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MARKET STRUCTURE AND THE TRANSITION TO HIGH-END EXPORT PRODUCTS IN DEVELOPING COUNTRIES

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Abstract

What determines the ability of a developing country to enter world markets for sophisticated, capital and skill-intensive products characterized by imperfect competition? For the NICs, this has become the paramount question of strategic trade policy. Booming exports of standardized, labor-intensive products have put upward pressure on exchange rates and unit labor costs in manufacturing and reduced their international competitiveness relative to other lower-wage developing countries. To survive in export markets countries like Korea and Taiwan must shift production into higher quality goods where value-added and profitability are much higher.

The transition from exporting standardized, labor-intensive goods to higher-end products is no simple matter. It requires a fundamental shift in the way countries compete in world markets. Put simply, this change can be characterized as a shift from price to non-price sources of competitiveness. Higher quality exports require increasingly complex technologies, investment in R&D, greater marketing expertise and after-sales services. No longer can firms win markets by simply undercutting production costs of international competitors.

This paper investigates the determinants of the speed and direction of transition to higher export quality in developing countries. In particular, it assesses the link between export performance and industrial organization. The central question we pose is: Does a country with a domestic market structure populated by large firms and conglomerates have advantages over a more competitive market structure, made up of small and medium enterprises, in moving into high quality export products?

Evidence from Korea and Taiwan provides the empirical context within which we examine this question. Both countries have had substantial success in export markets over the last 30 years but are now struggling with the problem of moving up to higher-end products. Export-led growth in each country, however, has been accomplished with divergent industrial enterprise size structures -- Taiwan is famous for its small enterprises and Korea for its conglomerates.

We use highly disaggregated U.S. import data to assess the export performance of Korea and Taiwan for the 1978-87 period. The U.S. market has been the primary destination of manufactured exports of each country. Balassa's revealed comparative advantage index and the trade-weighted, unit value index are used to examine comparative country performance.

The results of the investigation indicate that both countries have achieved a remarkable degree of diversification in exports since the early 1960s. Taiwan began its export-led growth strategy a few years before Korea. Hence, by the late 1960s, Korean exporters began to accelerate their entry into many new product areas, such that by the end of the decade they had reached the level of structural diversification achieved by Taiwan and by the late 1980s surpassed Taiwan -- the correlation between 1978 and 1987 RCA indexes for Korea was .6128 and Taiwan .7256, showing that Korea had moved farther away from its old export commodity structure.

Along the second dimension of export performance -- the shift to higher quality products -- an analysis of trade-weighted, unit values of exports shows that by 1987 Korea had achieved only a slightly higher average index. However, since the late 1970s, the speed of transition to higher export quality has been significantly faster in Korea -- Korea's index doubled from 1978 to 1987, while Taiwan's increased just 60 percent. The paper examines several hypotheses that could be put forth to explain the differences in export performance in each country: (a) differences in endowments of human and physical capital, (b) differential rates of change in international competitiveness and (c) cross-country differences in industrial organization. We find that differences in industrial organization provide a compelling explanation for the differences in transition.

Yet, while the analysis indicates that large firms and conglomerates find it easier to compete in markets where non-price competition is important, smaller firms can also develop "strategic assets" that facilitate their entry into high-end products. In some instances, smaller rivals may even be able to acquire "local" oligopoly power and pursue super-normal profits through (vertical) product differentiation. Such factors explain Taiwan's movement up the export quality scale to date. But overall Taiwan's small and medium firms, in the face of an increasing competitive challenge due to rising real wages and exchange rates, seem to have had some problems making the transition to higher export quality. As the industrial census data indicates, firm consolidation is beginning to accelerate in Taiwan. In the next ten years, if financial markets can meet the increasing requirements to finance larger operations, one should see a good deal of structural change taking place at the firm level.

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MARKET STRUCTURE AND THE TRANSITION TO HIGH-END EXPORT PRODUCTS IN DEVELOPING COUNTRIES[1]

1. INTRODUCTION

What determines the ability of a developing country to enter world markets for sophisticated, capital and skill-intensive products characterized by imperfect competition? For the NICS, this has become the paramount question of strategic trade policy. At least three concerns are responsible for their preoccupation with this question. First, rousing success in exports of standardized, labor-intensive products has driven up real wages and caused appreciation in their exchange rates. This has reduced export competitiveness relative to the lower wage, "second-tier" NICS, necessitating a shift to more capital and skill-intensive export products. Second, policymakers in these countries have a strong sense that some skill and technology-intensive products are "strategic" in that home production creates spillovers in the form of "learning by doing", R&D externalities and the like, which lead to further advances in competitive advantage and growth. Lastly, skill-intensive, higher-quality export goods are often traded in oligopolistic markets where the gains from trade can be much higher. Moreover, the history of economic growth in developed countries indicates that an important part of their rise in living standards has been achieved by producing higher quality products rather than simply producing larger quantities.

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[1] We thank Jong-Wha Lee for research assistance.

The transition from exporting standardized, labor-intensive goods to higher-end products involves more than just a change in production technology. It requires a fundamental shift in the way countries compete in world markets. Put simply, this change can be characterized as a shift from price to non-price sources of competitiveness (Rodrick 1988.) No longer can firms simply win markets by undercutting production costs of competitors. More sophisticated products involve a greater range of production skills, increasingly complex technology, investment in R&D, and most important, greater marketing prowess and access to significantly larger financing than do standardized goods. Considering these new requirements, one might expect domestic industrial organization to play an increasing role in the transition.

The purpose of this paper is to assess the link between export performance (narrowly defined as the transition to higher-end products) and industrial organization. Our aim is to make a preliminary study of the extent to which cross-country differences in market structure are responsible for relative differences in the rate at which the transition takes place. The central question we pose is: Does a country with a domestic market structure populated by large firms and conglomerates have advantages over a more competitive domestic market structure, made up of small and medium firms, in moving into high-quality export products? Answers to this question could have important ramifications for industrial policy. It may be that policies affecting industrial organization

should be an integral part of strategic trade policy. For example, would antitrust policies and policies neutral to scale of production be more conducive to making the transition to higher-end products than policies favoring conglomeration of firms?

Evidence from Korea and Taiwan provides the empirical context to examine this question. Both countries have experienced a rapid expansion and diversification of exports over the last two decades, as well as enormous increases in per capita income. Export-led growth in each country, however, has been accomplished with divergent domestic market structures.

Taiwan's industrial sector has been much less concentrated than Korea's in export activities. Korean exports are dominated by a small group of conglomerates, and industry concentration is high. In Taiwan, market structure is much more competitive with small and medium firms providing a large share of output. We use time series data for each country to calculate the extent of export diversification and the degree to which exporters have moved into higher value products. We then study the relationship between export performance and cross-country differences in industrial organization by investigating the incentives and costs different firms face in entering particular industries. Our main conclusion is that a market structure dominated by conglomerates does have higher incentives and lower entry costs in many high-end products and thus will make a more rapid transition in these industries. Yet, not all high-end commodities have characteristics that confer advantages on large firms. In other high quality products, smaller

rivals can also move up by differentiating their products vertically for niche markets, or by being quick to the market in areas with short product cycles (all this is incorporated in the popular label "flexible specialization").[2] Even so, our analysis indicates that Taiwan's small firms may be having more trouble than Korea's conglomerates meeting the current challenges.

The paper is organized in the following way: Section II sets out some initial comparative data on export diversification and quality upgrading in Korea and Taiwan, together with a discussion of several hypotheses that purport to explain the structural transformation to high-end exports. Section III investigates the costs and incentives for different size firms to enter higher-quality products classified by product characteristics. In section IV, we present preliminary evidence to support our hypothesis regarding the link between industrial organization and market structure. Section V contains concluding comments.

2. SOME FACTS

For the past two decades, Korea and Taiwan have been engaged in a rapid transformation of their export structures. This transformation has encompassed two dimensions: a diversification of the overall commodity structure and a transition from standardized, labor-intensive manufactures to sophisticated, skill-intensive products. In the discussion that follows, we set out the

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[2] Vertical differentiation refers to higher quality product characteristics, while horizontal differentiation refers to different varieties of the same product.

statistical evidence for this transformation and highlight country differences.

2.1. Diversification of the Overall Commodity Structure

Taking diversification of the commodity structure first, the Balassa (1985) "revealed comparative advantage index" is used to examine comparative country performance.[3] The RCA index measures a country's share of exports for a designated product in a particular market, relative to its share in total exports for the same market.

For the early years of Korean and Taiwanese export growth, Lee (1986) has calculated RCA indexes using 3 digit level of ISIC data from the OECD Trade Matrix for the years 1964-1977. (Japanese data is included as a benchmark.) The results are reproduced in Tables 1a and 1b. Standard deviations of RCA indexes are used to indicate the degree of diversification in the commodity structure over time. A high standard deviation indicates low diversification (i.e., that

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[3] The RCA index is calculated on the basis of actual export performance of individual countries. The formula is:

$$RCA_i = \frac{E_{ij}/E_{TOT,j}}{E_{i,all}/E_{TOT,all}}$$

where RCA_i = Korea or Taiwan's relative comparative advantage index for product group i.

E_{ij} = exports of product i by exporter j.

This index, based on changing market shares of each country's export commodities, depends on both changes in a country's export competitiveness (price and non-price) and changes in the demand of the importing country. In the case of Taiwan and Korea, competitiveness has been the overwhelming factor in market share changes according to shift share analysis.

only a few items make up a large portion of exports in a particular year). The figures show that, by 1964, Japan had reached a high level of diversification, whereas Taiwan and Korea were just beginning to export and had comparative advantage in only a few products. During the 1960s and 1970s, both Taiwan and Korea increased their export volumes and broadened their commodity composition of exports. By the late 1960s,Korea lagged about 4 to 5 years behind Taiwan in export diversification, but began to accelerate its structural transformation of its exports in the early 1970s, achieving a lower index than Taiwan by the end of the period. Spearman rank correlation coefficients for between year RCA indexes amplify this point further (last three columns of Table 1b). The rank correlation between Korea's 1964 and 1977 indexes is the lowest among the three countries, indicating that over the period it effected the largest structural change in manufactured exports.

Since the late 1970s, export diversification in each country has continued unabated. We use 4-digit level of ISIC data for the U.S. market from DRI Trade Matrix Revision 2 for the period 1978-1987 to calculate RCA indexes.[4] Surprisingly, the structural changes noted in the earlier 1966 - 1976 period and the changes

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[4] During the 1978-87 period, the U.S. was by far the largest export market for Korea and Taiwan, accounting for 40 to 50 percent of total export sales. Hence, it is unlikely that our results are biased by restricting analysis to the U.S. market. We calculated RCA indexes for 1978, 1983 and 1987. It should also be noted that about 8 percent of Taiwan's exports to the U.S. come from U.S. companies in Taiwan, whereas in Korea only about 5 percent of exports come from U.S. companies.

reported in Tables 2 a and b for the more recent decade are very similar (although our estimates are based on more disaggregated data). Correlations between 1978 and 1987 RCA indexes for Korea (0.6128) and Taiwan (0.7256) are very close to those reported in 1966-1976. And so are the correlations reported for Japan. It would appear that the extent of structural diversification of exports has been roughly similar for each decade in all three countries. Again, Korea tops the list for the most rapid structural change over the 1978-87.

What does the analysis of RCAs conclude about the extent of competition between Korea and Taiwan? Table 3 reports the simple and Spearman rank correlations between RCA indexes of each country for three years in the 1978 to 1987 period. Both measures show that patterns of comparative advantage in Korea and Taiwan have been diverging since 1978. Comparing these figures with earlier patterns in Table 1b, suggests that the late 1970s was a turning point in the resemblance between Korean and Taiwanese export structures. Since then, it appears each country has pursued a divergent competitive strategy. Also striking is the growing divergence in Japanese and Korean export structures. Combining figures from Tables 1b and 3 indicates that patterns of comparative advantage in these two countries have been moving farther apart since about 1972. A similar result is observed for Taiwan. Clearly, Japan has been continuously adjusting its export structure and avoiding competition with both countries.

In a recent article, Petri presents data supporting the popular hypothesis that Korea has consciously followed Japan, even though the two countries have quite different incomes per capita and factor endowments (Petri, 1988). The lagged correlations in Tables 1b and 3 between Japanese and Korean export structures support this hypothesis, although weakly. Two factors may be responsible for our lower correlations. First, our lag is shorter than Petri's: Petri found that the correlation between Korean and Japanese RCAs was maximized with a lag of 15 years. Second, our data are more disaggregated; hence, it may be that part of Petri's correlation can be accounted for by the more highly aggregated data he uses.

2.2. The Shift to High-End Products

A continuing shift to higher value products marks the second dimension of the export transformation in Korea and Taiwan. The transition to higher export quality has several indicators. One is the increasing physical and human capital intensity of Korean and Taiwanese exports. Bradford finds, for example, that Korea's capital and skill-intensive exports, as a share of total exports, jumped from 2 percent in 1967 to almost 20 percent in 1978. Another indicator is the trend in unit value of exports. This measures the rate at which exports add value to material inputs based on an index of dollars per unit. Products can be ranked by quality according to a scale based on value-added per pound, as in the list below:

Product	Value Added ($/lb.)
Satellite	20,000
Jet Fighter	2,500
Supercomputer	1,700
Aero-engine	900
Jumbo Jet	350
Video Camera	280
Mainframe Computer	160
Semiconductor	100
Submarine	45
Color Television	16
NC Machine Tool	11
Luxury Motor Car	10
Std. Motor Car	5
Cargo Ship	1

Source: The Economist 9 Dec., Survey, p4.

In order to shed light on the question of which country has moved faster up the export quality scale, we calculated the trade weighted averages of unit values from 4-digit level of ISIC data for the 1978 to 1987 period. Beginning with a comparison of average index levels, Korea's weighted average is only about 4 percent higher than Taiwan's in 1987. This is not a significant difference. There is, however, a significant difference between countries in period changes in average indexes. The relative unit value index (1987/1978) for each country is reported in the last row of Table 2b. Clearly, the speed of transition to higher value products over the decade has been faster in Korea. Korea's exporters almost doubled their index, while Taiwan's managed just a 60 percent increase.

This evidence is not an indication that Taiwanese firms have been overwhelmed. Taiwan's weighted unit value index in 1978 (7.46) was already quite high, about 12 percent higher than Korea's

(6.69). So part of Korea's faster transition in the 1980s has been "catching up." Between 1978 and 1987, Taiwan's index rose 65 percent to Korea's 91 percent and Japan's 117 percent. This left Korea's aggregate unit value index only slightly higher than Taiwan's by 1987. Unquestionably, Taiwanese firms have also developed the capability to produce and export higher quality products. Nonetheless, it may be troubling to Taiwan's policymakers that signs are cropping up of a slowing in the movement of firms to higher value products. In addition to our data for the U.S. market, Taiwan's (unweighted) export unit value index for all exports shows a decline in the annual growth rate from 10.6 percent in 1972-76 and 9.8 percent in 1979-81 to -1.0 percent in 1982-86.[5] The difference between Korean and Taiwanese firms in the 1980s, as we will substantiate later, would appear to reside in the ability of Korean firms to enter the highest quality segments in particular industries where high quality is closely associated with market power of larger firms.

2.3. Determinants of the Transition to Higher Quality Exports

Three hypotheses can be distilled from economic theory to explain the speed and direction of transition to higher-value exports. The first is provided by traditional trade theories which link export product characteristics with national attributes (Hufbauer, 1970). Chenery's (1986) stylized facts (see also

[5] Based on data from Taiwan statistical Data Book, Council for Economic Planning and Development, R.O.C. 1987.

Balassa 1979b) describing structural transformation during development, linked with these traditional theories, predicts a progression to exports with higher skill content and higher value-added as per capita income and endowments of skills, capital and other critical resources accumulate. Several studies confirm this association. Petri (1988 p. 56) and Lee (1986 p.155), for example, regress changes in physical and human capital endowments on changing RCA indexes for the 1960s and 1970s and find that shifts in comparative advantage, together with a significant and growing proportion of the exports of both countries, can be accounted for by increasing accumulations of capital and skills.

But, if accumulating factor endowments were the whole story, Taiwan should have made greater progress than Korea. Taiwan has a significantly higher per capita income, larger endowments per capita of physical and human resources (e.g., more engineers per capita), as well as a production structure more oriented toward manufacturing. So there must be more to the story of Korea's faster increase in average export quality than simply cross-country differences in endowments of critical resources.

Based on the Ricardian model of trade, the second hypothesis suggests that rising (relative) unit labor costs, in conjunction with "targeted" government policy, "push" firms in countries like Japan, Korea and Taiwan into higher ranges of value-added (for example see Dornbusch and Park, 1987; and The Economist, 8 Dec., 1989, Survey, p. 4). The basic argument is that in the face of rising relative unit labor costs, caused by increasing wages and

appreciating exchange rates, competitiveness can survive if labor is continuously reallocated towards production of higher value, higher quality products, away from low-value activities.[6]

This point can be illustrated in Figure 1, which depicts the Ricardian model with a continuum of goods (Dornbusch, Fisher, Samuelson, 1977). The model determines for a two-country world the equilibrium relative wage and the geographic pattern of specialization. W/w* is the wage of the developing country, Taiwan or Korea, relative to the advanced country, the U.S. A(z) = a*(z)/a(z) is the relative unit labor requirement for commodity (z) in the advanced country relative to the developing country. Along the vertical axis is measured the relative wage and relative unit labor requirements. Along the horizontal axis the range of goods is aligned, with Taiwan and Korea relatively more efficient at producing lower quality, lower cost goods near the origin.

Geographic specialization is determined by relative unit labor costs. The home country (Taiwan or Korea) produces all those goods for which its relative unit labor costs are less than others. For

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[6] The Economist uses Japan to illustrate this point. According to the Dec. 1989 article, "more and more of Japan's national wealth is coming from industries that add value to their materials at rates in excess of $100 per pound (based on the unit value index). Japanese companies operating below that unit value are being savaged by leaner and meaner manufacturers from Korea, Hong Kong, Singapore and Taiwan. Those Japanese that can are retreating upmarket, carving out niches for themselves in the higher reaches of manufacturing where professional, industrial and luxury goods command far fatter margins. In turn, this has meant upgrading their level of in-house technology. No longer is it good enough merely to turn out products that are well designed, of reasonable quality, with lots of features and a modest prices. Now they have to be packed with 'technological smarts'..."

a particular good (z), production will be at home if $wa(z) < w^*a^*(z)$. Thus, for a given relative wage w/w^*, one can obtain the competitive margin between production at home and abroad. But the relative wage is endogenous and is determined by demand and relative levels of spending. Home country demand conditions are represented by schedule OB, along which demand for domestically produced goods are equal to full-employment supply. An increase in the range or quality of goods produced by the home country (moving to the right along the horizontal axis) creates excess demand for labor, which leads to an increase in the equilibrium real wage.

Point E represents an equilibrium where goods markets clear and production occurs in the lowest unit labor cost location. In equilibrium, the home country produces goods in the quality range Oz_0 and foreigners produce the range of goods to the right of Z_0.

Comparative advantage in developing countries can be shifted towards the production of higher quality varieties by importing superior technology from advanced countries (Collins, 1985; Flam and Helpman, 1987). At point E, the relative wage w/w^* is less than 1 and the (foreign) advanced country has superior technology for goods that the home country is already producing. As foreign superior technology is imported, the home country's relative unit labor requirements decline and the A(z) schedule rotates, at point H (where $w/w^* = 1$), upward. The improved technology reduces unit labor costs in the exporting industry and allows the developing country to expand the range and quality of goods it can

competitively produce. However, given that the economy is in full employment, expansion in the export sector creates excess demand for labor and, as a consequence, raises the relative wage w/w*. A new trade equilibrium results at point E^1, where the relative wage is higher (x_0 to x^1) and the quality of exports has expanded to z^1.

Now consider what the importation of superior technology and the shift to production of higher quality products does to unit labor costs. For higher value products near point E^1, relative unit labor cost of the home country declines (or remains stable) as rising productivity offsets the increase in nominal wages caused by the jump in higher quality exports.[7] For other varieties to the left of point H, however, no technical change has occurred, but <u>average</u> relative wage has risen. In these products the home country experiences an increase in relative unit labor cost and a decline in competitiveness. Thus, it is possible that a country like Korea or Taiwan shows a rise in its relative unit labor cost and still realizes a gain in competitiveness in higher-end products. This is achieved by continually shifting comparative advantage toward higher quality through adoption of more advanced production and marketing techniques.

Export success, as the model illustrates, inevitably creates its own problems. To stay ahead of export-induced wage increases and exchange rate appreciation, as well as the rapidly rising "second tier" NICS, the home country must continue to import new

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[7] Remember unit labor cost = nominal wage/labor productivity.

technology and to produce more sophisticated products for the world market. This, of course, is the story of the international product-cycle. Flam and Helpman (1987) develop a model of North-South trade in which a product-cycle in quality-differentiated products is the outcome of cross-country differences in levels and growth rates of technology (ie. the North has relatively lower unit labor costs in production of high cost, high quality products, the South low quality products) and income distribution (ie. high income consumers demand high quality goods). As in the Flam and Helpman model, Figure 1 indicates that in those varieties where the home country loses competitiveness because relative unit labor costs have increased, production shifts to the "second tier" NICS whose costs are lower. East Asian experience also shows that the process of moving up to higher quality products can be expedited by targeted government subsidies, which generally underwrite the import and adaptation of superior technology and support learning-by-doing.

The unit labor cost thesis presumes that the country with the highest growth rates in relative unit labor costs, should be spurred to upgrade export quality more rapidly, assuming that government subsidies are about the same in each country. Does the relative unit labor cost evidence for Korea and Taiwan confirm this prognosis? Figures 2 and 3 plot indexes of real bilateral and real effective exchange rates, deflated by unit labor costs, for each country. These indexes convey most of the pertinent information needed to assess changes in a country's price competitiveness.

Examination of the figures shows that, overall, Taiwan has suffered the greatest relative loss in competitiveness over the period. Its real effective exchange rate (weighed by trading-partner shares in trade) appreciated at an annual rate of 4.6 percent from 1977, while Korea's was virtually stable. Moreover, Taiwan's nominal wage rate increased at an annual rate of 13.2 percent, compared to Korea's 10.1 percent from 1977 to 1987.[8] Given Taiwan's much lower annual rate of productivity growth over the period - 5.2 percent to Korea's 7.6 percent - its higher nominal wage growth resulted in higher relative growth rates of unit labor cost.[9]

As for "targeted" government subsidies, the differences between Korea and Taiwan are difficult to assess. Although both countries have intervened strategically to promote industry, Korea's record of channeling subsidized credit to its conglomerates far exceeds the credit subsidies handed out in Taiwan (Wontack Hong, 1982; T. Biggs, 1988c). In the 1980s, however, Korea has moved to liberalize its financial markets with the result that credit subsidies have largely disappeared. In Taiwan, on the other hand, financial intermediaries have remained under government ownership, and capital and money markets have been closely controlled. As many Taiwanese bankers and businessmen argue,

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[8] Note that in 1983 average hourly compensation in U.S. dollars in Taiwan was $1.61, in Korea $1.29, in Japan $6.20 and in the U.S. $12.26.

[9] It might be noted that, since 1986, Korea has experienced a much more rapid increases in wages than Taiwan. Workers in Korea have won pay raises of over 20 percent in each of the past three years. Today, Korean manufacturing workers get higher wages than those in Taiwan.

illiberal financial markets are now creating untoward problems for domestic investment. As Figure 4 indicates, since 1981, domestic investment as a percentage of GNP has declined from about 29 percent to roughly 19 percent. In Korea, gross domestic investment has remained steady at about 30 percent of GNP. The decline in domestic investment is an important sign of Taiwan's lagging response to its relative decline in competitiveness.

The third hypothesis offered to explain differences in export quality concerns cross-country differences in industrial organization. So far, we have been concerned with theories that implicitly assume price competition, no barriers to entry, constant returns to scale and a competitive market structure. Consequently, the transition to higher value products is considered a "cost-push" phenomena, or a shift in comparative advantage set in motion by changes in technology and factor endowments, rather than a drive for super-normal profits. In market structure explanations, a country's transition to higher-end products is viewed as a shift from price to product quality and variety as a source of competitiveness. It is assumed that entry into high-quality, often oligopolistic markets typically requires a bundle of firm-specific assets, ranging from superior technology and management skills, investment in consumer loyalty and the firm's reputation, to improved ability to access financial markets. Put simply then, market structure determinants of the transition to higher export quality concern barriers to entry and non-price rivalry for oligopolistic profits.

Accordingly, Rodrick (1988) argues that highly concentrated industries in Korea are better able to cope with the inevitable reputational externalities involved in producing high-quality goods for foreign markets. In the same vein, Mody (1986) suggests that the conglomerate form of firm organization in Korea is more effective in overcoming the financial barriers to entry in high-end export products. He has in mind the need to make huge, lumpy investments in R&D, tooling and marketing, as well as to offset sizable front-end "learning costs." Furthermore, there are many studies showing that exporting tends to be concentrated, across industries and countries, in the largest firms (Caves, 1987). At least two important reasons are responsible for this outcome: (a) access to export markets increases the opportunities for producers to fully attain available economies of scale, which constraints of national demand and domestic rivals otherwise deter; (b) existence of high fixed costs of exporting deter smaller firms. If they export at all, small firms export a high proportion of output.

Industrial organization explanations for differences in export quality offer important added insights. Most of these arguments, however, exclusively focus on the economies of large scale, disregarding the potential benefits of flexible, fast-moving small enterprises in some industries. Taiwan's relative success in moving up the quality scale to date indicates that smaller firms can adopt superior technology and move into higher quality segments in some product areas. In the next section, we examine the industrial organization arguments more closely. In particular, we

investigate the difference between industries in fixed entry cost and quality improvement cost, and point out how these influence the incentives for producers, given domestic market structures, to move into higher-end products.

3. MARKET STRUCTURE AND EXPORT QUALITY

Among the skill intensive industries, some are capital intensive and require high entry cost. These are generally industries where the marginal cost of quality improvement is negligible relative to product-specific fixed cost (related to design, tooling and marketing). Examples might be high density memory chips and motor cars. Capacity in these industries is largely indivisible and most R & D expenses are fixed costs. In these industries, firms' profits are greater, the higher the quality of their products. Every entering firm has strong incentives to choose higher quality, and the eventual outcome will depend on their price-quality competition.

In less capital intensive industries, entry barriers are low, and market structure becomes more competitive. Excess profits in these industries are competed away and the firm's incentive to move up becomes weakened and ambiguous if the marginal cost of improving quality is large. Competition from foreign firms or an economy wide increase in unit labor cost may induce home firms to move up the quality ladder, but the profit margin does not necessarily increase. In what follows, we will outline a simple model of price-quality competition and elaborate more on this hypothesis.

Consider a case where products exported by firms of two developing countries differ in quality. Quality is determined by consumers' preferences in the export market. Assume that quality of product A is higher than product B if every foreign consumer prefers A to B when both are offered at the same price. We implicitly abstract from the quality characteristics that arise from horizontal differentiation or the appearance of new products due to technical innovation (see Greenaway and Milner, 1986).

Firms from developing countries compete in quality and price. Following Shaked and Sutton (1983, 1987), we view competition among firms as a two stage game. In the first stage, firms will decide on the level of quality and quality-specific capital equipment will be installed. Then in the second stage, firms will market their products (i.e., set market price). As in the normal two-stage game, it is natural to assume that firms commit themselves to investment in quality-specific capital only after taking into account equilibrium prices of various qualities at the second stage in order to have no regrets.

Let z denote the level of quality and P(z), the price associated with it. Let F(y) denote the probability distribution of income y among the foreign consumers. Consumers are assumed to purchase one unit of the product and spend the rest of their income on other goods and services. Their maximizing behavior and the underlying distribution of income generates a system of demand functions for various product quality levels. Quality is vertically differentiated. Hence, higher income consumers are

willing to pay more for higher quality than consumers in lower income brackets. Let c(z) denote the constant unit variable cost of producing z level of quality. Shaked and Sutton show that if c(z) is nearly constant over the conceivable range of quality, then the market becomes oligopolistic (regardless of the level of fixed entry cost).[10] Only a finite number of different qualities will be offered in the market.

These assumptions regarding the cost function and the nature of product differentiation are likely to be met in many capital intensive high tech industries, where the major burden of cost associated with upgrading quality falls on fixed development cost, capacity cost, and fixed cost of building an initial sales network or marketing channels. The major question that arises is why some firms choose to produce at the higher end, and others at the lower end of the quality spectrum. Oligopolists have an incentive to offer product quality that is sufficiently different in order to relax price or output competition in the next period. But in making the product quality selection, fixed entry cost also plays a part. To focus on these determinants of product selection, assume that only a finite number of vertical product qualities $(z_1 \ldots z_N)$ are produced in equilibrium. Further, assume that $c(z)=c$ for all z. Let $P_i(Z)$ be the equilibrium price of the ith vertical quality when the quality distribution is given as $Z = (z_i)_{i=1}^{N}$. When the entry cost is positive, no two firms will produce the same

[10] In particular, even if the fixed cost is zero, the equilibrium number of firms becomes finite.

quality, and the price will be proportional to quality, i.e., $c < P_N < P_{N-1} <---< P_1$, if quality is ordered in a descending way. Let T denote the set of consumers, and I_i denote the set of income classes such that those consumers whose income belongs to this set prefer ith quality. Let $G_i(c) = (P_i(Z)-c)t_i$,

$$\text{where } t_i = T \int_{I_i} dF(y)$$

We claim that

$$G_N^{(c)} < G_{N-1}(c) < --- < G_1(c)$$

which implies that if every firm incurs the same entry cost, the profits of the firm will be greater the higher the quality of product it produces.[11] In this case, each firm will have a strong incentive to move up the quality ladder.

To show this, let N = 3, and $G_1(c) < G_2(c)$. If firm 1 lowers its price to $P_2(Z)$, consumers who prefer product 2 at previous market prices will switch to product 1. The new profits of firm 1 will be $G_1' = G_2(c) + (P_2(Z)-c)t_1 > G_2(c)$. Since firm 1 could do better then lowering price to P_2 at a Nash equilibrium of prices and quality, it follows that $G_1^{(c)} > G_1' > G_2(c)$, which contradicts our original supposition. This argument can easily be generalized to any finite number N. Notice that our proposition holds as long as a Nash equilibrium in the two-stage game of quality and price

[11] For a numerical example on profitability when N=2, see Tisole, J. (1988), The Theory of Industrial Organization, MIT Press, Cambridge, MA, pp. 296-298.

exists. It holds true for any distribution of income in the foreign market.

Suppose now that the unit variable cost c(z) increases from c as z increases. If c(z) increases very fast, consumers may prefer to purchase a lower quality when all qualities are offered at their respective unit variable costs. If the rate of increase is small enough, continuity of an equilibrium with respect to small changes in cost ensures that the equilibrium number of firms and inequality (1) can still be preserved.[12] We summarize our reasoning in the following proposition.

PROPOSITION 1: Let $G_i(c(z_i))$ denote firm i's profits in equilibrium, where quality i is ordered in a descending order. If marginal cost of upgrading quality is sufficiently small, then $G_i(c(z_i)) > G_j(c(z_j))$ for any $i<j$.

Proposition 1 states that, under the assumed cost condition, every firm in the industry has a strong incentive to move up the quality spectrum, if the major burden of quality upgrading only falls on fixed entry costs. Notice that a high product-specific fixed entry cost is not necessary to derive Proposition 1. The proposition only infers that the assumed cost of quality improvement is likely to be satisfied in an industry with large fixed cost.

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[12] We will not elaborate on the continuity of a Nash equilibrium with respect to the underlying parameters, which is quite standard in a general equilibrium analysis.

Also interesting is the possibility that the interfirm differences in product-specific fixed entry cost among potential entrants are related to the distribution of actual product quality selected by firms. Assume that every potential entrant has the same variable cost function, c(z), but differs in product-specific fixed cost. In a sequential entry model, the first entrant takes the most profitable location in the space of potential vertical quality, and the next entrant, the next most profitable location, and so on. This occurs because once any firm selects a quality location, it builds up product-specific economies of scale and the late coming firms will effectively be deterred from entering by these scale economies plus the product-specific sunk cost. Hence, late comers end up staying at the lower end. Late entering firms rationally figure out that if they select a similar quality as the incumbent's, Bertrend price competition becomes unavoidable. Late comers would certainly lose the product-specific fixed costs, which are sunk to the incumbent but not to potential entrants.

Firms thus compete to enter first, engaging in an investment race to reach the most profitable location of the quality scale. Let K_0 denote the required capacity for any firm to enter the market. Let $T_i(c_i)$ denote the time taken to build the capacity when firm i incurs cost c_i per unit time. Assume that for any given c, and for two firms i and j with $i<j$, $T_i(c)<T_j(c)$ for $i,j = 1, 2 ---,N$. Then whatever the level of investment cost chosen by the jth firm, firm i can respond by adopting an investment strategy that costs the same, and in fact build the capacity earlier than firm

j. Knowing this, firm j will not attempt to compete with firm i in this investment race. In other words, it is rational for the firm with less efficient investment technology not to compete with the more efficient firm from the outset. We thus have the following intuitive proposition.

PROPOSITION 2: Assume that the marginal cost of quality improvement is negligible and that firms have different product-specific investment technology. In a Nash equilibrium of an investment race, the firm with the lowest product-specific fixed entry cost produces the (most profitable) highest quality product. In general then firms will be located in a quality spectrum from the highest end in a decreasing order of their ability to meet product-specific fixed entry cost.

The central feature of the testable hypothesis we have proposed is that in capital-intensive high tech oligopolistic industries, firms that can develop high quality in the least costly way will monopolize the upper end of the (within a given amount of time) quality spectrum. This will be true in those industries where the marginal cost of quality upgrading is negligible, compared to the large fixed product-specific entry costs. Thus, for example, when the firm's activities cover several industries where there are economies of scope, the firm may be able to spread the fixed cost of inputs such as R&D, tooling and marketing over the other range of activities. In this case, a multiproduct firm, or a firm with a conglomerate structure has an advantage over a

newly entering single product firm in quality competition in high tech industries.

By the same token, in an industry where technological linkage effects between old and new products are present, a firm with a large market share in existing products will have a competitive edge in developing new high-quality products. This is an example of intertemporal economies of scope. Reputation is a nontangible firm-specific asset, the returns from which can be spread intertemporally over separated markets. The firm's reputation for supplying reliable, high quality products at a reasonable price is accumulated over a long period and does not depreciate quickly. Firms can utilize intertemporal economies of scope by building their reputation, but only if reputational externalities among competing firms are negligible. It follows that firms in concentrated home industries with a large market share are in a better position to invest in reputation building in a foreign market and can thus more easily move into higher product locations.

Our hypothesis regarding market structure and industrial transition is valid in capital intensive, high tech oligolopistic industries. In an industry where the product-specific marginal cost of quality improvement is large relative to fixed entry costs, it is likely that each firm will settle down in its area of specialization. And if product-specific fixed entry cost is low, the industry will be in a monopolistically competitive equilibrium. In this type of industry equilibrium, no profitability comparison is possible among different firms. Firms producing higher quality

and meeting the demand of rich consumers are not necessarily making greater profits than firms producing lower quality. In a long-run equilibrium with free entry, every firm will earn normal profits.

The proposition that economics of scale, scope and size are needed to enter and prosper in oligolopistic markets for capital intensive, high quality products does not mean that small firms are relegated to low quality products or to competitive markets and normal profits. In many situations, where product-specific entry costs are lower and product differentiation (vertical and horizontal) is an important competitive strategy, smaller firms can enter and compete for super-normal profits.

Consider a situation where buyers are heterogeneous and purchase only one product. Products in this case can be described as points in a space (horizontal and vertical) with dimensions corresponding to product characteristics. In such "address models" rivalry tends to be localized because a change in any producer's price or quality mainly affects its nearest neighbors. (Archibald, Eaton and Lipsey, 1982; Hotelling, 1929; Schmalensee, 1978.) Each brand (a horizontally differentiated variety or vertically differentiated quality) faces only a small number of direct competitors, no matter how many sellers are present in the market as a whole. Small firms, given this sort of localization in the market and relatively low entry costs, can acquire a "local" (generally short-run) oligopoly through product differentiation.

Moreover, supplying a small (but highly profitable), specialized niche, of a differentiated - product market is generally more consistent with the best use of a small firm's strategic assets than it is for a large firm's. Hence, their may be "mobility barriers" in various markets that make the activities of small firms difficult for larger rivals to replicate (Caves and Porter, 1977). Small firm strategic assets and mobility barriers can enhance short-run market power.

Strategic assets of small Taiwanese firms generally take the form of flexible production technology and the capability (engineering design, production, delivery) to move rapidly through various product-cycles. Flexible production technology operates at higher minimum average cost, but enhances the firm's ability to vary output in the presence of demand fluctuations, which gives it an offsetting competitive advantage in fluctuation-prone industries (Mills and Schumann, 1985). Rapid response capability plus flexible production technology allows smaller rivals to differentiate their products in at least two ways. First, they can fill profitable "short orders" when demand is high and other exporters face capacity or timing constraints. And second, they can meet specific demands of small market niches. Both forms of differentiation generally make firm demand curves less elastic and thus tends to enhance short-run market power.

Taiwan's small firms also have an additional feature which enhances their competitive advantage - namely, "horizontal integration". Small producers in Taiwan "cluster" together, by

industry, in primary and secondary cities. These clusters of producers, suppliers, and subcontractors, all involved in producing a particular product, realize economies of agglomeration, and, because each small firm tends to specialize as much as possible, increasingly complex structures of the division of labor and economies of scale. Within these agglomerations, larger firms help smaller firms overcome technological and financial barriers to entry that would plague small producers working alone (Biggs, T., 1986). Such complex forms of cooperation raise the productivity of all firms and reduce productivity differences between firms. Lastly, Taiwanese small and medium firms tend to concentrate almost exclusively on production, leaving marketing to the foreign buyer. OEM contracts (contracts to manufacture particular designs for large retailers who attach their own brand names) between small firms in Taiwan and large US retailers, like Sears Roebuck, have given Taiwan the capability to shift into higher-end products even though its small producers have no marketing or after-sales service facilities (for a discussion of some of these issues see Biggs and Levy, 1989; and Biggs and Lorsch, 1989).

Summing up, we have put forth the following arguments in respect to market structure and export quality.

First, in many high-tech industries, profits earned at the higher end of the quality spectrum are greater than at the lower end. If the industrial organization of a country provides advantages (economies of scale, scope and size) to the domestic

firm to move into the profitable, high-quality segment, industrial transition toward higher export quality will speed up.

Second, when market structure is dominated by small and medium enterprises, the transition to high-end products in response to rising unit labor costs can be constrained because of entry barriers. Small firms do not have the wherewithall to enter an investment race for the highest-value segments of oligopolistic, high-tech industries. Moreover, smaller firms will not have the incentives, provided by economies of scope, reputation externalities and the like, to move up in quality in many export industries. Third, however, if small firms have strategic assets that allow them to pursue "flexible-specialization", and "clustering" creates enough economies of agglomeration and economies of scale to reduce some entry barriers, the possibility of "local" market power and short-run super-normal profits on the leading edge of product-cycles do provide incentives and opportunities in some product areas. Given these propositions, we would expect to find Korea moving up in export quality in spite of lesser pressure from rising unit labor costs. On the other hand, one might expect Taiwan to face rather substantial barriers to entry in oligopolistic industries and advantages in those with low entry barriers, short product-cycles and fluctuating demand. By and large, we should expect to see divergent competitive strategies from each country on world markets and these differences should affect the speed of transition to higher export quality.

4. INDUSTRIAL MARKET STRUCTURE IN KOREA AND TAIWAN

Differences in market structure in Korea and Taiwan are best illustrated by aggregate firm concentration ratios in manufacturing. Table 4 presents manufacturing shares for the value of shipments of the largest 50 and 100 firms in each country, as well as their shares in total manufacturing employment. It is clear that manufacturing in Korea has been dominated by a few large enterprises. The largest 100 (less than .2 percent of the total number of firms in 1985) produce more than 40 percent of manufacturing output and employ 20 percent of the manufacturing labor force. On the other hand, the structure of Taiwanese manufacturing continues to be dominated by a preponderance of dynamic small and medium enterprises. The top 100 manufacturing firms in Taiwan produce only a little more than 20 percent of output and employ a little less than 20 percent of the labor force. Compared to Korean firms, the ratio of output to labor employed shows Taiwan's largest firms to be a lot less capital intensive.

Most of the largest firms in Korea are also subsidiaries of conglomerates (jaebols). Jaebols include subsidiaries that span diverse industries and service activities from general trading companies, heavy chemicals to construction. The largest jaebols have their own unified system of research laboratories, which coordinate and control various R&D activities of their subsidiaries. In 1985, the top ten jaebols, with 147 subsidiary companies, were responsible for more than 30 percent of manufacturing output and 32 percent of Korean manufactured exports

(Table 5). These giant conglomerates have spearheaded Korea's international competitive strategy, which, in the 1980s, has been aimed at breaking into high tech industries dominated by developed country multinationals.

Many of Taiwan's largest companies are also members of business groups. But private business groups in Taiwan tend to be much smaller and less diversified than in Korea. Table 6 compares the top ten business groups in each country. The total sales of Taiwan's business groups were only 16 percent of total sales of Korea's groups in 1983. In terms of total assets, Taiwan's top ten was about one-fifth of the Korea's top ten. Further, Taiwan's business groups do not generally span out to include general trading companies[13] or large joint R&D facilities. Their assets are much more closely tied to manufacturing. It might be noted that some of Taiwan's large, state-owned enterprises rank with Korea's largest jaebols. For example, together with affiliated companies, China Petroleum ranks with number three in Korea's top ten. Taiwan's state-owned firms, however, generally do not export. In fact, the largest five hundred firms in Taiwan only account for 25-30 percent of manufactured exports. Small and medium size enterprises account for about 50 to 55 percent of exports and foreign firms the rest (T.C. Chou, 1985).

It is interesting to compare Korean and Taiwanese industrial structures on a more disaggregated level. Table 7 presents

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[13] In some cases, trading subsidiaries are attached to Taiwanese groups, but they are not large, <u>general</u> trading companies.

comparative two-digit level ISIC (value-added share) data for Taiwan 1981 and Korea 1982. In twelve out of twenty industries, Korea has a decided advantage, relative to Taiwan, in firm size. Korea's size advantage is concentrated in industries such as chemical products, rubber products, basic metal and metal products and transportation equipment. In some of these industries Korea appears to be upgrading export quality faster than Taiwan, as we will note in the next section.[14] Taiwan's firm size distribution, on the other hand, is more skewed, relative to Korea's, towards larger firms in "upstream industries." The basic reasons for this higher concentration in intermediates are state-ownership and smaller market size. The Nationalist state has chosen to control

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[14] Additional data is available that compared market structure in Korea and Taiwan at an even lower level of aggregation. Table 8 contains firm size distribution figures for the information industry in each country. Korea is shown to have more firms in the largest size category. Taiwan's computer firms are mostly concentrated at the small and medium end of the size spectrum.

Table 8 Firm Size Structure in the Information Industry

Assets (U.S. $ millions)	Taiwan	Korea
.57 and below	18	23
.57 to 1.15	10	5
1.15 to 3.45	21	6
3.45 to 5.75	7	3
5.75 to 11.50	6	5
11.50 and above	2	10
Total	64	52

Source: Institute for Information Industry, Taipei, ROC (1987)

upstream industries since the 1950s for reasons of industrial policy and political domination.[15]

Clearly, there are enormous differences in levels of market competition in Korea and Taiwan. No more graphic portrayal of this difference can be found than the relative growth in number of firms in each country. Between 1966 and 1986, the number of manufacturing firms in Taiwan grew 315 percent, while average firm size (as measured by the number of employees) increased only 15 percent. In Korea, it was just the opposite: the number of firms grew 20 percent, while average firm size increased 300 percent. As these figures indicate, growth in Korea has come largely from the expanding output of existing firms, while growth in Taiwan has come largely from entry of new firms.

The reasons for these divergent patterns of industrial structure are complex. But several factors can be identified as having played a leading role: culture, historical circumstance, and government policy. Taiwan's businessmen have a cultural preference for family-controlled, independent companies, as Chinese communities do all over Asia. As one businessman in Taipei put it, "If you stood in the middle of this city and tossed a stone in any direction, you'd probably hit a boss." This proclivity for family-controlled, independent companies has kept enterprises small and

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[15] Winkler (1987) points out that at best, the Nationalist state owns basic industries to steer the economy and to be able to subsidize private firms when desirable. At worst, it owns basic industries to dominate policy and to be able to retaliate against private firms when necessary. See also Gold (1981) and Wade (1987).

contributed to an industrial complex based on a high degree of specialization and subcontracting, as noted earlier. The resulting networks of firms have, in turn, created production niches facilitating entry at relatively small firm sizes.

An important influence on Taiwan's early industrial development was the immigration of overseas Chinese. These immigrants brought with them substantial capital and equipment to start up many new family-controlled businesses (Scitovsky, 1986). Moreover, the political problem with Mainland China that brought these migrants to Taiwan (and which continues to hang over Taiwan today), created a good deal of investment risk, which worked to keep invested capital relatively small. Authorities in Taiwan have been much less involved in socializing investor's risk with financial subsidies (since 1950) than the Korean government.

As for industrial policy, Korea's policies subsidized industrial consolidation, while Taiwan's have sometimes been negative towards consolidation and sometimes indifferent. Both countries pursued interventionist policies to promote industrial development, as we mentioned earlier, but on balance it would seem that the Korean authorities were much more interested in directing the technological advancement of large conglomerates in export markets than the Taiwanese. As we will discuss later, the interests of policymakers in both countries have reversed in recent years. Korean officials are now acting to increase the number of smaller firms, while Taiwan is moving to promote consolidation.

5. DIFFERENCES IN THE TRANSITION TO HIGHER EXPORT QUALITY

Given these dramatic differences in industrial organization, one would expect to see cross-country differences in export patterns. Specifically, if the propositions in section III are correct and gigantism confers an advantage in industries with high fixed entry costs and relatively low variable costs of upgrading quality, we would expect Korea to have a higher rate of transition to high-end products in these areas. Taiwan, on the other hand, should be relatively disadvantaged in entering these industries. We would expect Taiwan's transition to higher export quality to be in industries with relatively low fixed entry costs and higher variable costs (relative to entry costs) of upgrading quality. In short, we expect that divergent market structures will lead to cross-country differences in the overall speed of transition and to differences in competitive strategy in various product areas.

The disaggregated weighted unit value indexes in Table 9 and the RCA indexes in Table 10 are helpful in examining these issues. Table 9 reports averages of unit value indexes for total exports and for industry subgroups (SITC 5, 6, 7 and 8) in products where each country's comparative advantage has been rising (i.e., RCAs have been increasing). It is evident that Korea's average unit value index has risen sharply in those products where it has gained comparative advantage. Moreover, relative to Taiwan, Korea has moved up faster in the high technology industry group of SITC 7 and

part of 8 (the other part of 8 being relatively low-tech), as predicted.[16]

It is important to note, however, that although Taiwan has not moved up as fast as Korea in the last decade, it has done quite well in some industry groups. By 1978, for example, Taiwan had already attained a relatively high weighted average unit value in SITC 7. Taiwan's transition to higher-end products had been much faster than Korea's in the 1970s; hence, Taiwan was moving up the ladder in the 1980s from a much higher base. For example, by 1987, Korea had only managed to reach half the level of Taiwan's unit value index in the important SITC 7 group. Having said this, it still remains that, since 1978, Taiwan has generally made much slower progress than Korea. Particularly in SITC 7, Taiwanese firms appear to have stagnated.

RCA indexes for some of each country's leading export products appear in Table 10, illustrating where the patterns of transition to high-end products diverge.[17] The first thing Table 10 makes clear is that both countries have high volumes of exports in areas

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[16] Korea's ability to shift into high-quality products is evidenced by a regression of its relative 1978/1987 unit value index on its relative RCA index for the SITC 7 subcategory.

$$\log(RCA78_k/RCA87_k) = \underset{(0.20192)}{4.748} \log(UVI78_k/UVI87_k) + \underset{(0.38326)}{1.3045}, \quad R^2 = 0.1562 \quad N = 24,$$

where RCA^t_j denotes RCA index of j country product in year t, and UVI^t_j denote unit value index of j country product in year t. Korea's increasing unit value index is significantly associated with the shifting pattern of comparative advantage in SITC 7 industry.

[17] These 15 products account for more than one quarter of each country's exports.

where they have highest comparative advantage. In Korea, eleven products belong to the upper 10 percent tail of the 1987 RCA distribution and in Taiwan ten products. It is also evident that each country has been successful in moving into skill and capital-intensive industries. Many labor-intensive, light industry products (SITC 6) have already disappeared from the leading export products list.

Two products stand out on Korea's list, which graphically explain the differences in transition in the two countries -- integrated circuits and passenger cars. Both of these products fit the characteristics outlined in section III. A key ingredient in Korea's ability to enter these industries and to sustain its competitive edge is the wherewithal to incur the necessary lumpy investments. A prime example is integrated circuits. Korea's 1986 sales of semiconductors amounted to $1.4 billion, while Taiwan's sales were $610 million. Behind these differences in sales were enormous differences in R&D investment: between 1984 and 1986, Korean firms invested $1.5 billion, and Taiwanese firms $300 million; as of mid-1987 the leading Korean semiconductor supplier, Samsung Semiconductor and Telecommunications, had itself invested more than $500 million (Mody, 1986).

The skill-intensive industries where Taiwan has moved up are much lower in fixed entry costs - television receivers and combinations, automatic data processing machines and adult cycles. Upgrading quality in these areas tends to be engineering (design) intensive, and Taiwan has a relative comparative advantage in low

cost engineers (Woo, 1988). These products also have several other features which fit the competitive characteristics of Taiwan's industrial organization. Product differentiation tends to be important and there are significant rents to be earned by meeting quick delivery schedules.

Personal computers and peripherals are high-tech products where Taiwan's smaller, faster-moving firms have outstripped their Korean competitors in export quality. Korea's huge conglomerates initially misjudged the personal computer business, believing it too small to bother with. By the time the chaebol changed their minds, the market was crowded. Entry costs are moderate and firms can enter at small-scale in the PC (IBM) clone making business (Levy and Kuo, 1987). Product-cycles have been short: typically each technology (8086/88 - 16 bit computer, 80286 - 16 bit computer to 80386 - 32 bit computer) from introduction to maturity has lasted about 4 to 5 years. And, although the industry is changing rapidly, the personal computer business is still a fragmented industry where small producers can compete in product-differentiated niches.

Taiwan is roughly a year ahead of Korea in PC export quality (see item 7520 in Table 10). While the number of PCs produced in each country are about the same, a larger proportion of Taiwan's are higher quality and more profitable. Taiwan's production is mainly ATs, whereas about half of Korea's output is still composed of older XTs, for which the market is at, or nearing, saturation

point.[18] Also, Taiwanese firms have been much quicker to produce and export the new 80386 - 32 bit technology, as well as the hot-selling laptop computer. Moreover, Taiwan producers have gone farther than any other Asian PC maker along the path from OEM to own-brand sales (in 1986, exports of "own-brand" as a percentage of total PC exports was 16 percent in Korea and 28 percent in Taiwan[19]).

Another dimension of the divergent transition in Korea and Taiwan is the difference in competitive strategy in capital intensive, high-tech industries. While Korean firms invested huge resources in tooling and R&D to compete with Japanese, European and American firms in production of standardized semiconductors, Taiwan's strategy was to limit production and competition to ASICs (application specific integrated circuits). This strategy fir Taiwan's comparative advantage because ASIC chips are design-intensive rather than capital intensive products requiring large volume production.

Recapitulating, the RCA and disaggregated unit value indexes, as expected, suggest that market structures do influence a country's transition to capital and skill-intensive exports. Korea's export quality has risen most rapidly in some of the highest quality and most profitable segments of SITC 7 and 8 where

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[18] "Personal Computers: Asia's Winning System", Far East Economic Review, 31 Aug. 1989, p. 53.

[19] Institute for the Information Industry, A Comparative Analysis of the Information Industry in Korea and Taiwan (Taipei, May, 1987) (in Chinese).

there are significant barriers to entry in terms of fixed costs in tooling, marketing and R&D. On the other hand, Taiwan's increase in export quality has been concentrated in high-tech products where entry costs are moderate and where market niches and short product-cycles are more important. Within its area of comparative advantage, Taiwan moved to higher export quality very quickly in the 1970s, reaching a higher unit value index than Korea in several categories of exports. In the last decade, however, the ability of Korean conglomerates to compete in the highest quality segments has enabled Korean exporters to overtake Taiwanese exporters in the transition to higher-end products.

6. CONCLUDING REMARKS

In product-cycle models with vertical product differentiation, such as Flam and Helpman (1987), moving up in export quality is a simple matter of importing superior technology and using it to become more price competitive. No mention is made of the capability of different firms to invest in more sophisticated technology or to meet the entry requirements in these higher quality products where non-price competition is more important. This paper has used a set of U.S. import data from Korea and Taiwan to make a preliminary investigation of the influences of industrial organization on the speed and direction of a country's shift to higher-end exports. Three main conclusions emerge from the study.

First, a country with a comglomerate market structure does appear to have advantages in making the transition into the highest

quality segments of oligolopolistic international markets. Korea's rate of increase in export quality has been significantly higher than Taiwan's in the last decade, particularly within the high-tech categories of SITC 7 and 8 where entry requirements are high.

Second, in the face of declining competitiveness, as measured by the real effective (trade weighted) exchange rate deflated by unit labor costs, Taiwan's exporters seem to have slowed their rate of increase in export quality in the last decade. Taiwan's small firms moved up in some high-end product areas very quickly in the 1970s, by exploiting their cost, flexibility and product differentiation advantages. Now that declining price competitiveness is forcing firms to compete more and more in high-end products where non-price competition is important, there is some indication that Taiwan's small firms are having difficulty meeting the challenge (with the exception of PCs).

Third, while there appears to be advantages in having conglomerates, it is not overwhelming. We show that the conglomerate's advantages are mainly in entering the highest quality segments of capital and skill-intensive products. In other high-tech industries where entry barriers are moderate, a country with a more competitive market structure can expand export quality. Also, smaller, more flexible rivals have firm-specific assets which can be used to develop "local" monopoly power by innovative product differentiation and quick entry at the leading edge of product-cycles. It might be noted, however, that such "firm-specific assets" are not easily acquired. As Section III argues, Taiwan's

small export producers reap benefits from "horizontal integration" and human resources that are not specific to small enterprises everywhere.

It is interesting to note that, although Taiwan's exporters have not increased export quality as fast as Korea's exporters in the last decade, they have kept pace with Korea's export volumes even though Taiwan's small firms have experienced a larger decline in price competitiveness (Table 2c). The smaller profit margins that have been necessary to maintain export volumes show up in slightly lower real growth rates of GNP.

The profits squeeze on Taiwan's small firms, evidenced by the fact that, in 1986, firms with less than 100 employees paid 70 percent of the wages of large firms (500 + employees) but had only 46 percent of the productivity, should finally begin to influence market structure through firm consolidation (see Tables 11 and 12). Larger firms in Taiwan are experiencing more rapid rates of productivity growth, lower wage growth and thus larger annual rates of decline in unit labor costs. Consolidation should help Taiwan to compete in product areas where it heretofore has been disadvantaged because of entry barriers.

In Korea, recent events have not been kind to the Jaebols. Their export growth and profitability have been hit by a stranger currency (revaluation of 15 percent since 1988) and worker pay raises have jumped 20 percent in each of the past three years. The government is also not as supportive as it used to be. And, in fact, has moved vigorously to support the emergence of more small,

independent enterprises in recent years. In addition, many of the Jaebols are heavily indebted and involved in too many businesses (The Economist, Dec. 1989).

The restructuring that the Jaebol will have to undertake in the future will be painful and expensive, and will require artful management. Given the current political environment in Korea and the growing military of Korean labor, there could be problems ahead for Korean conglomerates in international markets.

Table 1a *Standard Deviation of the RCA Indexes*

Year	Korea	Taiwan	Japan
1964	4.956	4.934	1.438
1966	4.616	3.763	1.247
1968	4.043	2.501	1.274
1970	4.170	2.068	1.122
1972	2.375	2.021	0.978
1974	1.707	1.804	0.988
1976	1.773	1.849	0.903
1977	1.768	1.860	0.925

Source: Young Sun Lee.

Table 1b *Various Spearman Rank Correlation Coefficients of RCA Indexes*

Year	Between the 1977 and the specific year indices for each country			Between the indices of Korea in 1977 and the indices of the other country in the specific year		Between the indices of two of the three countries for each year		
	Korea	Taiwan	Japan	Taiwan and Korea	Japan and Korea	Korea and Taiwan	Korea and Japan	Japan and Taiwan
1964	0.417	0.674	0.629	0.522	0.720	0.481	0.335	0.622
1966	0.641	0.753	0.695	0.589	0.703	0.577	0.564	0.563
1968	0.654	0.830	0.727	0.621	0.690	0.600	0.550	0.588
1970	0.762	0.878	0.785	0.672	0.662	0.592	0.516	0.612
1972	0.779	0.863	0.854	0.707	0.607	0.648	0.482	0.500
1974	0.914	0.932	0.853	0.733	0.414	0.738	0.414	0.357
1976	0.978	0.973	0.971	0.734	0.377	0.723	0.369	0.309
1977				0.722	0.352	0.722	0.352	0.341

Source: Young Sun Lee.

Table 2a: Standard Deviation of the Recent RCA Indexes

Year	Korea	Taiwan	Japan
1978	1.828	1.659	0.7871
1983	1.759	1.631	0.7802
1987	1.443	1.489	0.6983

Source: Author's Estimates

Table 2b: Structural Change in the Export Sector

Period	Korea	Taiwan	Japan
1978-83	0.6834	0.8209	0.7503
1983-87	0.6584	0.9083	0.7966
1978-87	0.6128	0.7256	0.6832
Relative Unit Value Index UVI87/UVI78	1.910	1.654	2.172

Source: Author's Estimates

Table 2c: Export Growth (Merchandise Export)

(Unit: Percent)

Period	Korea	Taiwan	Japan
1971-80	36.4	28.5	20.6
	(7.7)	(13.9)	(7.7)
1981-87	14.5	15.4	7.2
	(9.2)	(8.2)	(3.8)

Note: Numbers in parentheses denote real GNP growth rates.

Source: Statistical Yearbooks for Korea and Taiwan, 1987.

Table 3: Similarity in Export Structure

Year	Korea - Taiwan		Korea - Japan		Taiwan - Japan	
	simple	rank	simple	rank	simple	rank
1978	0.4572	0.693	-0.0039	0.283	-0.0090	0.224
1983	0.3071	0.641	-0.0597	0.177	-0.0737	0.177
1987	0.2627	0.599	-0.0473	0.157	-0.0799	0.144
Japan '78 w/ Korea/Taiwan '87*			0.1560	0.355	0.0563	0.277

* Lagged correlations

Source: Author's Estimates

Table 4: Concentration Ratio in Manufacturing
Percentage (%)

Period	Korea		Taiwan	
	50	100	50	100
1974	32.9	43.6 (23.0)	16.9	23.4 (15.9)
1977	35.0	44.9 (23.9)	15.2	22.4 (17.9)
1980			16.4	21.9 (18.4)
1982	37.5	46.8 (21.9)		
1985	35.2	43.9 (20.9)	17.2	23.5 (22.6)

* Numbers in parenthesis indicate the share in terms of employment size.

Source: C.H. Yoon and K.Y. Lee (1988).

Table 5: Korean Jaebols in Manufacturing (1985)

(%)

	Subsidiaries	Shipment	Employment	Exports
Top 10	147	30.2	11.7	32.2
Top 30	270	40.2	17.6	41.3

Source: Kyu-Uck Lee, "International Trade and Industrial Organization: The Korean Experience", KDI, mimeo.

Table 6: Comparison of Business Groups (1983)
(current in U.S. $)

	Korea			Taiwan	
	Sales	Total Assets[a]		Sales	Total Assets
Samsung	7077	8741	Formosa	2039	1835
Hyundai	8868	10315	Linden	823	842
Lucky-Gold Star	7023	7055	Tainan Spin	777	1215
Daewoo	6008	8673	Yue Loong	717	717
Sunkyung	6213	2836	Far Eastern	701	908
Ssangyong	3265	3148	Shinkong	676	980
K. Explosive	2177	2483	Tatung	585	822
Hanjin	2061	3143	Cathay Trust	390	1771
Hyosung	1953	1811	San Yang	385	222
Daelim	n.a.	1718	Sampo	355	295
Kukje	2443	n.a.			
Total	47088	49923		7446	9607

(a) Total assets in 1985

Source: Biggs, Tyler, and Lorch, Klaus, 1989.

Table 7 : Size Structure of Manufacturing in Taiwan and Korea

-- Distribution of Value Added, 1981/1982

Industry	TAIWAN 1981 Total Value Added (m US$)	TAIWAN 1981 % of Total Mfrg.	TAIWAN 1981 Share of Value Added: Small Firms (5-19)	TAIWAN 1981 Share of Value Added: Medium Firms (20-299)	TAIWAN 1981 Share of Value Added: Large Firms (300+)	KOREA 1982 Total Value Added (m US$)	KOREA 1982 % of Total Mfrg.	KOREA 1982 Share of Value Added: Small Firms (5-19)	KOREA 1982 Share of Value Added: Medium Firms (20-299)	KOREA 1982 Share of Value Added: Large Firms (300+)	DIFFERENCE TAIWAN-KOREA in Value Added Shares: Small Firms (5-19)	DIFFERENCE TAIWAN-KOREA in Value Added Shares: Medium Firms (20-299)	DIFFERENCE TAIWAN-KOREA in Value Added Shares: Large Firms (300+)
Food	721	5.9%	7.1%	35.8%	57.1%	1,653	7.2%	6.0%	31.6%	62.4%	1.1%	4.2%	-5.3%
Beverage & Tobacco	1,086	8.8%	0.1%	1.9%	98.0%	2,129	9.2%	2.7%	15.6%	81.8%	-2.5%	-13.7%	16.2%
Textiles	1,447	11.7%	4.9%	35.4%	59.7%	2,678	11.6%	3.7%	37.1%	59.2%	1.2%	-1.7%	0.5%
Garment & Apparel	417	3.4%	7.9%	56.3%	35.7%	1,073	4.7%	6.5%	36.5%	57.0%	1.4%	19.8%	-21.2%
Leather, Fur	177	1.4%	5.3%	62.5%	32.2%	368	1.6%	6.6%	50.1%	43.3%	-1.3%	12.4%	-11.1%
Wood&Bamboo Products	407	3.3%	22.2%	46.1%	31.6%	439	1.9%	21.8%	32.7%	45.5%	0.4%	13.5%	-13.9%
Paper,Print,Publish.	433	3.5%	19.1%	38.1%	42.8%	1,010	4.4%	10.7%	47.3%	42.0%	8.4%	-9.2%	0.8%
Chemical Materials	534	4.3%	2.2%	21.7%	76.1%	1,048	4.5%	3.0%	48.1%	49.0%	-0.7%	-26.4%	27.1%
Chemical Products	273	2.2%	9.9%	66.8%	23.3%	1,133	4.9%	1.9%	39.6%	58.4%	8.0%	27.2%	-35.1%
Petro&Coal Products	452	3.7%	0.4%	3.0%	96.5%	1,266	5.5%	1.1%	18.1%	80.8%	-0.7%	-15.1%	15.8%
Rubber Products	242	2.0%	6.6%	33.5%	59.9%	561	2.4%	2.1%	14.2%	83.7%	4.5%	19.3%	-23.8%
Plastic Products	885	7.2%	10.4%	48.6%	40.9%	402	1.7%	10.8%	42.0%	47.2%	-0.4%	6.6%	-6.3%
Non-Met. Mineral Pr.	678	5.5%	5.7%	33.4%	60.9%	997	4.3%	6.3%	57.5%	36.1%	-0.6%	-24.1%	24.7%
Basic Metal Ind.	474	3.8%	5.7%	47.3%	47.0%	1,981	8.6%	1.5%	17.7%	80.8%	4.1%	29.6%	-33.8%
Metal Products	564	4.6%	29.4%	54.8%	15.8%	938	4.1%	9.5%	43.8%	46.7%	19.9%	11.0%	-30.8%
Mach. Equip. Mfr&Rep	446	3.6%	21.5%	47.5%	31.1%	804	3.5%	10.9%	43.4%	45.7%	10.6%	4.1%	-14.7%
Elec.&Electronic M&R	1,720	14.0%	3.3%	21.2%	75.6%	2,031	8.8%	2.6%	22.1%	75.4%	0.7%	-0.9%	0.2%
Transport.Equip. M&R	914	7.4%	3.8%	23.5%	72.8%	1,873	8.1%	1.6%	12.8%	85.6%	2.1%	10.7%	-12.8%
Precision Machinery	95	0.8%	7.5%	46.7%	45.8%	204	0.9%	5.4%	52.7%	42.0%	2.1%	-6.0%	3.9%
Misc. Ind. Products	354	2.9%	13.5%	53.9%	32.6%	468	2.0%	7.8%	58.6%	33.5%	5.6%	-4.7%	-0.9%
Grand Total	12,321	100.0%	7.8%	33.3%	58.9%	23,055	100.0%	4.7%	31.4%	64.0%	3.1%	1.9%	-5.0%
											+: 14	+: 11	+: 8
											-: 6	-: 9	-: 12

Source: Biggs, Tyler and Lorch, Klaus, "Structure, Dynamics and Performance of Taiwanese Industry", Employment and Enterprise Policy Analysis Project Discussion Paper No. 19, Harvard Institute for International Development, Cambridge, MA, forthcoming, 1989.

Table 9: Weighted Unit Value Index: Mean Value[a]
RCA87>RCA78

	JAPAN			KOREA			TAIWAN		
	87	78	87/78	87	78	87/78	87	78	87/78
Total	17.209	8.725	1.972	9.894	4.922	2.010	9.843	5.675	1.735
SITC 5	24.462	9.011	2.715	1.630	1.522	1.071	1.852	1.982	0.935
6	8.136	1.802	4.514	5.182	2.444	2.121	3.884	2.293	1.694
7	15.943	14.040	1.136	8.902	3.889	2.289	16.843	17.600	0.957
8	29.976	5.656	5.300	13.599	5.773	2.356	10.349	7.315	1.415

(a) Note that the subcategory indexes do not add up in each case to the total indexes. In the calculation of each subcategory the weights were changed to add to one.

Source: Author's Estimates

Table 10 Major Export Products to the U.S. Market (1987)

Product (SITC)	Korea Export(a)	Korea RCA 1987	Korea RCA 1978	Taiwan Export(b)	Taiwan RCA 1987	Taiwan RCA 1978
7520 Automatic Data Process Mch, Nes	593	1.50	0.03	1111	1.94	0.02
7611 Television Receivers & Combinations	252	3.41	3.44	407	3.77	3.84
7638 Audio & Video Tape Players and Recorders	582	2.17	1.33	387	0.99	0.97
7649 Parts NSPF of Telecom & Sound Repair Equip.	346	1.47	0.23	590	1.72	2.52
8310 Luggage, Handbags and Similar Articles	466	4.23	5.94	618	3.85	6.81
8451 Sweaters and Owear App Textile KT	379	3.57	4.75	435	2.81	6.81
8468 U Garments, Inc Shrts of Tex NSPF KT	318	3.56	5.93	459	3.52	6.05
8510 Footwear, New, Exc. Military or Orthopdc.	1846	4.48	4.31	2564	4.26	4.56
8811 Still Cameras & Parts, Flash Apparat	26	0.46	0.47	93	1.14	1.40
8942 Toys, Games & Christmas Ornaments	770	3.60	3.41	988	3.16	3.74
7758 Electro-Themic Appliances, NSPF & PT	407	4.48	0.12			
7810 Passenger Motor Veh (Exc Public Serv)	2183	0.81	0.00			
7764 Integrated Circuits	664	2.03	3.60			
8441 Shirts, Cot, Wool, MMF, NT Knit M&B	310	3.89	9.33			

(1 of 2)

Table 10 (cont'd)

Product (SITC)	Korea Export(a)	Korea RCA 1987	Korea RCA 1978	Taiwan Export(b)	Taiwan RCA 1987	Taiwan RCA 1978
8459 Outerwear NES, KNIT	336	2.78	3.52			
8481 Gloves, Blts & Ot Wear Add Lea, NSPF	520	9.09	8.99			
7599 Parts of ADP & Calculating Office Mch				699	1.11	0.46
7731 Insulated Electric Conductors (Cable)				375	2.22	4.09
7852 Adult Cycles				410	9.57	5.99
8124 Lighting Fixtures & Fittings				414	6.76	2.36
8939 Misc. Chemical Products				765	3.84	3.61
8210 Furniture & Parts Thereof				1342	3.49	n.a.

(a), (b): Export in millions, U.S. dollars to the U.S. market (1987)

(2 of 2)

Table 11: Wages and Productivity Differentials and Wage-Value Added Rates For Different Size Firms 1966-86

	1966			1976			1986		
	W/L	VA/L	W/VA	W/L	VA/L	W/VA	W/L	VA/L	W/VA
1-9	.528	.676	.255	.801	.641	.777	.688	.445	.491
10-49	.553	.495	.365	.741	.573	.805	.663	.449	.468
50-99	.657	.611	.351	.833	.604	.892	.720	.490	.465
100-499	.647	.700	.302	.894	.760	.756	.798	.600	.423
500+	1.000	1.000	.326	1.000	1.000	.641	1.000	1.000	.317

Source: Author estimates from Biggs, T. and Lorsch, K., "Structure Dynamics and Performance of Taiwan's Industry", Harvard Institute for International Development, Harvard University, mimeo, 1989.

Table 12: Annual Growth Rates of Nominal Wages, Productivity and Unit Labor Costs for Different Size Firms 1966-86 (percent)

	1966-76			1976-86		
	W[a]	VA/L	ULC[b]	W	VA/L	ULC
1-9	28.1	5.4	21.6	12.7	12.8	-.12
10-49	28.1	7.5	19.2	15.9	14.2	1.42
50-99	32.6	5.8	25.3	14.5	14.6	-.11
100-499	34.2	6.8	25.6	11.7	14.3	-2.23
500+	24.8	5.9	17.8	11.3	17.1	-4.92

Source: Author estimates from Biggs, T. and Lorsch, K., "Structure Dynamics and Performance of Taiwan's Industry", Harvard Institute for International Development, Harvard University, mimeo, 1989.

(a) nominal wages
(b) ULC = nominal wages/labor productivity

Figure 1: The Ricardian Model and Imported Superior Technology

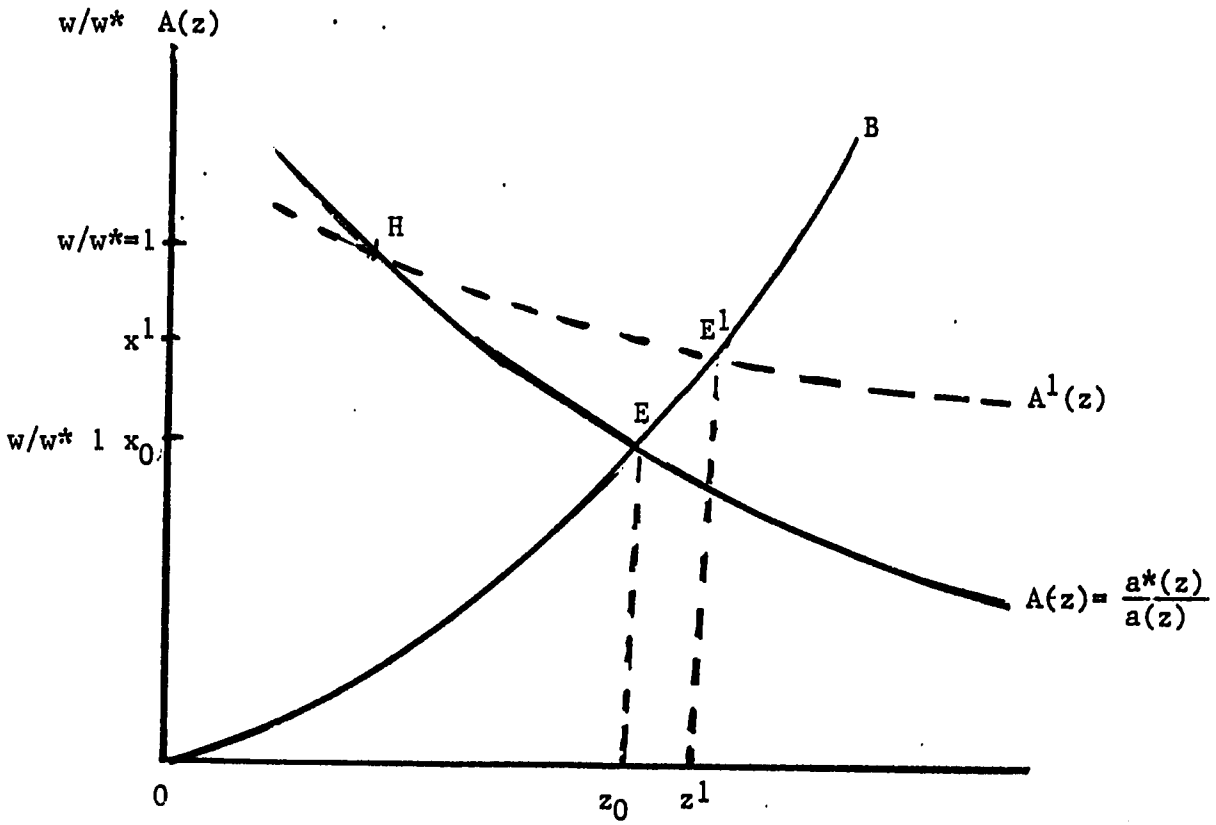
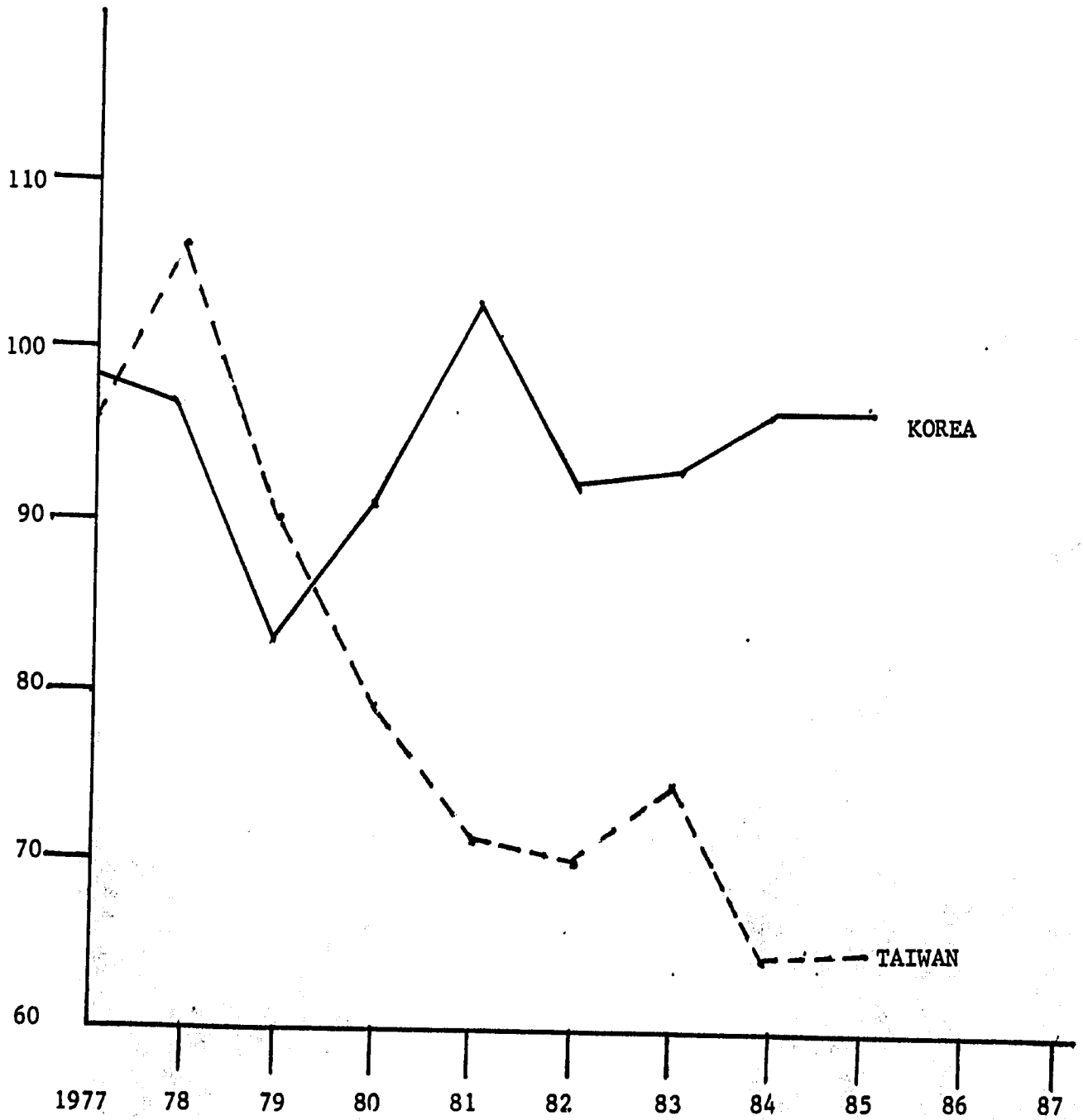
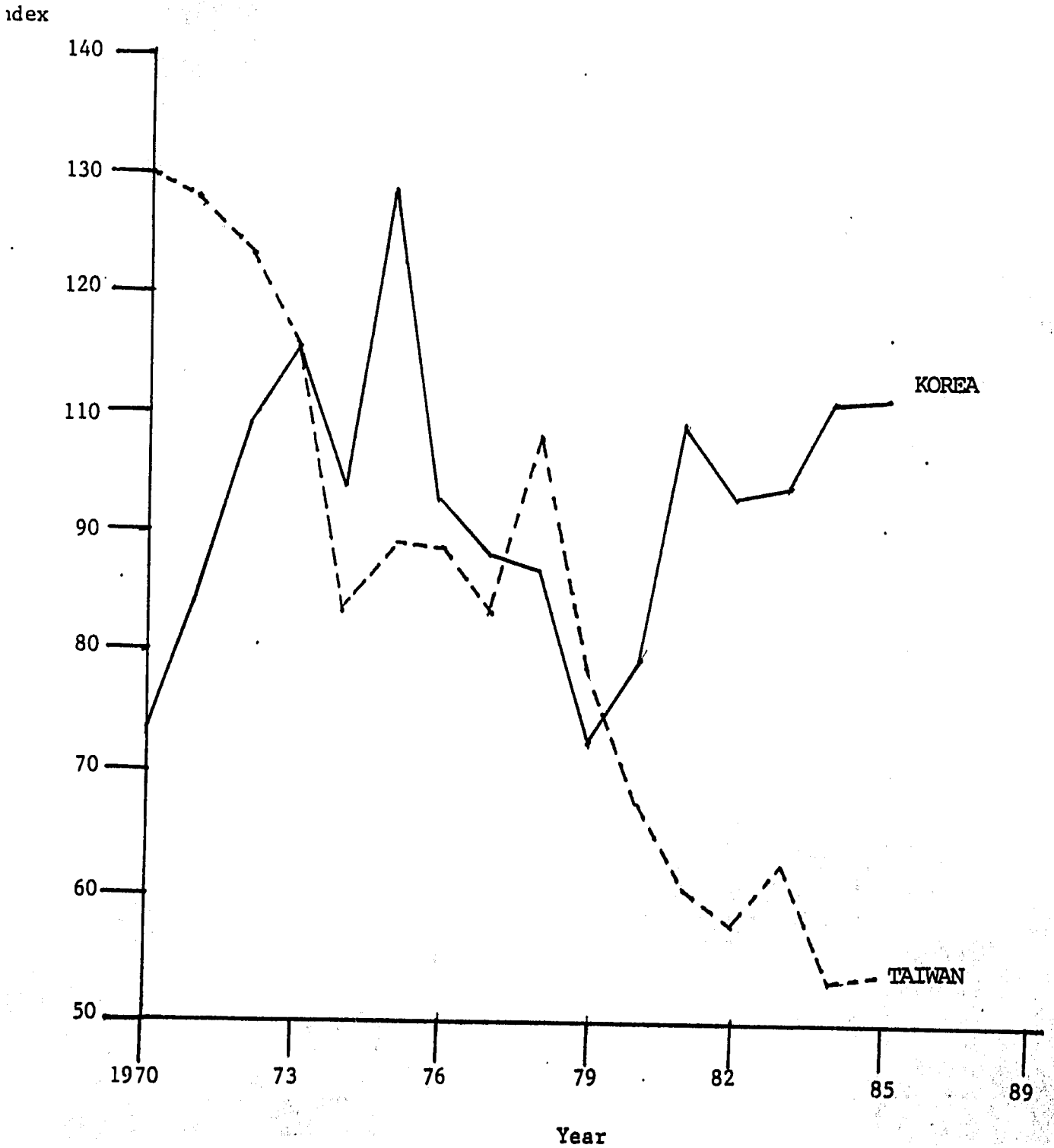


Figure 2: Real Effective Exchange Rates Deflated by Unit Labor Costs, Korea and Taiwan, Trading-Partner Weights (Index 1976 - 78 = 100)



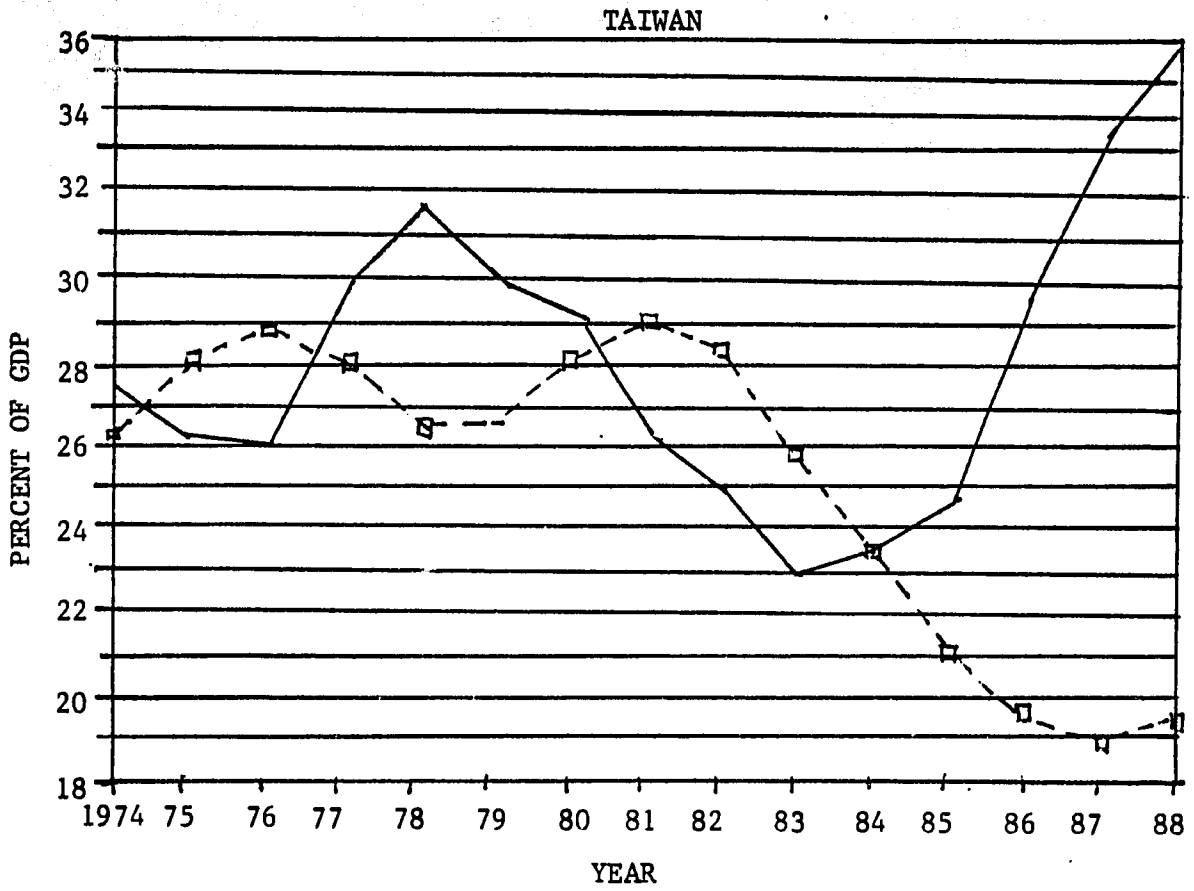
Source: Balassa and Williamson, 1987 p.106

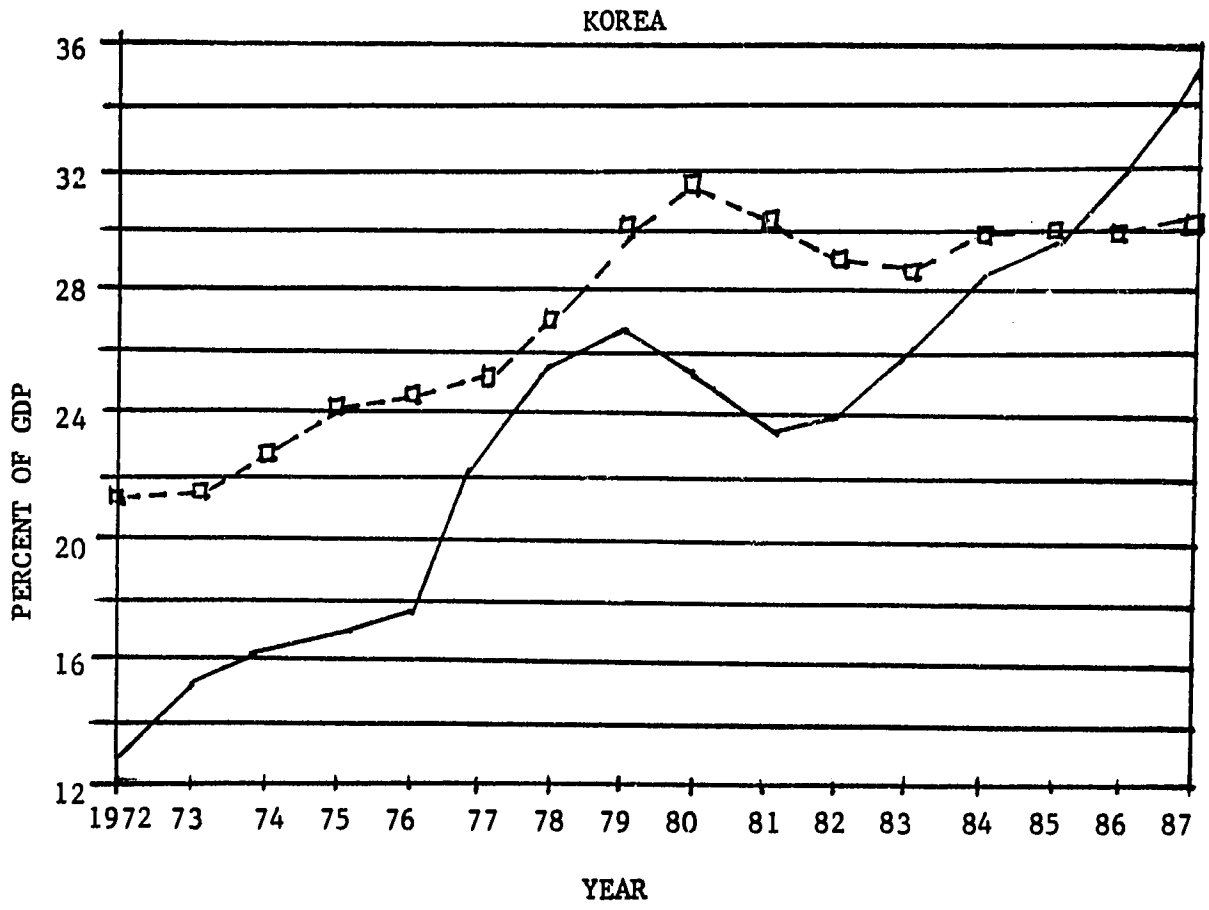
Figure 3: Bilateral Real Exchange Rates Index Deflated by Unit Labor Cost Index Relative to U.S. and Japan



Source: Balassa and Williamson, 1987, p.106

Figure 4: Savings and Investment in Taiwan and Korea





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