in real wages was also beginning to accelerate (Figures 4 and 5). The rate

Figure 4: Taiwan Manufacturing Real Wages, Unit Labor Costs, and Labor Productivity



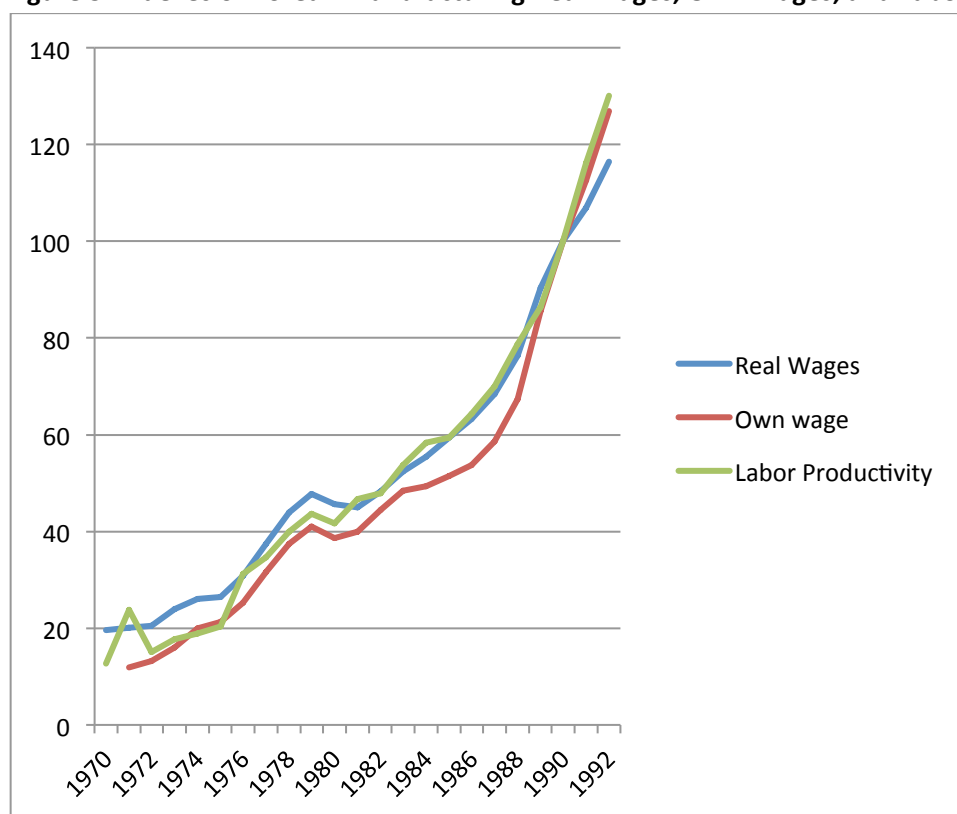
Sources: Various Issues of Council for Economic Planning and Development, *Taiwan Statistical Data Book*.

of increase from 1973 through 1980 was 5.4 percent per year and this rose to 7.3 percent in 1981 through 1990. The sectors of industry dependent on inexpensive labor, as a result, began to decline. Textiles, garments, leather products all peaked in 1986 and production declined sharply thereafter. Taiwan had become the world's major supplier of shoes, for example, but most of the production of

shoes moved from the island to the Chinese mainland although Taiwan kept the high value added end of the business, design and marketing. Light industry plastics peaked in 1988.

A third influence is that Taiwan in the 1980s began to run very large current account surpluses as high as 22 percent of GDP (in 1986) and foreign exchange reserves, as a result, rose rapidly. There was no longer a balance of payments justification for maintaining tight restrictions on imports. This in turn led to US pressure to liberalize foreign trade. Even earlier, economists with strong Taiwan connections had begun to speak up in favor of more liberal economic policies. In the 1980s these liberalization arguments began to have some influence on policy that up to that point had mainly been determined by government officials many with an engineering background.

Figure 5: Indexes of Korean Manufacturing Real Wages, Own Wages, and Labor Productivity



Source: Various issues of National Statistical Office, *Major Statistics of Korean Economy*.

Note: Real wages are nominal wages divided by the consumer price index. Own wages in this case were nominal manufacturing wages divided by the export price index where exports were mainly made up of manufactures. Labor productivity is labor output in manufacturing divided by the number employed in manufacturing.

The dominant force in determining industrial policy and which manufacturing industries should be emphasized, however, remained in the hands of the government and key economic ministers. Given the decline in the competitiveness of labor intensive industries and a desire to put less emphasis on products dependent on large petroleum imports, the government began to shift its emphasis to high

technology industries. The approach, however, was different from the efforts to promote heavy industries or earlier labor intensive export sectors.

The basic approach to high technology industries could not readily rely on the existing industrial enterprises. Leadership in high technology required a high level of education and most entrepreneurs in industry in the early years were high school graduates. The first step taken by the government was to hold a large conference on the field leading to a decision to require each ministry to develop a science and technology plan (1979-1981). To educate the broader population on the importance of computers and information technology, the government took the lead by rapidly expanding the role of use of computers and information technology within the government itself. Universities were required to revamp their curricula to give greater emphasis to training relevant to high technology. The government also directly sponsored research in a wide range of high technology fields. Companies that did start up firms in this area also received various direct incentives such as reduced taxes and easier access to credit as had been the case with earlier export oriented industries but these incentives were secondary to the main effort.

An important element in this effort was to encourage people who had left Taiwan to further their education abroad, mainly in the United States, to return home and set up firms in these high technology sectors. Many of these people had not only been educated in high technology, they often had gone on to work in high technology firms in places like Silicon Valley. One initiative that furthered this goal was the establishment of Hsinchu Science Park. The park not only provided the infrastructure required by high technology sectors, it also took a variety of measures to make it easier for those who had been abroad to return by setting up a bilingual experimental high school so that children who had mostly been educated abroad could integrate easily back into Taiwan society (or in the case of foreigners attracted, could continue to be educated in an American style education system).

In areas deemed essential for the development of a broad based vigorous high technology sector but where the kind of enterprise required appeared to still be beyond the capacity of individuals and companies on the island, the government did itself step in with a state owned enterprise. The most notable examples of this were the United Microelectronics Corporation and Taiwan Semiconductor Manufacturing but these were the exception to what was mostly an effort that relied on the private sector except in the area of research and development.

There is no question that all of these efforts paid off for Taiwan with continued rapid GDP growth throughout the 1980s and into the 1990s with the share of high technology industries steadily rising both in terms of production and exports.⁴³ While rapid industrial growth overall continued into the 1990s, the share of manufacturing in GDP peaked in 1986 and then began to decline. The gradual transition to a more service oriented economy had begun.

4. Korea Economic Policy in the 1980s and Beyond

⁴³ We do not include specific data on the rising share of high technology production and exports because the Taiwan data are not published in a way that separates out these sectors. Going back to the highly disaggregated industrial production and export data to construct our own index of the contribution of these sectors was beyond what could be accomplished in this short essay.

The Chun Doo-hwan led government that took power through a coup in 1980 had significantly different priorities from the Park government of the 1970s. While Chun Doo-hwan and his economic advisors were not supporters of either a 1970s industrial policy or of the chaebol more generally, there was never a clear decision to move away from heavy industry to an emphasis on information technology as occurred in Taiwan. To the contrary, heavy industries by the 1980s had become the mainstay of Korean exports and remained so into the next century. Machinery and Transport equipment, for example, rose from 20.3 percent of Korean exports in 1980 to 42.5 percent in 1992. Heavy industry products overall were 41.6 percent of total exports in 1980 and 59.5 percent in 1992 (and 72.3 percent in 2000). Information Technology products grew rapidly and were 33.4 percent of all heavy industry exports and 27 percent of total exports in 2000).

Korea's government, like that of Taiwan, was concerned from 1960s on with the fact that Koreans were increasingly being trained in high technology areas mainly in the United States but few were returning home to work in Korea. In an attempt to change this situation, the Korean government first created the Korea Institute of Science and Technology in 1966, a multi-disciplinary research institute mainly in the sciences and engineering. The Korean Advanced Institute of Science (KAIST) was established in 1971 as an educational and research institution that rapidly rose to be among the highest status universities in Korea (and in international university rankings). But the chaebol also had their own research institutes. Overall research and development expenditures in Korea rose from 0.29 percent of GDP in 1973 to 0.57 percent in 1979 at the end of the Heavy and Chemical Industry program and then doubled by 1981 to 1.02 percent of GDP in 1982 and doubled again to 2.01 percent in 1991. The motivation for this rapid rise in research and development was both economic and military.

Korea's GDP growth continued its rapid pace right through the political disruptions of the late Chun Doo-hwan years and the election of President Roh. Manufacturing as a share of GDP, however, began to fall after 1988, two years later than was the case in Taiwan. Employment in manufacturing in Korea peaked in 1989 (in Taiwan in 1987). In Korea as elsewhere these declining shares are often seen as deindustrialization but manufacturing output was continuing to grow, just not growing as rapidly as GDP. Korea like Taiwan was beginning the transition to a more service oriented economy.

Conclusion

In Japan, the Republic of Korea, and Taiwan governments played a leading role in their respective industrialization drives, but the nature of those governments and their evolution from one kind of leadership to another differed. In Japan the Meiji restoration begun in 1868 kept much of the pre-modern elite in control but fundamentally changed most of the institutions that had characterized the semi-feudal Tokugawa period. After that, however, that same elite ruled for six decades while it experimented with reforms that would facilitate Japan's catching up with the world powers of Europe and North America. It was not until the Japanese military came to dominate the government that the nature of the ruling elite that governed economic policy changed fundamentally. The nature of the government and the manufacturing strategies pursued were also influenced by the external environment, notably World War I that cut Europe off from active economic involvement with Asia, the Great Depression, that was accompanied by rising protection and trade wars, and then the Second World War from which Japan did not recover until the early 1950s.

Korea and Taiwan were ruled by Japan until 1945. Japan then focused economic development strategies that emphasized agriculture and mining exports that were driven by Japanese colonial interests. Independence in 1945 brought completely new governments but initially one's more interested in political and military goals than with industrialization or economic development. External pressures due in part to their over dependence on US aid, and the threat to their very existence led to fundamental changes in policy in both economies in the early 1960s. What followed was similar in that both governments led manufacturing development efforts that transformed both economies in a matter of a few decades.

Manufacturing development in Korea and Taiwan from the 1960s to the early 1990s was much faster than the growth of Japanese manufacturing in the pre-World War II period although Japan's own continued manufacturing growth after economic recovery from that war was equally rapid for two decades and its pre-World War II experience was more rapid than in most other industrialized economies at that time. Plausible hypotheses are that higher growth from the mid 1950s on in all three was due in part to a large backlog of unused technologies and of knowledge about what development strategies worked and which did not, allowing these economies, particularly Korea and Taiwan, to leap frog ahead. Korea and Taiwan had the added advantage of being able to learn from Japan's experience starting from a similar economic foundation, whereas Japan had to figure out what would best fit. Korea and Taiwan's manufacturing growth (and Japan's after the Second World War) also benefited from being able to pursue an export oriented strategy in an increasingly open world market.

The faster pace of manufacturing growth in Korea and Taiwan also meant that the structure of industry and of industrial exports also changed more rapidly than in Japan although the nature of the structural changes was similar. All three countries began their industrial development drives with a focus on exports of labor intensive products, but Korea and Taiwan experienced a more rapid shift from labor intensive products to producer goods, notably machinery and transport equipment, less than two decades after their rapid growth period began. In Japan this shift came to some degree in the military buildup of the 1930s, but more in the post Second World War era.

The industrial organization structure also differed between the three economies, but the differences were between Korea and Japan, on the one hand, and Taiwan on the other. In the former there were large business groups in both Korea and Japan -- zaibatsu in Japan before World War II and keiretsu after the war, and chaebol in Korea. In Taiwan, most industrial firms during the first two decades of industrial development were small in scale and business groups were looser combinations of these smaller firms usually with a lead firm. Over time that has changed as large groups have arisen but have not reached the level of dominance of the business groups of Korea and Japan.

Finally, rapid manufacturing growth is a transitory period in all countries and that was the case in Japan, Korea, and Taiwan. The starting point is an economy dominated by agriculture and handicrafts plus supporting commercial and financial services followed by a period when industrial growth dominates the economy. At purchasing power parity per capita incomes in the \$14,000 to \$17,000 range, however, industrial growth is increasingly replaced by services including many modern services

that did not exist in earlier periods.⁴⁴ In Korea and Taiwan that transition into and then out of a focus manufacturing took place over three decades. In Japan it took much longer both because growth

⁴⁴ The lower figure is the purchasing power parity per capita GDP (in 2011 prices) in Korea in the early 1990s and the higher figure is that for Japan in the early 1970s. This is when the share of manufacturing (in Korea) and of industry (in Japan) began to decline as a share of GDP. (World Bank, *WDI online*, August 5, 2014.

generally was much slower in the first half of the twentieth century than in the latter half, and because of the impact of the Second World War that set Japan back for over a decade. In Japan it took roughly seven decades from when industrialization started to when the share of industry in GDP began to fall.

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