Chapter Title: Trade Patterns and Trends of Taiwan

Chapter Author: Chi Schive

# 11    Trade Patterns and Trends of Taiwan

Chi Schive

Over the past two decades, Taiwan's successful export-led economic development has been documented in many studies (Scott 1979; Lee and Liang 1980; Stein 1981). Trade has expanded Taiwan's domestic market and has provided necessary capital goods and much needed materials. More importantly, many industries established during this period have flourished with trade, have been directly in line with the comparative advantage of Taiwan, and have created a large amount of employment. This development strategy has not only alleviated Taiwan's heavy population burden[1] but has also improved its income distribution situation. The so-called Kuznets trap has been rather successfully avoided in the case of Taiwan.

The export-led development process in Taiwan can be summarized as in table 11.1. In 1960 the trade dependence index (the ratio of the total amount of trade to the GNP) was 27.4%. The ratio doubled during the following ten years, exceeded 100 percent in 1980, and reached 103.12% in 1983. Only a few other countries (e.g., Hong Kong and Singapore) have had higher trade dependence ratios than Taiwan. We might also hope that Taiwan has not been involved in reexport activities. Given this situation, in order to assess Taiwan's growth in the 1980s, we first have to foresee its trade prospects, and then we will be in a position to analyze the probable links between trade and the domestic economy. Within the international economic setting, Taiwan's strong position as a big supplier to the United States and to some European countries may already have demonstrated Taiwan's potential as a future buyer. Oddly enough, during the past decade Taiwan has

Chi Schive is professor of economics at National Taiwan University, Taiwan, Republic of China.

**Table 11.1**            **Trade Dependence Index of Taiwan**

|        | Trade/GDP[a] (%) | GNP (billions of U.S. $) |
|--------|------------------|--------------------------|
| 1960   | 27.45            | 1.55                     |
| 1965   | 37.57            | 2.80                     |
| 1970   | 54.85            | 5.64                     |
| 1975   | 74.08            | 14.61                    |
| 1980   | 102.36           | 39.52                    |
| 1981   | 104.48           | 44.84                    |
| 1982   | 98.19            | 45.60                    |
| 1983[b] | 103.12          | 48.56                    |

*Source:* Council of Economic Planning and Development (CEPD), *Taiwan Statistical Data Book 1983.*
[a]The difference between GNP and GDP in Taiwan is negligible.
[b]Estimated by assuming a 6.5% growth rate of GNP and a 10% growth rate of trade in 1983.

accumulated a substantial trade surplus, in spite of having also had to contend with two bouts of stagflation. This accumulated foreign exchange reserve has made Taiwan (and it may be the only non-oil-exporting newly industrializing country in such a position) a net lender rather than a borrower on the international monetary market.

This paper, focusing on the trade patterns and trends of Taiwan, begins with a presentation of the trade structure of Taiwan in the past. It then analyzes the determinants underlying the changes that have been implemented in the trade structure. Three questions are discussed: (1) Can the trade patterns in Taiwan be explained by its vested comparative advantage? (2) Should the trade fluctuations of the 1970s be largely attributed to a lack of foreign demand, or should the rigid domestic monetary system, in particular the fixed exchange rate, share some of the blame? (3) Did the industrial structural change that occurred when Taiwan entered into a post-labor-surplus development stage in the 1970s (called "secondary import substitution," i.e., the establishment of the materials and capital goods industries) affect the commodity composition of trade? Knowledge gained from this part of the analysis will be extremely useful to us when we examine the 1980s in the last section of the paper.

## 11.1   Trade Structure, 1960–80

### 11.1   The Growth of Trade

Though Taiwan's industrial and export sectors had already been partially developed during the colonial period, World War II destroyed much of it. It was not until the early 1950s that agricultural production

returned to the prewar level. In the 1950s, Taiwan's economic policy was inward-looking, with top priority given to producing enough consumer nondurables and construction materials for basic needs. Exports in this period were traditional export items; sugar, rice, tea, and canned and tropical fruits accounted for the bulk of exports (87.4% in 1953 and 67.7% in 1960). Manufactured exports, mainly textiles, were minimal during the period but did start picking up near the end of the period. The average annual growth rate of total trade in U.S. dollars in the 1950s was 5.7%.

At the end of the 1950s, by which time the domestic economy had gradually become saturated, as evidenced by stable prices and low utilization rates of industrial capacity (Tang and Liang 1975),[2] the economy seemed to have reached a turning point, requiring change. A set of policy reforms was therefore initiated around 1960, including two devaluations that brought the New Taiwan dollar to its market value, the unification of the multiple exchange systems, and the promulgation of the investment law, which provided various incentive schemes for investment (Lee and Liang 1980; Lin 1973). These policy measures created a favorable environment for encouraging exports. Nonetheless, it is still unclear whether these decisions, made during a critical period, were based upon careful calculations or were simply based on a belief that a market-oriented and more liberal policy should be put into effect. We mention this because during the policy reform period no one predicted the rapid expansion of trade that followed in the next decade, and exports grew only at a moderate rate, 7.5% during the policy transition period, 1958–61.

In the 1960s, the so-called export promotion, export substitution period, nominal trade grew at an average annual rate of 21.57%, which was about the growth rate of trade in real terms. In the 1970s, though nominal trade grew at an even higher rate, 30.73%, inflation accounted for more than half of it. During the export promotion stage, even though exports did increase much faster than imports, 25.32% compared with 18.40%, the trade balances were still negative in 1970. They have turned positive since 1971. If there had not been an energy crisis, Taiwan would have stored up a handsome trade surplus back in the first half of the 1970s. In the second half of the 1970s, when exports were boosted again, a total trade surplus of $4.48 billion was recorded. The trade surplus has continued to mount through 1981 and 1982. This time the important factor is not export expansion but is the shrinking of imports (see table 11.2).

## 11.1.2  The Commodity Composition of Trade

Taiwan's export trade commodity composition has changed significantly over the past two decades. At present, Taiwan exports mostly manufactured goods in exchange for materials and capital goods. In

Table 11.2                Growth Rates of Trade in Taiwan (percentages)

| | Imports | | Exports | | Total | | |
|---|---|---|---|---|---|---|---|
| | Value | Quantum | Value | Quantum | Value | Balance[a] | GNP |
| 1961–65 | 14.01 | 24.06 | 23.46 | 17.20 | 18.43 | −0.34 | 9.5 |
| 1966–70 | 22.69 | 20.90 | 27.18 | 23.70 | 24.71 | −0.57 | 9.8 |
| 1971–75 | 35.46 | 13.02 | 30.82 | 17.88 | 32.58 | −0.59 | 8.9 |
| 1976–80 | 27.36 | 12.32 | 30.79 | 19.88 | 28.87 | 4.48 | 10.4 |
| 1981–82 | −1.74 | −1.80 | 6.17 | 4.35 | 2.29 | 4.73 | 4.4 |
| 1961–70 | 18.40 | 22.48 | 25.32 | 20.45 | 21.57 | −0.91 | 9.6 |
| 1971–80 | 31.41 | 10.26 | 30.81 | 16.46 | 30.73 | 3.89 | 9.6 |
| 1961–82 | 22.48 | 15.81 | 26.07 | 18.27 | 23.98 | 7.71 | 9.2 |

Source: CEPD, Taiwan Statistical Data Book, 1983.
Note: Value is in terms of U.S. dollars. Quantum is based on 1976 prices.
[a]In billions of dollars.

1982, 92.4% of total exports were accounted for by manufactures, 1.9% by agricultural products, and 5.7% by processed agricultural products. In 1970 nonagricultural products accounted for 78.6% of Taiwan's total exports, but the figure was only 32.3% in 1960.

While Taiwan has exported increasingly many manufactured goods, in both the relative and the absolute sense, the export composition of manufactures has also changed rapidly (see table 11.3). Over the past two decades, textiles have obviously been in the forefront of Taiwan's exports, although their importance has declined since 1970, and they have now been replaced by electrical equipment and electronics. Plywood has followed basically the same pattern as textiles, but with an even shorter life cycle. Exports of metals and metal products with scraps from ship-breaking increased faster than total exports in the 1960s and were further augmented by a modern steel complex established in the late 1970s. Another industry that demonstrated a remarkably stable increasing trend in total exports, albeit slowly, was machinery.

On the import side, in 1982 raw materials and manufactured intermediates comprised 67.3% of Taiwan's total imports, capital goods 24.8%, and consumption goods only 7.9%. Looking backward for comparison, we note that raw materials and intermediates were 62.8% of total imports in 1970 and 64.0% in 1960, and that the shares of capital goods and consumption goods in total imports were 32.3% and 4.9% in 1970 and 27.9% and 8.1% in 1960, respectively. Thus, during the past two decades Taiwan's import composition has remained relatively stable, though some changes can still be identified. For instance, the proportion accounted for by consumption goods declined slightly in the 1960s and then rose gradually in the 1970s. The capital goods share in total imports displayed an opposite movement, having first an increasing trend in the 1970s and then a declining one in the 1980s.

**Table 11.3**        **The Trade Commodity Structure of Taiwan** (percentages)

A. Exports

| | Agric. Products | Processed Agric. Products | | | Manufactured Products | | | | | | | Total Exports |
| | | Sugar | Canned Food | Total | Textiles | Plywood | Plastic Products | Metals & Metal Products | Machinery | Elect. Eq., Electronics, & Appliances | Total | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1960 | 12.0 | 44.0 | 4.79 | 55.7 | 14.2 | 1.7 | — | 3.99 | 0.20 | 0.59 | 32.3 | 100.0 |
| 1965 | 23.6 | 13.1 | 10.47 | 30.4 | 15.8 | 5.9 | — | 4.75 | 1.30 | 2.67 | 46.0 | 100.0 |
| 1970 | 8.6 | 3.1 | 5.73 | 12.8 | 31.7 | 5.3 | — | 6.31 | 3.27 | 12.32 | 78.6 | 100.0 |
| 1975 | 5.6 | 5.0 | 2.90 | 10.8 | 27.6 | 3.3 | 6.5 | 4.79 | 3.62 | 14.72 | 83.6 | 100.0 |
| 1980 | 3.6 | 1.2 | 1.42 | 5.6 | 22.6 | 2.1 | 7.4 | 6.35 | 3.75 | 18.17 | 90.8 | 100.0 |
| 1982 | 1.9 | 0.4 | 0.90 | 5.7 | 21.6 | 1.5 | 6.8 | 7.58 | 3.80 | 17.60 | 92.4 | 100.0 |

B. Imports

| | Capital Goods | | Materials and Intermediates | | | | Consumer Goods | Total Imports | Elect. Eq. & Electronics | Trans. Vehicles |
| | Machinery | Total | Crude Oil | Iron & Steel | Chemicals | Total | | | | |
|------|------|------|------|------|------|------|------|------|------|------|
| 1960 | 15.5 | 27.9 | 6.4 | 9.5 | 6.7 | 64.0 | 8.1 | 100.0 | 5.3 | 6.3 |
| 1965 | 12.4 | 29.3 | 2.3 | 11.9 | 10.5 | 65.5 | 5.1 | 100.0 | 6.3 | 10.3 |
| 1970 | 13.3 | 32.3 | 3.1 | 7.8 | 11.0 | 62.8 | 4.9 | 100.0 | 11.7 | 10.7 |
| 1975 | 16.2 | 30.6 | 10.5 | 6.6 | 12.1 | 62.6 | 6.8 | 100.0 | 8.5 | 5.3 |
| 1980 | 12.14 | 23.4 | 20.8 | 6.8 | 7.8 | 70.8 | 5.8 | 100.0 | 9.8 | 3.7 |
| 1982 | 10.40 | 24.8 | 20.5 | 8.7 | 8.0 | 67.3 | 7.9 | 100.0 | 10.6 | 5.5 |

*Source:* CEPD, *Taiwan Statistical Data Book 1983.*

A further breakdown of the capital goods and materials categories reveals more information on changes in the import shares of certain commodities. Crude oil imports, which were not a major item at all in the 1960s, accounted for 10.5% of Taiwan's total imports after the first oil crisis. In 1980, right after the second oil crisis, around one-fifth of Taiwan's total imports consisted of oil. Because of the significant rise in oil imports, most of the other major import commodities have shown a declining trend in import shares after 1970. If we excluded oil from total imports, the import shares of machinery, iron and steel, and chemicals would become more stable in the 1980s. However, there are two industries that show clearer trends in import shares. Electrical equipment and electronics (E&E) increased two percentage points in import shares between 1975 and 1982, even with oil included in total imports. Part of the increase in E&E items in total imports was due to the import of more consumer durables after 1975. Imports of transportation vehicles, on the other hand, decreased significantly after 1970, which was not due to the rise of oil imports either. In view of these changes in import composition, it can be inferred that import substitution for consumer goods continued in the 1960s and that for certain materials and capital goods (transportation vehicles in particular), was more gradual in the 1970s.

### 11.1.3   Trade Partners

Taiwan's major contemporary trade partners are developed countries (DCs), which account for about two-thirds of exports and supply about the same ratio of imports. In the past, the DCs were not as important as buyers as they are at present, but they sold more to Taiwan. Less-developed countries (LDCs) have enjoyed favorable trade balances with Taiwan since the first energy crisis. The newly industrializing countries (NICs)—Korea, Singapore, and Hong Kong—have never been major recipients of Taiwan's exports (see table 11.4).

Among the DCs, the United States has been the most important trade partner of Taiwan, especially as a buyer, over the past decade. In 1970 the United States absorbed 39.70% of Taiwan's total exports; the figure was 21.87% in 1961. However, the picture is different on the import side. The United States used to be Taiwan's largest supplier in the early 1960s but has gradually been replaced by Japan. In 1970 Japan provided 41.46% of all imported commodities. This figure has also decreased in the 1970s, mainly because of the rise in oil imports. If we excluded oil from total imports, we would find that the U.S. position as a supplier of Taiwan's imports has improved significantly since the 1970s. Simply from these figures, we would expect that Taiwan had amassed a large

**Table 11.4**            **Taiwan's Trade Partners by Country Classification** (percentages)

|       | DCs | | | | | |
|       | U.S. | Japan | EC | Total | LDCs | NICs |
|-------|------|-------|-----|-------|------|------|
| | Exports | | | | | |
| 1961 | 21.87 | 28.81 | 8.35 | 60.14 | 21.76 | 18.16 |
| 1965 | 21.54 | 30.17 | 9.86 | 65.44 | 25.51 | 10.05 |
| 1970 | 39.70 | 15.19 | 9.83 | 70.64 | 15.16 | 14.18 |
| 1975 | 34.28 | 13.04 | 13.67 | 68.61 | 19.50 | 11.81 |
| 1980 | 34.08 | 10.96 | 13.21 | 65.98 | 22.13 | 11.89 |
| | Imports | | | | | |
| 1961 | 40.95 | 30.50 | 8.12 | 83.52 | 14.48 | 2.00 |
| 1965 | 31.52 | 39.16 | 7.09 | 84.06 | 13.54 | 2.40 |
| 1970 | 23.18 | 41.46 | 8.07 | 78.60 | 16.68 | 4.72 |
| 1975 | 27.50 | 30.16 | 11.32 | 75.03 | 22.07 | 2.90 |
| 1980 | 23.58 | 26.99 | 8.04 | 65.52 | 31.00 | 3.48 |

*Sources: Commodity Trade Statistics of the Republic of China (SITC Revised)* Research, Development and Evaluation Commission, Executive Yuan, (1976). Data after 1975 are from Ministry of Finance, *Trade Statistics of the Republic of China.*

*Note:* NICs include Hong Kong, South Korea, and Singapore. Row summation may not equal 100 because of rounding.

trade surplus with the United States but a trade deficit with Japan. On the other hand, there have been recent signs indicating some encouragement for the closing of these two trade gaps. The European Community (EC) countries have become a much more important market for Taiwan. In 1970 the EC countries received 9.83% of Taiwan's total exports, up from 8.35% in 1961. However, by 1980 their share was over 13%. On the import side, the EC has continued to supply a roughly consistent share of Taiwan's total imports during the last two decades. But if oil is again excluded, imports from the EC would increase beyond former levels.

Table 11.5 gives a breakdown of the commodity composition of Taiwan's foreign trade by country groups. In general, machinery (SITC 7), chemicals (SITC 5), products from materials (including iron and steel) (SITC 6), and nonedible materials (SITC 2) were imported from the DCs. Fuel (SITC 3) and some nonedible materials (SITC 2) came from the LDCs. The DCs were most interested in Taiwan's food items in the 1960s, but in the 1970s the demand of the DCs was more for miscellaneous items, including footwear, furniture, etc. The DCs' purchase of machinery and materials accounted for 25.40% and 17.27% of Taiwan's total exports in 1981. The LDCs and NICs were also large buyers of these goods.

**Table 11.5**     **Commodity Composition of Taiwan's Foreign Trade** (percentages)

| | SITC 0 | SITC 1 | SITC 2 | SITC 3 | SITC 4 | SITC 5 | SITC 6 | SITC 7 | SITC 8 | SITC 9 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Imports | | | | | |
| **1961** | | | | | | | | | | | |
| DCs | 10.18 | 2.09 | 23.19 | 1.03 | 1.58 | 15.21 | 13.95 | 28.78 | 3.76 | 0.23 | 100.00 |
| LDCs | 14.66 | 0.02 | 30.17 | 50.97 | 0.11 | 0.37 | 1.57 | 0.55 | 0.23 | 1.35 | 100.00 |
| NICs | 8.55 | — | 60.02 | 0.32 | 0.10 | 8.16 | 2.91 | 12.20 | 4.78 | 2.95 | 100.00 |
| **1966** | | | | | | | | | | | |
| DCs | 5.99 | 0.86 | 17.83 | 1.01 | 1.01 | 13.76 | 20.43 | 35.59 | 3.40 | 0.12 | 100.00 |
| LDCs | 9.64 | 0.15 | 44.95 | 39.96 | 0.14 | 1.15 | 1.83 | 1.14 | 0.04 | 1.00 | 100.00 |
| NICs | 15.35 | 1.00 | 65.41 | 0.33 | 1.07 | 1.96 | 5.21 | 4.67 | 4.29 | 0.71 | 100.00 |
| **1971** | | | | | | | | | | | |
| DCs | 6.21 | 0.77 | 16.05 | 0.60 | 0.75 | 12.28 | 18.92 | 40.06 | 4.29 | 0.07 | 100.00 |
| LDCs | 14.52 | 0.05 | 44.53 | 29.16 | 0.17 | 1.20 | 2.12 | 5.30 | 0.90 | 2.05 | 100.00 |
| NICs | 4.79 | 2.53 | 29.42 | 1.30 | 0.84 | 3.90 | 34.84 | 17.41 | 4.78 | 0.18 | 100.00 |
| **1976** | | | | | | | | | | | |
| DCs | 8.47 | 0.50 | 11.22 | 1.28 | 0.33 | 15.45 | 15.90 | 40.85 | 5.84 | 0.15 | 100.00 |
| LDCs | 7.27 | 0.09 | 22.73 | 62.81 | 0.13 | 1.12 | 2.44 | 2.45 | 0.29 | 0.68 | 100.00 |
| NICs | 5.97 | 3.64 | 18.19 | 4.14 | 1.75 | 5.33 | 21.54 | 22.35 | 10.91 | 6.18 | 100.00 |
| **1981** | | | | | | | | | | | |
| DCs | 9.21 | 0.51 | 10.15 | 4.56 | 0.27 | 13.00 | 15.05 | 40.07 | 7.05 | 0.13 | 100.00 |
| LDCs | 2.28 | 0.25 | 15.99 | 70.56 | — | 1.97 | 2.36 | 5.74 | 0.52 | 0.32 | 100.00 |
| NICs | 3.89 | 1.09 | 22.13 | 9.10 | 1.61 | 6.08 | 26.04 | 20.80 | 6.04 | 3.22 | 100.00 |

| | Exports | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1961** | | | | | | | | | | | |
| DCs | 66.95 | 1.57 | 6.07 | 1.50 | 0.07 | 6.09 | 12.71 | 0.03 | 5.00 | — | 100.00 |
| LDCs | 37.99 | 0.60 | 2.17 | 4.83 | 0.02 | 6.22 | 41.99 | 4.59 | 1.57 | 0.02 | 100.00 |
| NICs | 37.19 | 0.26 | 2.91 | 2.87 | 0.02 | 3.66 | 50.10 | 1.52 | 1.47 | — | 100.00 |
| **1966** | | | | | | | | | | | |
| DCs | 54.94 | 0.78 | 8.23 | 0.64 | 0.02 | 1.43 | 15.74 | 5.34 | 12.83 | 0.06 | 100.00 |
| LDCs | 19.91 | 0.11 | 1.96 | 0.97 | 0.07 | 6.35 | 53.84 | 12.54 | 4.25 | 0.01 | 100.00 |
| NICs | 33.13 | 0.62 | 3.99 | 0.93 | 0.16 | 7.04 | 41.63 | 2.76 | 9.71 | 0.03 | 100.00 |
| **1971** | | | | | | | | | | | |
| DCs | 17.19 | 0.14 | 2.91 | 0.16 | — | 0.73 | 17.86 | 17.37 | 43.57 | 0.06 | 100.00 |
| LDCs | 8.70 | 0.21 | 2.44 | 1.32 | 0.01 | 6.59 | 47.79 | 19.20 | 13.36 | 0.01 | 100.00 |
| NICs | 21.90 | 0.08 | 3.43 | 1.02 | — | 2.57 | 47.67 | 14.62 | 8.71 | 0.02 | 100.00 |
| **1976** | | | | | | | | | | | |
| DCs | 12.86 | 0.12 | 1.82 | 0.22 | 0.01 | 1.40 | 15.88 | 20.78 | 46.89 | 0.02 | 100.00 |
| LDCs | 8.61 | — | 1.52 | 5.70 | 0.01 | 3.44 | 34.27 | 22.28 | 24.16 | 0.01 | 100.00 |
| NICs | 9.47 | 0.22 | 2.23 | 0.84 | 0.01 | 4.13 | 53.88 | 19.65 | 9.56 | — | 100.00 |
| **1981** | | | | | | | | | | | |
| DCs | 7.79 | 0.05 | 1.52 | 0.74 | 0.01 | 1.86 | 17.27 | 25.40 | 45.35 | 0.01 | 100.00 |
| LDCs | 5.24 | 0.05 | 2.22 | 5.40 | — | 3.73 | 26.08 | 26.53 | 30.74 | 0.01 | 100.00 |
| NICs | 7.31 | 0.15 | 2.40 | 2.50 | 0.02 | 3.22 | 46.59 | 24.82 | 12.97 | — | 100.00 |

*Sources:* Data before 1971 are from *Commodity Trade Statistics of the Republic of China (SITC Revised)* (Executive Yuan, Research, Development and Evaluation Commission, 1976); data after 1971 are from Ministry of Finance, Republic of China, *Monthly Statistics of Exports and Imports*, various issues.

*Notes:* NICs include Hong Kong, South Korea, and Singapore.

SITC (Revised) 0: foods and animals. SITC 1: beverages and tobacco. SITC 2: nonedible materials. SITC 3: mineral fuels, lubricants, and related materials. SITC 4: animal and vegetable oils. SITC 5: chemicals. SITC 6: manufactured goods classified chiefly by material. SITC 7: machinery and transport equipment. SITC 8: miscellaneous manufactured articles. SITC 9: commodities and transactions not classified according to kind.

## 11.2    Determinants of Trade

### 11.2.1    Comparative Advantage

Comparative advantage can explain the trade pattern of Taiwan. Taiwan is not rich in natural resources. Except for a few coal mines, which are thousands of feet underground, and limestone for cement plants, there are almost no valuable mineral deposits in Taiwan. The availability of arable land is also a problem. The existing amount of cultivated land, around one-third of Taiwan's total area, cannot be increased. Thus agricultural production has been raised, but at a decreasing rate, in the past only via improvements in land productivity, not through cultivation of more land. Moreover, Taiwan's population density is extremely high. Taiwan will continue to export labor-intensive products, as the neoclassical trade doctrine asserts.

The results of studies on both the industrial level and the firm level confirm the predictions of neoclassical theory. Table 11.6 classifies all manufacturing industries into four trade categories according to their import and export ratios: export, import-competing, export-and-import-competing, and non-import-competing industries. Export industries refer to those industries that export more than 10% of their output and import less than 10%. Import-competing industries are just the opposite. If an industry exports more than 10% of its production and imports more than 10% of its total supply (domestic production plus imports), then this industry is classified as an export-and-import-competing industry. If both the export and import ratios are less than 10%, then this industry is called a non-import-competing one.

**Table 11.6    Capital Intensity and Skilled-Labor Intensity by Trade Category**

|  | Capital-Labor Ratio (NT $1,000 per worker) | | | Skilled-Labor to Total Labor Ratio | | |
|---|---|---|---|---|---|---|
|  | 1966 | 1971 | 1976 | 1966 | 1971 | 1976 |
| Export industries | 64.73 | 124.08 | 734.76 | .3387 | .4253 | .1306 |
| Export- and import-<br>competing industries | 60.81 | 146.56 | 1,527.49 | .4755 | .5067 | .3650 |
| Import-competing<br>industries | 96.10 | 356.22 | 1,400.30 | .4738 | .5350 | .4245 |
| Non-import-competing<br>industries | 46.52 | 52.85 | 1,353.90 | .3715 | .2152 | .1873 |
| All industries | 69.99 | 154.15 | 1,239.63 | .4292 | .4823 | .2691 |

*Sources:* 1966 and 1971 figures are from Lee and Liang 1980, 343. 1976 figures are calculated from CEPD, *Taiwan Input and Output Table 1976, The Republic of China.* Capital and labor (skilled and unskilled) data for each industry are from CEPD.

With the total capital (measured by fixed assets only) and labor requirement data for producing one unit of final product, we can calculate an average capital-labor ratio for each group of industries by using the production volume of each industry as a weight. In 1966 each worker in the exporting industries used NT $64.73 thousand worth of capital; the figure for the import-competing industries was NT $96.10 thousand. For non-import-competing industries (consisting mainly of foods, printing and publishing, etc.) the average capital-labor ratio was NT $46.52 thousand, the lowest among the four groups. The average capital-labor ratio for export-and-import-competing industries with no clear market sign was NT $60.81 thousand. In 1971 the average capital-labor ratio of all manufacturing industries increased to NT $154.15 thousand from NT $69.99 thousand in 1966, with a good deal of the increment the result of capital deepening in the import-competing industries. In short, the export industries in the 1960s used a slightly more labor-intensive technology than the export-and-import-competing ones. Both categories of industry were characterized by a much lower capital-labor ratio than that of the import-competing industries. Thus, the results for 1966–71 are in accord with the theoretical prediction that Taiwan would export high-labor-content products in exchange for high-capital-content goods.

An interesting question is whether Taiwan's trade patterns changed in the first half of the 1970s (a different period when Taiwan experienced for the first time real wage growth that equaled or exceeded productivity growth) or remained the same as the pattern outlined above.[3] In 1976 the export industries were still the most conservation-oriented group in terms of using capital, while the export-and-import-competing and non-import-competing industries had been continuing the process of capital deepening at a fast clip and had succeeded in raising their capital-labor ratios to about the same level as those of the import-competing industries. Part of the change in the non-import-competing industries was due to industry reclassification—for instance, cement was classified as an export industry in 1971, but it became a non-import-competing one in 1976 and hence raised the average capital-labor ratio of the non-import-competing industries significantly. However, reclassification was not a factor in raising the ratio for the export-and-import-competing industries. Thus, a large amount of investment was directed during the period to the export-and-import-competing industries. In addition to this, we might also point out that the capital-labor ratio difference between the export industries and the other three industry categories lessened in the relative sense. Without more recent data for further comparison,[4] the results reached here tend to suggest that the capital deepening was a general phenomenon for the manufacturing sector in response to the labor-shortage pressure constantly felt in the post-labor-

surplus stage in the 1970s, though the doctrine of comparative advantage still influenced Taiwan's trade pattern.

The Hecksher-Ohlin hypothesis, usually focusing on capital and labor only, can be viewed from another perspective. That is, if a country has abundant unskilled labor, then the country will export those products having a higher unskilled-labor content than that of its imports. Table 11.6 presents the ratio of skilled labor to total labor requirement for four industry groups. Export industries again were the most unskilled-labor-intensive ones during the period from 1966 to 1976. In 1976 a much lower average skilled-labor ratio was observed for the non-import-competing industries. Part of the change was due to the fact that different definitions were adopted for skilled labor.[5] Another explanation, which has not yet been proved with detailed data, might be that automation polarized the labor requirement, which is to say that when labor was replaced by highly automated machinery, only a handful of technicians or operators were needed (the jobs that could not be performed by machinery were certain packaging and delivery tasks, for which minimum training was required). Sectors adopting automation were flour mills and edible oil and cement plants; all are non-import-competing industries.

A serious obstacle to analyzing the capital-labor ratio at the industry level is that an industry may simultaneously be involved in both import and export activities, and these different activities may quite likely employ different types of technology. In fact, the import-and-export-competing industry group in table 11.6 is the largest one of the four trade categories. But with reliable industry data we may be able to solve the problem. The figures presented in table 11.7 are for this purpose.

In 1975 a foreign-firm survey (foreign firm is defined as a company with any amount of foreign capital in it) including 607 companies in the manufacturing sector provided the needed data. Assuming that the company in the sample used similar technology for its products sold in both the domestic and the foreign markets, we may then weigh each company's capital-labor ratio by its exports to take into account the size of export activity and by its domestic sales to take into account its domestic sales activity. We will thus obtain the industry's average capital-labor ratios for both exports and domestic sales.

In 1975 exports resulted from foreign manufacturing firms with an average of U.S. $9.00 thousand worth of fixed assets per worker, whereas domestic sales were produced from foreign firms with an average of U.S. $18.18 thousand worth of fixed assets per worker. Apparently, foreign firms as a whole tended to use different technologies for products with different market orientations. In industry, the foreign firms that predominated in the domestic sales in the foods and beverages,

**Table 11.7**          **Capital-Labor Ratios of Foreign Firms Weighted by Export and
Domestic Sales, 1975** (in thousands of U.S. dollars)

| | Fixed Assets per Worker | |
|---|---|---|
| Industry | Exports | Domestic Sales |
| Foods and beverages | 3.11 | 12.26 |
| Textiles | 26.84 | 19.95 |
| Apparel | 1.26 | 2.34 |
| Wood, bamboo, and rattan products | 1.92 | 2.74 |
| Paper and paper products | 12.00 | 11.42 |
| Leather and leather products | 1.61 | 2.76 |
| Plastic and rubber products | 2.29 | 10.76 |
| Chemicals | 16.24 | 17.61 |
| Nonmetallic products | 24.58 | 50.79 |
| Basic metals and products | 3.89 | 5.24 |
| Machinery | 3.32 | 10.47 |
| Electrical equipment and electronics | 2.89 | 3.95 |
| Total | 9.00 | 18.18 |

*Source:* Foreign Firm Survey primary data, Investment Commission, Ministry of Economic Affairs, 1975.

apparel, wood, bamboo, and rattan products, leather and leather products, plastic and rubber products, nonmetallic products, basic metals and basic metal products, machinery, and electrical equipment and electronics categories all used a much more capital-intensive technology than the firms which predominated in exports. The differences were extremely large in the foods and beverages, plastic and rubber products, and the machinery industries, of which the capital-labor ratios for local market sales were more than three times those for exports. In two industries, paper and paper products and chemicals, foreign firms did not greatly differentiate their production techniques with regard to market orientations. There was only one industry, textiles, in which export activities were more capital-intensive than in domestic market activities. A closer look at this particular industry, however, revealed that a few artificial fiber makers with a large amount of committed capital were active in exporting.

By using the same set of data, we may easily verify a corollary proposition that foreign firms located in the export-processing zones would use less capital per unit of worker than those outside the zones. In view of the fact that some companies in the zones rented their buildings and land, a better measure here would be the value of machinery and equipment per unit of direct worker, instead of fixed assets per unit of worker. In 1975 foreign firms in three zones used a total of

U.S. $789 worth of machinery and equipment per unit of direct worker, which is only 38.46% of the average figure for foreign firms in the electrical equipment and electronics industry limited to exporting activities (Schive 1982; Ranis and Schive 1985).

## 11.2.2 Trade Fluctuations and Fixed Exchange Rates

Trade in Taiwan has experienced two dips over the past ten years. One was in 1975 when exports decreased 5.7% in value, or remained barely the same as the previous year in real terms, and imports dropped 16.8% in value, or 11.0% in real terms. The other was in 1982 when exports climbed only 4.2% in value, or actually decreased 1.1% in real terms, and imports shrunk both in value and in real terms by 5.4% and 2.6%, respectively. These trade fluctuations were commonly attributed to the energy crisis followed by two worldwide recessions. These explanations have been readily accepted by economists (who have believed in the absorption approach) and have even been welcome among government officials charged with managing trade promotion affairs. However, in the case of Taiwan, when we recognize that the economy has been maintaining a fixed exchange rate system with tight controls on foreign exchange, especially in the sense that the exchange rate has not varied in response to wild fluctuations of relative (domestic and foreign) prices, then we may look for other determinants, rather than blindly accepting the simplistic explanation given above.

In analyzing Taiwan's trade fluctuations, and the balance of trade in particular, we may look at its purchasing-power-parity effective exchange rates (NT dollar per U.S. dollar). First, before 1972 the official exchange rate was pegged at U.S. $1 to NT $40. In 1973 a 5% appreciation of the Taiwan dollar shifted the official exchange rate to 1:38. The currency appreciated further in 1978 to 1:36 (this rate was effective for three years). In 1981, when Taiwan joined the mainstream and adopted a flexible exchange rate system, the Central Bank still exercised its power over the financial market and depreciated the Taiwan dollar by 5.5%.

In a free economy without price distortions, either against or in favor of trade, the exchange rate will vary in accordance with the balance of trade and changes in relative prices between foreign and domestic markets. In Taiwan, as pointed out earlier, a variety of incentive schemes were formulated to promote trade around 1960, including customs duties and indirect tax rebates and lower-interest-rate loans. This meant that in 1971, for example, an exporter, on average, would have received NT $5.71 extra beyond the official exchange rate for every U.S. $1 worth of exports owing to the export incentives mentioned above (see table 11.8). These incentives have declined since 1971 and by 1981 amounted to NT $1.53 for each U.S. $1 worth of exports. By adding

**Table 11.8          Purchasing-Power-Parity Effective Exchange Rates on Exports**

| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. Official exchange rate for exports[a] (NT $ per U.S. $) | 40.00 | 40.00 | 40.00 | 38.16 | 37.90 | 37.95 | 37.95 | 37.95 | 35.95 | 35.98 | 35.98 | 37.79 |
| B. Incentives (NT $) per U.S. $ of exports | | | | | | | | | | | | |
|    Interest subsidy[b] | 0.09 | 0.1 | 0.095 | 0.074 | 0.083 | 0.083 | 0.076 | 0.057 | 0.05 | 0.058 | 0.059 | 0.097 |
|    Customs duties rebate[c] | 4.06 | 4.27 | 3.68 | 2.82 | 2.47 | 2.70 | 2.14 | 2.11 | 1.65 | 1.569 | 1.348 | 1.185 |
|    Indirect tax rebate[d] | 1.36 | 1.34 | 1.24 | 0.98 | 0.87 | 1.12 | 0.89 | 0.89 | 0.77 | 0.62 | 0.50 | 0.25 |
|    Subtotal | 5.51 | 5.71 | 5.015 | 3.874 | 3.423 | 3.903 | 3.106 | 3.057 | 2.49 | 2.247 | 1.907 | 1.532 |
| C. Nominal effective exchange rate (A + B) | 45.51 | 45.71 | 45.02 | 42.03 | 41.32 | 41.85 | 41.06 | 41.01 | 38.44 | 38.23 | 37.88 | 39.32 |
| D. Taiwan's WPI (1960 = 100) | 121.46 | 121.67 | 127.08 | 156.04 | 219.38 | 208.33 | 214.17 | 220.00 | 227.71 | 259.29 | 315.15 | 339.17 |
| E. Average WPI of major trade partners[e] | 121.74 | 125.67 | 130.16 | 146.34 | 180.76 | 193.95 | 198.59 | 211.85 | 223.25 | 244.48 | 290.29 | 320.47 |
| F. Exchange rate index[f] | 96.03 | 96.92 | 101.45 | 109.33 | 103.63 | 104.65 | 106.89 | 106.95 | 113.30 | 116.15 | 121.29 | 113.43 |
| G. Purchasing-power-parity effective exchange rate on exports (C·E·F/D) | 43.80 | 45.76 | 46.78 | 43.09 | 35.28 | 40.77 | 40.70 | 42.24 | 42.69 | 41.86 | 42.33 | 42.14 |

*Sources:* DGBAS, Republic of China, *Commodity-Price Statistics Monthly, Taiwan District;* International Monetary Fund, *International Financial Statistics;* Economic Research Department, Central Bank of China, Republic of China, *Taiwan Financial Statistics Monthly;* Department of Statistics, Ministry of Finance, *Yearbook of Financial Statistics of the Republic of China;* Census and Statistics Department, Hong Kong, *Consumer Price Index Report.* Figures before 1978 are from Liang and Liang 1981.

[a]Where the rates fluctuated over a period of time, the mean of the range was taken. The rate up to 14 April 1958 was that applicable to exports by private enterprises. Therefore, until 30 September 1963, it was the rate applicable to all exports other than a few commodities (e.g., sugar, rice, salt, bananas) for which lower rates applied. The same rate applied to all exports after 30 September 1963 (see Scott 1979, 326).

[b]The difference in the interest on export loans and that on unsecured loans is treated as an export subsidy.

[c]Includes defense surtax and harbor dues.

[d]Includes commodity tax, salt tax, and flood rehabilitation surtax.

[e]An average of wholesale price indexes in Australia, Canada, West Germany, Hong Kong, Japan, Korea, the Netherlands, Singapore, the United Kingdom, and the United States, weighted by Taiwan's annual export value with the respective countries. When the WPI was not available, the consumer price index was used.

[f]An average of exchange rate index weighted by Taiwan's annual export value with the respective major trade partners. The exchange rate is expressed in terms of U.S. dollars per unit of the currencies of Taiwan's trading partners.

the subsidies for exports to the official exchange rate, we derive the nominal effective exchange rate.

Two other adjustments must be made before we reach the purchasing-power-parity effective exchange rates. In 1974 Taiwan experienced an inflation rate of 40.6% in wholesale prices, which was much higher than the average inflation rate (23.5%) of its major trade partners. Surprisingly enough, the government failed to act to correct the over-valued NT dollar, which definitely weakened the export incentives and the international competitiveness of Taiwan exports in that year. During the four-year period from 1974 to 1978, the wholesale price index rose by only 3.8%, or less than 1% annually. Nonetheless, in 1979 and 1980 the WPI increased by 12.1% and 21.5%, respectively, increases that were higher than the average inflation rates of Taiwan's ten major trading partners (see note e of table 11.8)) in the corresponding years (9.5% and 18.7%). These changes in relative prices again put Taiwan's products at a disadvantage in the international market. Finally, we have calculated the effective exchange rate to take into account the U.S. dollar situation in the international market.

Figure 11.1 depicts three curves, two representing Taiwan's balance of trade for commodities and commodities plus services, respectively, and one for the real effective exchange rate on exports in the 1970s. From figure 11.1, first we observe a close movement between the two balance-of-trade curves and a parallel movement between these two curves and that for the real effective exchange rate. These are four turning points on the balance of trade which matched nicely with the real effective exchange rate either simultaneously or with a one-year lag. Second, the movements of the three curves were more in tandem before 1975 than afterwards; the magnitude of fluctuations has de-creased for the real effective exchange rate since 1975 but not for the trade surplus. Third, the trade balance curves reveal roughly an in-creasing trend, while the real effective exchange rate shows a declining trend.

The first observation reminds us that the trade fluctuations in Taiwan in the 1970s could not be attributed completely to external factors. The varying real effective exchange rate, caused mainly by unstable do-mestic prices, was also relevant. Looking again at the situation in 1974, in that single year the real effective exchange rate deteriorated about NT $8 for U.S. $1 worth of exports, or appreciated 18% annually, or 23% when compared with the 1972 figure. It is very difficult to accept that there was trade inertia when the exchange rate moved so radically. The second finding is probably due to the inflationary effect, resulting in larger trade balance variations. For the third finding, an increasing trade surplus, to a large degree, reflects a long-term improvement of Taiwan's international competitiveness, while the declining effective
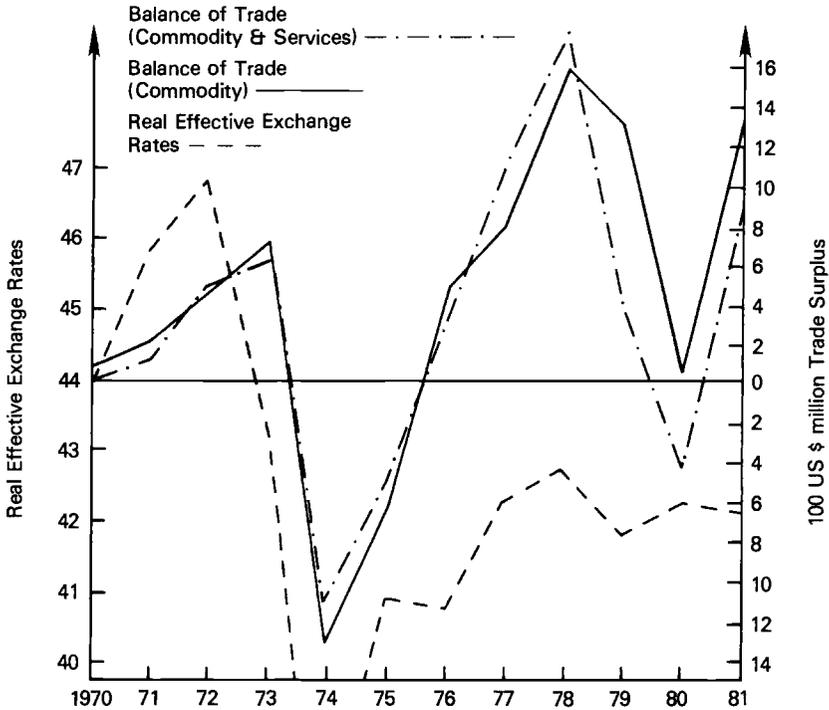
**Fig. 11.1**        Trade balance and the real effective exchange rates, 1970–
80

exchange rate was mainly caused by the gradual lifting of the export
incentives.

   To focus on the turning points of the curves, if the appreciations of
the NT dollar did result in a weak competitive position for Taiwan's
exports, then the factors underlying the appreciations deserve further
attention. As pointed out earlier, both appreciations could be attributed
mainly to higher inflation in Taiwan and abroad. It would be superficial
to say that the quadrupling of oil prices in 1973 and the later tripling
of oil prices in 1979 were absolutely responsible for Taiwan's inflation.
A multiple-regression analysis showing that import prices can explain
domestic inflation quite satisfactorily would not be surprising, because
Taiwan has imported around half of what it produced, and hence import
prices are weighted heavily in calculating the domestic WPI. Further
questions should be asked: Has inflation in Taiwan been higher than
in neighboring countries (Japan, Hong Kong, or Singapore) that have
depended on imported energy? Is there any way to calculate the impact
on domestic prices of the rise in oil prices?

To answer the first question, in 1974 the inflation rate was 31.4% in Japan in WPI, 22.33% in Singapore in CPI, and 15.0% in Hong Kong in CPI (all much lower than the WPI inflation rate of 40.7% in Taiwan). In 1979 and 1980, when Taiwan experienced an average 17.7% rise in WPI, rates were 12.5% in Japan, 17.0% in Singapore, and 13.9% in Hong Kong in CPI.[6] For the second question, we assume full-cost pricing that reflects the oil price surge by using input and output tables and estimate that 52.19% of domestic inflation in 1973 and 1974 and 70.35% in 1979 and 1980 were attributable to the price surge of imported materials, mainly the external oil price shocks.[7] With this information, Taiwan's inflation during the two periods coinciding with the two oil crises was not completely the result of higher imported-oil prices, even taking all imported materials into account.[8] In other words, a strong demand increase in these two periods was also relevant, or we can state that demand-pull inflation coexisted with cost-push inflation in the 1970s.

On the demand side, we found that the money supply increased at the unusually high rates of 42.2% and 31.9% annually during 1972–73 and 1976–78, but at much lower rates during the rest of the 1970s (table 11.9). A very rapid expansion in the money supply in both subperiods, much more than the economy could have absorbed, built up inflationary pressure, which inevitably raised the domestic price in the following subperiods. In examining the sources of monetary increase, we find that 98.72% of the increase in the money supply between 1972 and 1973 came from the accumulation of foreign assets that had resulted directly from the trade surplus. An equally high percentage contribution to the increase of the money supply from the same sources took place in the 1976–78 subperiod.

In short, Taiwan experienced wild fluctuations in GNP growth, trade expansion, and the price level in the 1970s, though the trend toward economic growth remained basically the same as during the earlier

**Table 11.9    Factors Affecting the Money Supply in Taiwan** (percentages)

| | Annual Changes in Money Sup. | Percentage Contributed by: | | | | |
| | | Claims on Gov. & Enterprises | Net For. Assets | Saving & Gov. Dep. | Others[a] | Total |
|---|---|---|---|---|---|---|
| 1972–73 | 42.2 | 188.4 | 98.7 | −142.9 | −44.2 | 100.0 |
| 1974–75 | 19.6 | 351.1 | −73.1 | −148.8 | −29.2 | 100.0 |
| 1976–78 | 31.9 | 182.2 | 89.8 | −156.1 | −15.9 | 100.0 |
| 1979–80 | 15.2 | 362.7 | −8.1 | −171.8 | −82.8 | 100.0 |

*Source:* CEPD, *Taiwan Statistical Data Book 1983.*
[a]Others include presettlement requirements for imports and other items (net).

decades. The trade variation, or that of the balance of trade, was caused to a certain extent by the changing position of the real effective exchange rate, for which unstable domestic prices were also responsible. The sources of domestic inflation can be traced to the fixed exchange rate system, in addition to external factors. Under the fixed exchange rate system the undervalued NT dollar encouraged exports and allowed the stockpiling of a large trade surplus, which, in turn, increased the money supply and the domestic price level later. Thus, Taiwan in the 1970s had a monetary system that was too rigid and a price level that was too flexible. All this meant that when the fixed exchange rate system failed to correct the undervalued local currency, the correction was made in the process of a higher domestic inflation rate, which resulted in an appreciation of the local currency anyway. The impact on trade of the readjustment of exchange rates was that the undervalued NT dollar boosted trade first, but then the appreciation later dampened it, and the magnitude of the trade fluctuations increased accordingly.

## 11.2.3   Secondary Import Substitution

Loosely used, import substitution refers to the augmentation of domestic production to replace imports. More strictly defined, import substitution occurs during a certain period only if the import share (imports over total supply) decreases. However, in measuring the import substitution effect, either at the industry level or at the aggregate level, most existing studies suffer from two limitations. First, imports are improperly compared with "gross" domestic production (Morley and Smith 1970);[9] i.e., the production of an industry usually includes not only the final product but also a number of different kinds of intermediates for that product. Therefore, the total production of the industry is not strictly comparable with the imported goods, which are final products. Second, the studies do not distinguish between imports for final and intermediate usages. The first limitation is purely due to the data problem, which can be solved by excluding all intermediates when measuring a product or by using an input-output table to convert imports into the "gross" measure of imports for comparison. The second limitation has conceptual significance and deserves further elaboration.

LDCs prefer the inward-looking, import substitution strategy because it protects the domestic market against foreign competition and therefore is easier to implement. Furthermore, by protecting the domestic market it facilitates the decision-making process for investment. Given the fact that a developing country is often in short supply of the entrepreneurial talent for decision making, this approach is not without merit. As to which industry is to be developed, in the earlier phase of the import substitution period this strategy focuses on consumer goods,

and nondurables in particular, since consumer goods usually account for a large share of imports and the technology required to manufacture nondurable consumer goods is most likely not too sophisticated. This approach is also in line with Hirschman's linkage concept, i.e., the notion that backward linkages are better thought out than are the forward ones (Hirschman 1958). However, when the domestic market gradually becomes saturated, whether it is wise to continue the same inward-looking policy (i.e., to develop certain upstream industries after the downstream industries have already been established) or to pursue an outward-looking policy becomes debatable.

The appropriate policy response may seem rather obvious for a small economy like Taiwan or Korea, based either upon the empirical evidence of their past performance or upon the theoretical reasoning that exports can alleviate the constraints of scale economies just as they reduce the inefficiencies in resource allocation produced by the protectionism of the inward-looking policy. Nonetheless, after years of successful export-led growth—now that exports have greatly expanded Taiwan's markets and increased the volume of domestic production in certain industries, now that the economy has had to contend with rapidly rising wages because of previous labor shortages, produced by the fast-growing export sector, and now that the nation's technological base is sufficiently high to support the development of some relatively high-technology industries—is the time perhaps right for the economy to develop certain intermediate and capital goods industries? It is from this line of reasoning that the secondary import substitution strategy can be justified and the distinction between imports for final consumption and those for intermediate uses in measuring the import substitution effect becomes relevant.

For the manufacturing sector as a whole, the results shown in table 11.10 indicate that the ordinary import substitution measure as well as the revised measure both had negative signs in the 1960s. In the first half of the 1970s, although the ordinary Chenery measure became positive, the sign for the revised measure remained negative. Furthermore, we also want to notice that the revised import substitution measure had a much larger negative value than the Chenery index. Thus, Taiwan was still in the import substitution stage when the export-led growth strategy was put into effect.

This finding, which may look puzzling and which differs from the general impression that Taiwan had terminated its import substitution stage by the end of the 1950s, is in fact quite logical. The majority of Taiwan's first manufactured exports were consumer goods with very high import content or products that were assembled and packaged from imported parts. It was actually the increasing amount of imports that facilitated the rapid expansion in exports. Further breakdown of

**Table 11.10**    **Import Substitution Coefficients of the Manufacturing Sector in Taiwan** (percentages)

|  | Chenery Formula (IS) | Revised Formula | | |
|---|---|---|---|---|
|  |  | First ($IS^{*f}$) | Secondary ($IS^{*i}$) | Total ($IS^*$) |
| 1964–66 | − 17.33 | − 19.09 | − 8.90 | − 17.99 |
| 1966–71 | − 2.54 | 1.44 | − 10.17 | − 8.73 |
| 1971–76 | 1.12 | 2.31 | − 4.01 | − 1.70 |

*Source:* See relevant issues of the input-output tables of the Republic of China (published by CEPD).

*Notes:* The import substitution formulas are derived as follows:

$$IS = Z_0 (m_0 - m_1)/\Delta X,$$

where $X$ = domestic production (vector), $M$ = imports (vector), $Z = X + M$, $m = M/Z$, and 0 and 1 represent the beginning and ending of a year. IS = import substitution index.

$$IS^* = Z^* (m_0^* - m_1^*)/\Delta X,$$

where $M^* = (1 - A)^{-1}M$, $A$ is the input-output matrix, $Z^* = (1 - A)^{-1}$, $F$ = final demand vector, $m^* = M^*/Z^*$.

$$IS^{*i} = Z_0^* (m_0^{*i} - m_1^{*i})/\Delta X,$$
$$IS^{*f} = Z_0^* (m_0^{*f} - m_1^{*f})/\Delta X,$$
$$M^{*i} = (1 - A)^{-1}M^i,$$

$M^i$ = intermediate imports vector, $M^f$ = final goods imports vector, $m^{*f} = (1 - A)^{-1}M^f$, $M = M^i + M^f$.

the revised import substitution index verifies this because the secondary import substitution index became worse in the second half of the 1960s, precisely at the time when exports grew at the highest rate. The secondary import substitution index even remained negative during the first half of the 1970s, though the import substitution for final goods index had been positive since the middle 1960s.

The overall picture we have painted above for Taiwan's import substitution is not necessarily representative of each separate industry. Using the same technique, table 11.11 presents those industries that have become significantly self-sufficient (that is, the replacement of imported intermediates and capital goods by domestic substitutes has contributed more than 10% to their growth). In the 1960s, some materials industries (petrochemical raw materials, steel and iron, artificial fibers) increased production, and a part of the increase has been used to substitute for previous imports, thereby lowering the import ratios of these industries. The capital goods industry, including machinery, electrical equipment and electronics, steel and iron products, and transportation equipment, performed equally well during the same period.[10] In the first half of the 1970s, the artificial fibers, artificial fabrics, steel and iron, and transportation equipment industries continued the previous import substitution development pattern. The "other industrial chemicals" category also joined the secondary import substitution group

**Table 11.11          Industries with Significant Import Substitution Effects**

|             | Materials Industry | Capital Goods Industry |
|-------------|--------------------|-----------------------|
| 1964–66 | Cotton, wool, and fabrics; artificial fiber fabrics; petrochemical raw materials; artificial fibers; steel and iron | Steel and iron products; machinery |
| 1966–71 | Rubber and rubber products; artificial fibers; miscellaneous manufactures | Steel and iron products; machinery; electrical equipment and electronics; transportation equipment |
| 1971–76 | Artificial fabrics; artificial fibers; other industrial chemicals; steel and iron | Transportation equipment |

*Source:* See relevant issues of the input-output tables of the Republic of China (published by CEPD).

*Note:* Industries with significant import substitution effects refer to those industries with $IS^{*i} \geq 10\%$ (or $IS^{*f} \geq 10\%$ for capital goods industries).

for the first time in the 1970s. These industry data clearly reveal that some material and capital goods industries had already been developed in the 1960s and early 1970s that have increasingly supplied domestic needs and moreover have reduced domestic reliance on imports.

## 11.3    Trade Patterns and Trends of Taiwan in the 1980s

Before predicting Taiwan's future trade patterns and trends, we should first lay the groundwork by making the following points:

1. Taiwan's trade dependence index has already exceeded 100%. Though a further increase in trade dependence is not impossible, more emphasis will probably be placed on the net contribution of trade to the domestic economy, i.e., the development of secondary import substitution industries.

2. Over the past decade Taiwan has experienced wild fluctuations in growth, trade, and the price level. Nonetheless, the basic increasing trends of economic growth and trade have not changed. In fact, Taiwan has performed relatively better than Korea and Japan in exports, and even in growth, during the last recession period.

3. The government must have learned a hard lesson from its mismanagement of monetary policy in the 1970s, which was at least partly responsible for the domestic inflation that hurt Taiwan's exports. After moving into a flexible exchange rate system, price instability could be avoided to some extent.

4. According to the revised secondary import substitution index, Taiwan might have already entered into this phase in the second half

of the 1970s. Several materials and capital goods industries that were established in the 1960s and continued to grow through the 1970s reveal significant import substitution effects. This group of industries is expected to expand both in its coverage and in the size of individual industries.

5. Taiwan has exported basically labor-intensive or unskilled-labor-intensive products. However, in view of rising wages, export industries and export-and-import-competing industries have been employing increasingly capital-intensive techniques to raise labor productivity.

6. For the time being, Taiwan has a large trade surplus with the United States and the EC countries as a whole, but it also has a large deficit with Japan. The accumulated trade balances have created difficulties for both Taiwan and its major trade partners.

7. In spite of the gradual lifting of the export incentives, the New Taiwan dollar is getting stronger and stronger as a result of the accumulation of foreign exchanges from trade surplus.

On the basis of the circumstances outlined above, we expect the following:

1. Trade will continue to grow in the 1980s but at a slightly slower rate than before, owing to the development of the secondary import substitution industries.

2. As the result of the successful development of the local materials and capital goods industries, the commodity composition of imports will change, with consumption goods increasingly imported (the consumption goods share in total imports has already shown an increasing trend). On the export side, Taiwan will become a strong competitor in the international markets for machinery and several intermediate products: steel and iron products, petrochemical raw materials, artificial fibers, etc.

3. Taiwan's traditional exports (textiles, garments, rubber and plastic products) will maintain an important share of Taiwan's total exports. Modernization efforts in these industries should help recapture, at least partly, the competitive position of these product types, which has recently been lost.

4. With a more cautious monetary policy, it is hoped that Taiwan will not repeat the same mistake it made in the 1970s. We expect a moderate appreciation of the NT dollar resulting from the stockpiled volume of foreign exchange. An appreciation of the local currency will be healthy for the domestic economy in the long run because by lowering the cost of imported materials, appreciation helps stabilize domestic prices and generates pressure for further improving efficiency.

5. The United States and Japan will still be the top two trade partners of Taiwan in the near future. The trade ties between Taiwan and the EC countries will be further improved.

6. Though the trade imbalances between Taiwan and Japan and between Taiwan and the United States (and even including the EC countries) cannot be corrected overnight, there is one area of hope. That is, Taiwan has been receiving more technology from the United States and the EC countries.[11] If the technology flow leads the trade flow, then trade between Taiwan and the United States will increase faster than that between Taiwan and Japan.

# Notes

1. In the 1950s and 1960s the population of Taiwan grew, respectively, by 3.5% and 2.7% annually. In the 1970s the growth rate remained high, at 1.9%. The population density of 512 persons per square kilometer in Taiwan in 1982 was the second highest in the world, behind Bangladesh.

2. We should, however, exercise some caution in accepting the low-utilization argument because unless the utilization was higher before, which has not been proved yet, the lower utilization rate alone does not imply market saturation.

3. In the 1960s labor productivity in the manufacturing sector increased at a higher rate than the growth rate of the money wage, which implies a declining unit labor cost. In the first half of the 1970s, wages rose on the average of an annual rate of 22.58% in money terms, or 9.93% in real terms, compared with a 6.07% rise in labor productivity.

4. We do have input-output tables for 1979. Nonetheless, these tables are extensions of the 1976 tables. Moreover, the 1979 tables contain ninety-nine industries, roughly one-half of the number of industries contained in the 1976 tables. Thus distortion would be unavoidable if the two sets of tables were used for comparison.

5. In the 1966 and 1971 data, skilled labor refers to those workers with more than three years' work experience. This definition classifies almost all farmers as skilled laborers and obviously raises the skilled-labor ratios for those relevant agricultural products industries when a total labor requirement instead of a direct one is used in estimating the skilled-labor ratio. In the 1976 data, farmers are excluded from the skilled-labor group.

6. Inflation rates for the four regions were taken from CEPD, *Taiwan Statistical Data Book 1983;* and Federal Reserve Bank of San Francisco, *Pacific Basic Economic Indicators.*

7. Internal report of the Council for Economic Planning and Development, 1981.

8. Ibid.

9. For the measurement of the "gross" product, see note to table 11.10.

10. It should be noted that some industries cover both consumption and capital goods. Because of data limitations, however, it is impossible to separate them.

11. In three major industries (electrical equipment and electronics, machinery, and chemicals) that are receiving foreign technology through formal technical collaboration, Japan's contribution to the technology flow declined during the 1970s. For instance, Japan accounted for 89% of the total technical col-

laboration cases in the electrical equipment and electronics industry in 1970, but only 75% in 1979; 93% in the machinery industry in 1972, but only 72% in 1980; and 53% in the chemicals industry in 1973, but 43% in 1981 (Schive 1980, 1981, 1983).

# References

Hirschman, A. 1958. *The strategy of economic development*. New Haven: Yale University Press.

Lee, T.H., and Kuo-shu Liang. 1980. Taiwan. In *Development strategies in semi-industrial economies*, ed. B. Balassa. (Baltimore: Johns Hopkins University Press.

Liang, Kuo-shu, and Ching-in Ho Liang. 1981. Trade strategy and the exchange rate policies in Taiwan. In *Trade and growth of the advanced developing countries in the Pacific Basin*, ed. Wontack Hong and Lawrence B. Krause. Seoul: Korean Development Institute Press.

Lin, Ching-yuan. 1973. *Industrialization in Taiwan, 1946–72: Trade and import substitution policies for developing countries*. New York: Praeger.

Morley, S. A., and G. W. Smith. 1970. On the measurement of import substitution. *American Economic Review* 60 (September): 728–35.

Ranis, Gustav, and Chi Schive. 1985. Direct foreign investment in Taiwan's development. In *Foreign trade and investment: Economic development in newly industrializing Asian countries*, ed. Walter Galenson. Madison: University of Wisconsin Press.

Schive, Chi. 1980. *A report on technical collaboration in the electricals and electronics industry*. Taipei: Investment Commission, Ministry of Economic Affairs, Government of Taiwan.

———. 1981. *A report on technical collaboration in the machinery industry*. Taipei: Investment Commission, Ministry of Economic Affairs, Government of Taiwan.

———. 1982. Direct foreign investment and technology transfer: A factor proposition approach in Taiwan. *Economic Essays* 10:211–27.

Scott, Maurice F. 1979. Foreign trade. In *Economic growth and structural change in Taiwan*, ed. Walter Galenson. Ithaca: Cornell University Press.

Stein, L. 1981. The growth and implications of LDC manufactured exports to advanced countries. *Kyklos* 34:36–69.

Tang, Anthony M., and Kuo-shu Liang. 1975. Agricultural trade in the economic development of Taiwan. In *Trade, agriculture, and development*, ed. G. S. Tolley and P. A. Zadrozny. Cambridge: Ballinger.

This Page Intentionally Left Blank