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DIRECTORATE OF
INTELLIGENCE

Intelligence Memorandum

Taiwan's Trade Prospects: A Quantitative Assessment

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CENTRAL INTELLIGENCE AGENCY
Directorate of Intelligence
November 1970

INTELLIGENCE MEMORANDUM

Taiwan's Trade Prospects: A Quantitative Assessment

Introduction

Taiwan's economic success since 1960 has been largely due to rapidly rising exports of manufactures. Because of this export-oriented growth, Taiwan has been able to finance large increases in imports, to add to its foreign exchange reserves, and at the same time to eliminate its reliance on US economic aid. A continuation of rapid export expansion is required to maintain economic growth, while allowing Taipei to lower its import barriers and to lessen its dependence on US military aid. This memorandum identifies and quantifies the most important influences on the growth of Taiwan's exports. The quantitative relationships derived from the past are used to project exports and the balance of payments for the 1970-73 period, taking into consideration the possibility of US restrictions on imports of woolen and manmade textile products.

Background

1. In less than a decade, Taiwan has been transformed from a predominantly agricultural economy dependent on US aid for essential imports to a manufacturing-led economy earning enough foreign exchange to pay its own way. This transformation resulted largely from Taipei adopting an export-oriented development policy in the early 1960s after the opportunities for efficient import substitution had been largely exhausted. Foreign investors establishing export-oriented plants were given tax breaks and substantially reduced duties on imported capital equipment. The foreign exchange system was simplified and a realistic exchange rate adopted. This development strategy paid off handsomely as exports rose more than 20%

Note: This memorandum was produced solely by CIA. It was prepared by the Office of Economic Research and was coordinated with the Office of Current Intelligence.

per year during the 1960s. While foreign sales of processed agricultural goods—such as canned asparagus and mushrooms—grew rapidly, the major export stimulus came from manufactures such as textiles, clothing, and electronics, which grew 35% annually during the past decade and their share of exports increased from less than 40% to more than 70%. This striking performance of manufactured exports is doubtless the most important factor in Taiwan's growing industrial orientation. Manufacturing's share of net domestic product increased from 17% in 1960 to 25% in 1969 while agriculture's share declined from 33% to 21%.

2. Largely because of higher exports over the past decade, Taiwan has been able to reduce its current account deficits from $125 million in 1960 (when receipts covered 62% of expenditures) to only $50 million by 1969 (when receipts covered 97% of expenditures). Even if the current account fails to improve further during the next several years, Taiwan still will have a favorable balance of payments because the capital account is likely to be in surplus.

3. Taiwan's overall balance-of-payments position improved markedly during 1961-69, with foreign exchange reserves increasing from $117 million to $477 million. In 1960, US aid covered about 40% of imports. By 1969, US economic aid had ceased, but net long-term private capital inflows had reached $130 million, well in excess of the current account deficit.

Trends in Exports

4. Taiwan's export success is closely associated with the inflow of foreign investment. The country offers a highly literate, hard-working but relatively low-paid labor force while providing tax relief and other incentives and a highly stable political climate. Even more important, Taiwan has attracted the kind of investor that supplies not only capital, technical know-how, and management techniques, but also access to foreign markets. Many American firms have simply moved their labor-intensive operations from the United States to Taiwan. They sell their Taiwan subsidiary the components for assembly and ship the finished product back to the United States. Japanese firms make similar use of Taiwan, but export their output to third countries, especially the United States—not to Japan.*

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5. The United States has been by far Taiwan's fastest growing market (see Figure 1). Exports to the United States increased from $7 million in 1956 to about $400 million in 1969. Most US purchases have been manufactured consumer goods such as radios and other electronic appliances, textile products, and wood products. Taiwan's exports to Japan have increased relatively slowly, from $46 million (37% of total exports) in 1956 to $162 million (15% of exports) in 1969. The composition has changed. Formerly dominated by sugar and rice, they now consist mainly of high-value foods, such as bananas, because of rising incomes and a shift to a rice surplus in Japan. However, unlike the United States, Japan has not become an important market for Taiwan's manufactures, because Tokyo has continued to severely restrict manufactured imports.

6. Taiwan's exports to other developed countries have expanded from $8 million in 1956 to $158 million in 1969. After the United States, this market, especially Canada and West Germany (see Figure 2), has been the most dynamic, and its share of Taiwan's exports increased from 7% in 1960 to 15% in 1969. Processed foodstuffs, especially asparagus and mushrooms, make up a large share of the increased sales to this group.

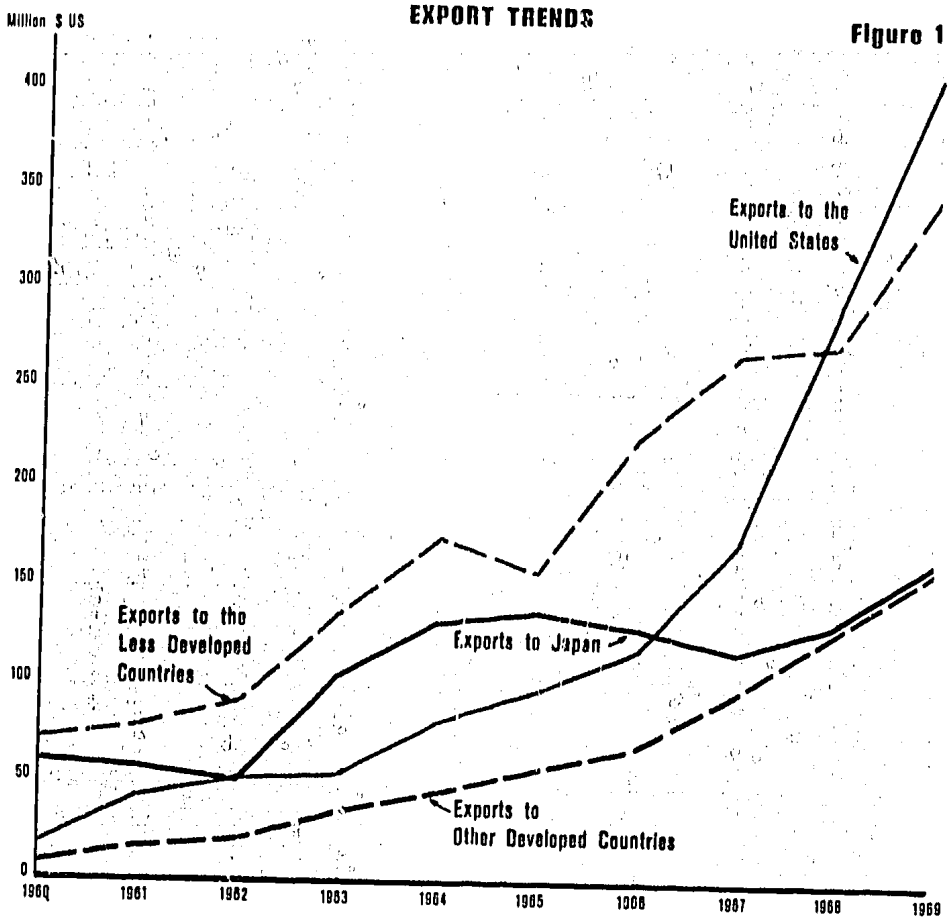
7. Taiwan's exports to the less developed countries grew from $63 million in 1956 to $349 million in 1969, or an average of over 14% annually. South Korea, Malaysia, Singapore, Hong Kong, the Philippines, and Thailand account for about 60% of exports to less developed countries (see Figure 2). Except those for Hong Kong and Singapore which are mainly foodstuffs; Taiwan's exports to less developed countries consist largely of manufactures, but of a different kind than those sold to developed countries. They are generally the products of industries financed by Taiwanese capital and include commodities such as cement, paper, and traditional Chinese pharmaceuticals for the overseas communities.

8. The extraordinary growth of exports (23% a year since 1960) had profound repercussions on Taiwan's economy. It opened up the economy to an accelerated growth of imports (17% a year since 1960) because the new export-oriented manufacturing industries involved for the most part the processing of imported materials and components, and also because the foreign investors in these industries imported nearly all their requirements for capital goods. However, the importation of machinery and equipment for the new industries was not a burden on the nation's foreign exchange supplies, because it was covered by the inflow of foreign capital.

TAIWAN'S EXPORT MARKET

EXPORT TRENDS

Figure 1



CHANGING TRADE PATTERNS

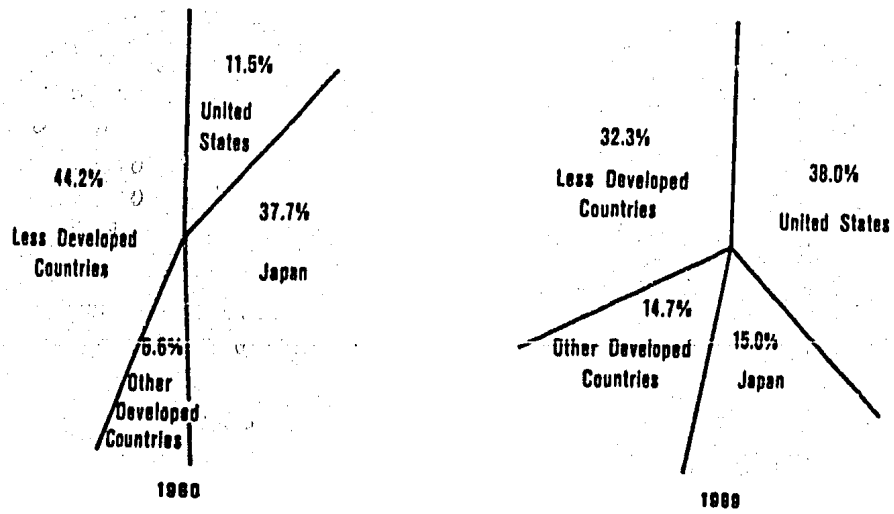


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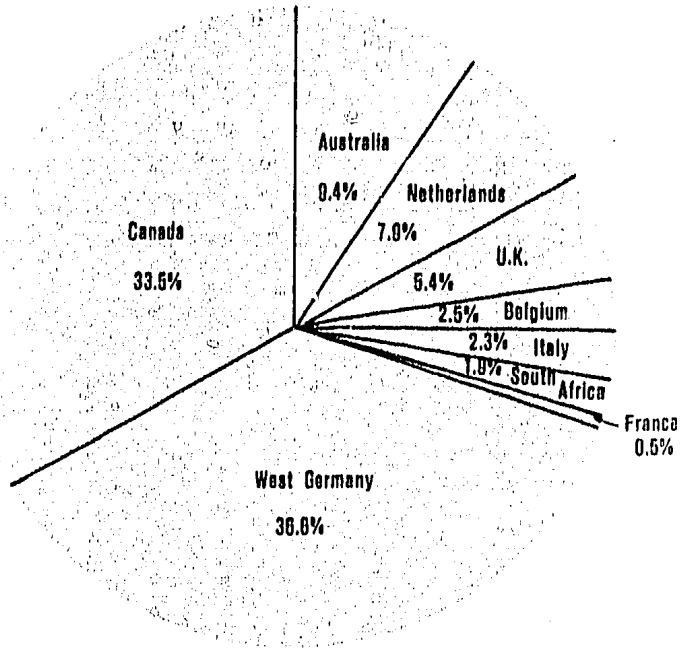
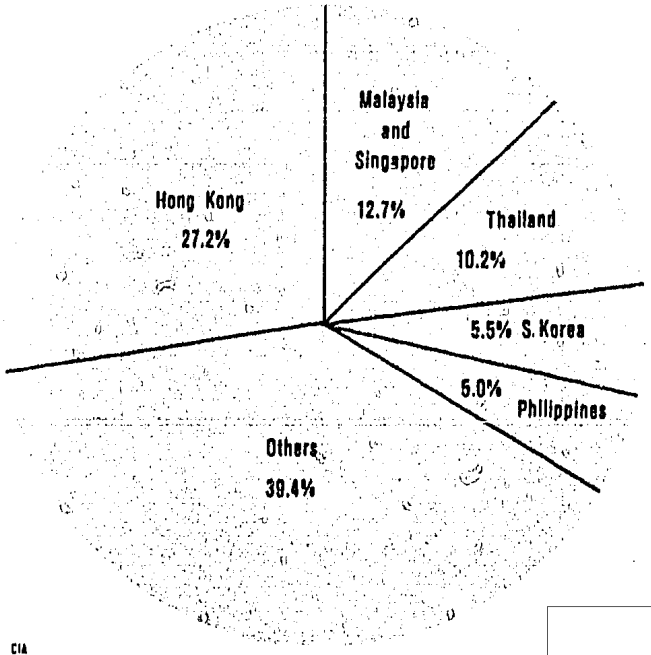
Figure 2

EXPORTS TO OTHER DEVELOPED COUNTRIES: 1968



EXPORTS TO LESS DEVELOPED COUNTRIES: 1968



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Projections

9. To project the current account balance through 1973, exports, imports, and service payments and receipts were estimated using an econometric model.* Past relationships between these current account categories and those factors affecting them were estimated and the results used for forecasting.** Taiwan has good statistics for a developing country. The problem is that its economy is changing so rapidly that it is difficult to estimate economic relationships using data for a period long enough to be statistically significant, yet still representative of current trends.

Exports

10. Analysis of the growth of Taiwan's exports reveals two predominant influences—aggregate demand in foreign markets and the stock of private foreign capital in Taiwan.*** But the relative importance of these two influences varies greatly from one market to the other. Private foreign capital is the dominant explanation of growth of Taiwan's exports to the United States since 1965—it explains 95% of export growth while the growth of US income explains only 5%. The United States has been the largest and most open market for Taiwan's new manufactures. Yet the main imports from Taiwan still make up only a small share of total US imports in the same categories so that they can easily increase rapidly even when total US demand is sluggish.

11. Taiwan's exports to other developed countries (excluding Japan) appear to be influenced to a significant degree by the growth of aggregate demand in these countries, but here also the stock of foreign capital in Taiwan is the most important factor (it explains almost two-thirds of export growth since 1965). Exports to Japan and to the less developed countries,

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** *In general the regressions are based on 13 or 14 annual observations covering the period from the mid-1950s to the late 1960s, see the Appendix.*

*** *The stock of foreign private capital was calculated by cumulating the inflow of private foreign capital, with a 10% annual deduction for depreciation.*

however, are explained almost entirely by the growth of aggregate demand in these countries. Foreign capital in Taiwan is not a factor, because the exports resulting from it are not directed to these markets. A complicating element in Japanese demand is the influence of the country's rice situation, from deficit to surplus.

12. Export projections thus require projections of aggregate demand in the importing countries. The following tabulation shows the average annual growth rates of the relevant measures of aggregate demand in the four market areas (in current prices) for various periods between 1956 and 1969.

Percent

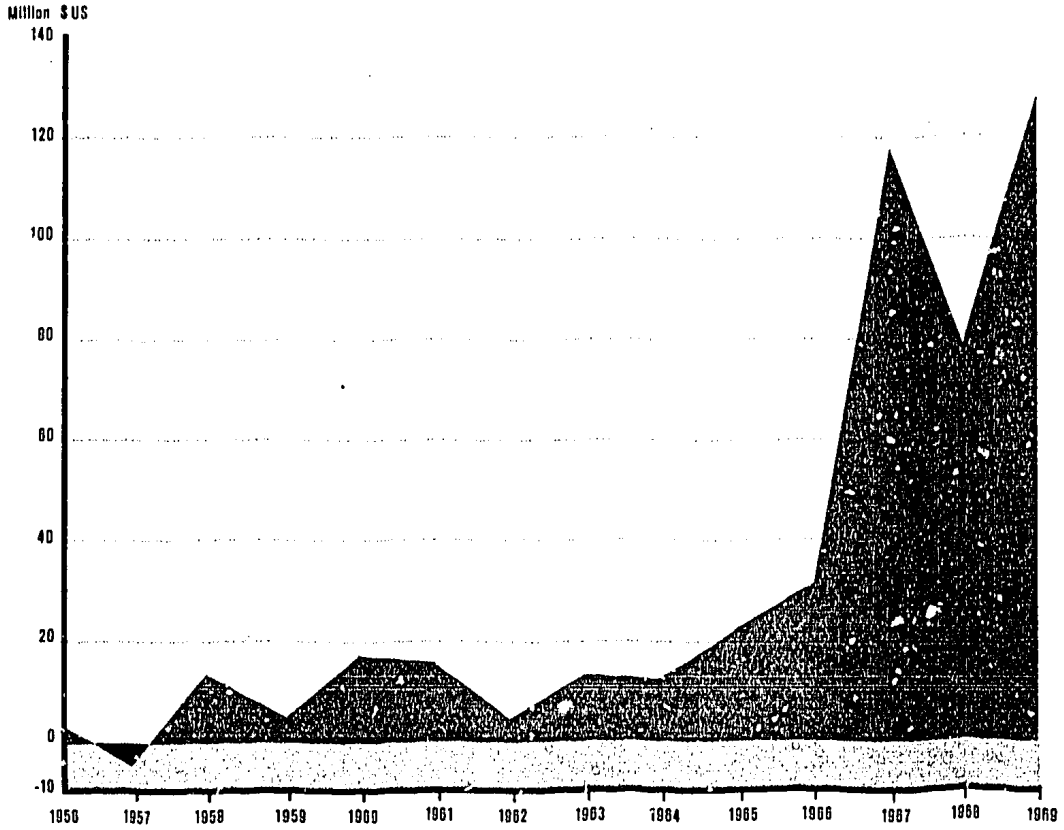
Period[a]	Japan GNP	Economic Activity in Less Developed Countries	GNP Other Developed Countries	US Disposable Income
1957-60	12.5	5.5	7.2	4.5
1961-65	15.5	8.8	8.3	6.2
1966-69	17.1	14.0	8.0	7.4
1957-69	15.0	9.3	7.8	6.1

a. Base year is the year prior to the stated period.

1956-60 growth rates are used for a "low" projection because they represent the slowest growth for all areas. Similarly the high 1965-69 rates are used for a "high" projection for all areas except "other developed countries."

13. Private capital inflow has risen dramatically but erratically, which makes it difficult to project (see Figure 3). Continuation of the 50% annual increase of the 1966-69 period cannot be expected. But there continues to be keen foreign interest in establishing plants in Taiwan and thus we estimate, as a maximum, that foreign investment will increase at half the rate of the past four years, or 25% a year. At a minimum we assume no increase at all. The high and low export levels obtained under the above assumptions as to foreign demand and capital inflow are shown in Table 1 and Figure 4. Both the high and the low estimates show Taiwan's exports continuing to increase rapidly during 1970-73. The rather narrow range between the high and low estimate is due to the fact that (a) for more than half of Taiwan's exports—that is, exports to the United States and other developed countries—foreign capital stock in Taiwan influences exports much more than income growth abroad and (b) the foreign capital stock continues to increase rapidly even if the capital inflow levels off.

TAIWAN: PRIVATE LONG-TERM CAPITAL INFLOWS Figure 3



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Imports

14. Imports of raw materials, capital goods, and consumer goods are projected separately. Raw material imports are estimated as a function of exports of industrial products and of industrial output for domestic use.* As would be expected, the import content of industrial raw materials for export goods is high, about 42%, while that of output for domestic consumption is 12%.

** More specifically, industrial output for domestic use is GNP less agriculture, government, and industrial exports.*

15. Capital goods imports are estimated as a function of domestically financed fixed investment and foreign capital inflow. A high import content—92%—for foreign-financed investments is obtained, compared with 30% for domestic investment. Consumer goods imports are simply related to total private consumption—some 3% of goods consumed privately are imported.

16. Among the determinants of imports, those reflecting domestic demand (industrial production for domestic use, domestic investment, and private consumption) are assumed to increase at the 1965-69 rate. The export-related determinants (exports of manufactures* and the inflow of foreign capital), however, are the largest influence on imports. A slowdown (or increase) in exports of manufactures causes a slowdown (or increase) in imports regardless of the growth of domestic demand in Taiwan.

Current Account Balance

17. These projections of commodity exports and imports, together with projection of earnings and payments on service transactions,** yield projections of Taiwan's balance of payments on current account in the form of a range, as shown in the following tabulation:

	Million US $	
Year	Low	High
1970	30	93
1971	106	175
1972	93	270
1973	51	385

The lower limit results from assuming relatively slow growth of aggregate demand abroad and no increase in the inflow of foreign investment. The upper limit results from assuming high demand growth abroad and a 25% annual increase in foreign investment in Taiwan.

18. The results of these calculations indicate that foreign exchange supplies are highly unlikely to limit Taiwan's economic growth in the next few years and that a balance-of-payments surplus is likely. Under optimistic

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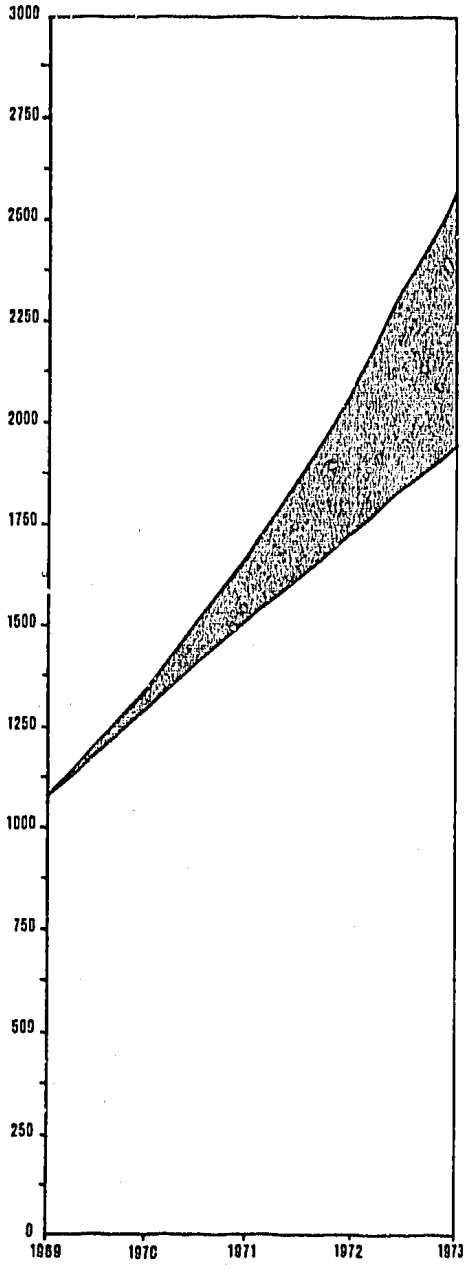
* *These are estimated as a function of exports to the various markets.*

** *Service earnings and payments are estimated as a function of total merchandise trade.*

assumptions, which in effect continue most of the trends of the past few years, the current account surplus increases rapidly, reaching almost $400 million by 1973, and the inflow of foreign private capital more than doubles, to more than $200 million a year, in the same period. But even if the growth of exports slows considerably, there will be more than enough foreign exchange to support the same high rate of growth of GDP—10% a year—as in the past decade. Under relatively pessimistic assumptions regarding foreign markets and the inflow of foreign investment, we project current account surpluses averaging about $85 million a year, to which must be added an inflow of foreign capital of some $100 million a year. The reasons for this favorable result are that continued growth of foreign-owned capital stock insures continued growth of manufactured exports, while the leveling off of the inflow of new foreign capital results in a leveling off of imports of capital goods for export industries. In the long run, however, lack of dynamism in the inflow of foreign investment would result in a sharply reduced growth of manufactured exports and economic growth would be slowed.

TOTAL EXPORTS



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Textiles—A Special Case

19. Manmade and woolen textiles have been major items in Taiwan's rapidly expanding exports to the United States; they accounted for 28% of the increase between 1965 and 1969. Pending US legislation would reduce these textile imports in 1971 to the average 1967-69 level and allow

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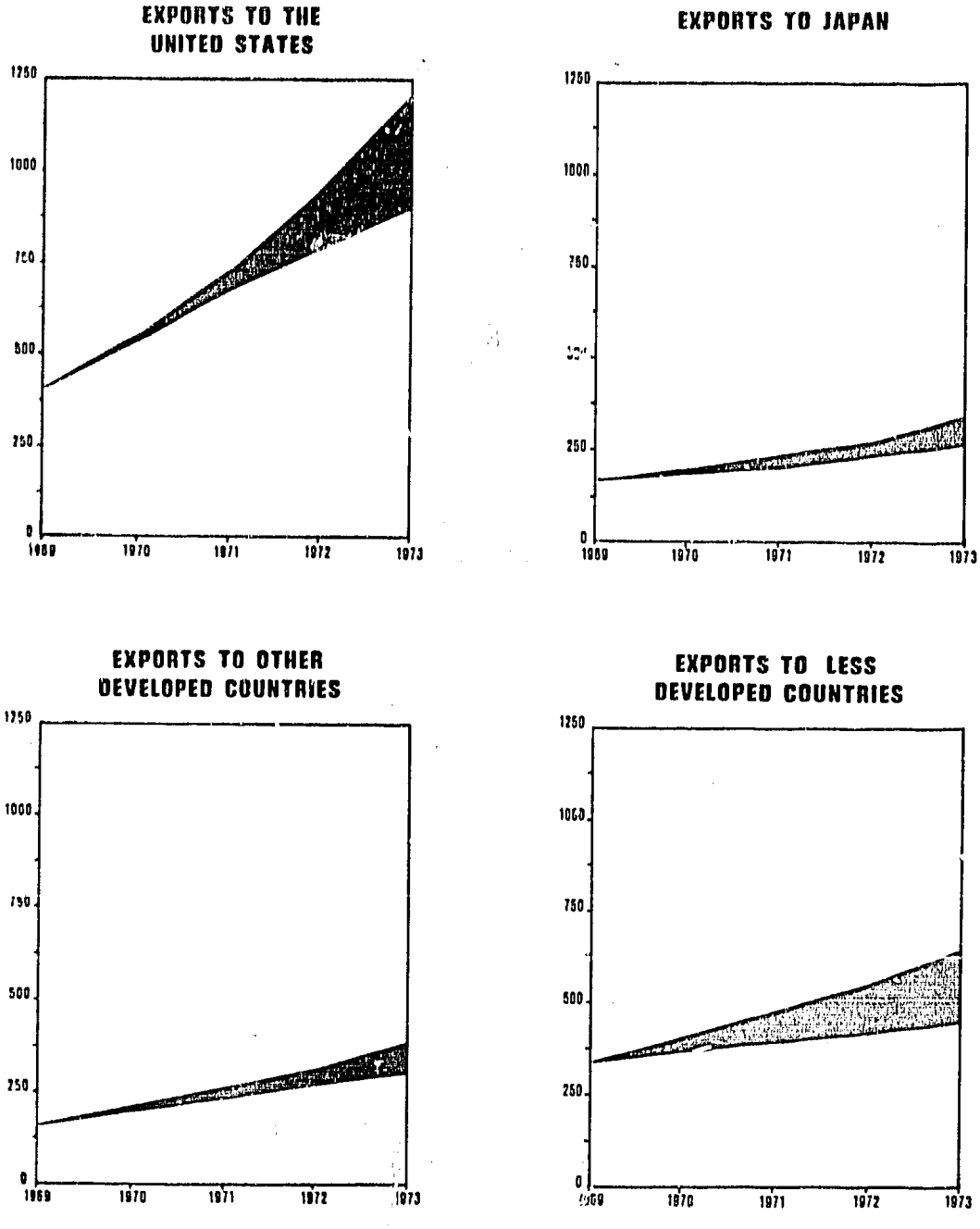
TAIWAN: EXPORT PROJECTION RANGES

Figure 4

(Million $ US)



NOTE: High projections assume growth in economic activity in the maket areas equal to the highest rate achieved during any five year period (1965-1969) since 1956 and a 25% annual growth in the private capital inflow. Low projections assume growth in economic activity in the market areas equal to the lowest rate experienced during any five year period (1956-1960) since 1956 and no growth in the private capital inflow

a 5% annual increase during 1972 and 1973. We have accounted for this possibility by reestimating the function for Taiwan's exports to the United States to exclude the relevant textile products. The derived equation projects non-textile exports to the United States, to which are added the textile exports allowed by the proposed legislation and Taiwan's projected exports to the other market areas. The results for exports and the current account balance are shown below for the lowest and highest cases.

Exports

Million US $

Year	Low	Percentage Growth	High	Percentage Growth
1970	1296	20	1344	24
1971	1430	10	1582	18
1972	1818	13	1933	22
1973	1799	11	2354	22

Current Account Balance

Million US $

Year	Low	High
1970	80	103
1971	42	125
1972	15	200
1973	−48	288

20. Exports continue to grow rapidly in all cases. The smallest growth occurs in 1971 when the textile restrictions are assumed to become effective. Even so, under the assumption of the lowest reasonable increase in income in Taiwan's markets and constant private capital flows, the export growth in 1971 is still a respectable 10%. Except for the final year of the low estimate, the projections of the current account balance are in surplus.

Conclusions

21. Taiwan enters the 1970s with a highly favorable foreign payments position. After a decade in which export growth exceeded import growth by one-third, Taiwan has almost eliminated its previously large current account deficits and still receives a fairly large net capital inflow from private sources.

22. Projections of Taiwan's trade outlook during 1970-73 yield balance-of-payments surpluses under almost any likely circumstances. Even if aggregate demand in Taiwan's export markets expands relatively slowly and foreign private investment inflows into export-related industries fail to increase over the 1969 level, the current account would still be in surplus. The outlook is also favorable if the United States restricts imports of Taiwan's manmade and woolen textiles.

23. The bright outlook for Taiwan's balance of payments is bolstered by a relatively low level of external debt, fairly high foreign exchange reserves, and a likely continuation of foreign investor confidence. Under these circumstances, Taipei will likely be in a good position in the next few years both to increase its purchases of military goods--to compensate for any reduction in US military assistance--and to liberalize somewhat its import restrictions. Under favorable circumstances, Taiwan would also be able to greatly increase its official reserves.

Table 1

Taiwan: Projected Exports

Year	With 25% Annual Growth in Foreign Investment				With No Growth in Foreign Investment			
	High [a]		Low [b]		High [a]		Low [b]	
	Value (Million US$)	Percentage Growth	Value (Million US$)	Percentage Growth	Value (Million US$)	Percentage Growth	Value (Million US$)	Percentage Growth
1970	1,344	24	1,297	20	1,344	24	1,297	20
1971	1,679	25	1,574	21	1,624	21	1,519	17
1972	2,078	24	1,904	21	1,905	17	1,731	14
1973	2,559	23	2,298	21	2,195	15	1,934	12

[a] High estimates of exports assumes growth in economic activity in the market areas equal to the highest rate achieved during any five-year period (1965–69) since 1950.

[b] Low estimate of exports assumes growth in economic activity in the market areas equal to the lowest rate achieved during any five-year period (1956–60) since 1956.

APPENDIX

Methodology

A system of 13 equations is developed to project Taiwan's exports, imports, and service payments and receipts in order to determine the current account balance. Ten equations are stochastic and are estimated using ordinary least squares regression. Exports are estimated by area destination and imports by type of product. Published data on balance of payments, both export (f.o.b.) and import (c.i.f.), are available only as aggregates and differ from customs figures which do break down the totals. The export series used in this memorandum was derived by applying the country shares as given in customs data published in *Industry of Free China* to the figure for total exports (f.o.b.) given in the *IMF Balance of Payments Yearbook*. The import series was similarly derived by applying the relative shares given for capital goods, raw materials, and consumer goods given by the Bank of Taiwan and the Committee for International Economic Cooperation and Development published in the *Taiwan Statistical Data Book 1969*. The series derived are shown in Tables A-1 and A-2.

Exports to Japan

Taiwan's exports to Japan are estimated as a function of Japanese GNP and Japanese rice inventories using annual data for the period 1956 to 1969, as follows:

$$XJ = 69.9 + 1.13\ JNP - 0.0173\ RIJ^{*}$$
$$(4.37)\quad (7.28)\quad (-2.72)$$
$$RB2^{**} = 0.843$$
$$DW^{***} = 1.65$$

Where:

XJ = Taiwan's f.o.b. exports to Japan in million US$.
JNP = Japan's GNP in current prices in billion US$.
RIJ = Rice inventories held by the Japanese government at the end of October of each year in thousand metric tons.

Exports to Less Developed Countries

Less developed countries are defined to include all countries except OECD members, Japan, Australia, and South Africa.

The results using annual data for the period 1950-69 are shown below:

$$XLDC = -71.9 + 300.0\ ACTLDC$$
$$(-5.47)\quad (18.30)$$
$$RB2 = 0.903$$
$$DW = 1.73$$

XLDC = Taiwan's exports to less developed countries in million US$.

ACTLDC = A 1968-based weighted index of economic activity in six countries which in 1968 accounted for 60% of Taiwan's exports to less developed countries. The weights were assigned according to the importing countries' relative share of Taiwan's exports. The countries, weights, and variable used to measure the level of economic activity are shown below:

Country	*Weight*	*Relevant Variable*
Hong Kong	.447	1968-based index of total exports
South Korea	.091	1968-based index of GNP in constant prices
Malaysia and Singapore	.213	1968-based index of combined GNP in current prices
Philippines	.082	1968-based index of GNP in current prices
Thailand	.168	1968-based index of GNP in current prices

Exports to Other Developed Countries

Taiwan's exports to other developed countries (Australia, South Africa, Belgium, the United Kingdom, France, West Germany, Italy, the Netherlands, and Canada) are estimated as a function of a weighted

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*Figures shown in parentheses below the regression coefficients are the t statistics or Student's t.

**The coefficient of determination corrected for degrees of freedom.

***The Durbin-Watson Statistic tests whether the residuals of the regression equation are independent from one observation to the next (no serial correlation). In general, for the numbers of observations used in this model, and with regressions containing one independent variable, a DW statistic between 1.07 and 2.93 indicates virtually no serial correlation, either positive or negative. For regressions containing two or three independent variables the ranges are 1.25 or 2.75 and 1.46 to 2.54, respectively.

index of GNP in the countries, and the stock of foreign capital in Taiwan using annual data for the period 1957-69, as follows:

$$XOD = -50.7 + 1.10\ GNPOD + 0.313\ KINVFL$$
$$(4.80)\quad (5.54)\qquad (5.42)$$
$$RB2 = 0.982$$
$$DW = 1.25$$

Where:

XOD = Taiwan's exports to other developed countries in million US$.

GNPOD = A 1968-based index of GNP in current prices in the market countries weighted by their relative shares of Taiwan's exports in 1968. The countries and weights are shown below:

Country	*Weight*
Australia	.094
South Africa	.019
Belgium	.025
United Kingdom	.054
France	.005
West Germany	.300
Italy	.023
Netherlands	.079
Canada	.335

KINVFL = The stock of foreign private capital in Taiwan in million US$. The series is derived by cumulating the inflow of foreign private long-term loans and direct investment from the balance of payments from 1950 to the year prior to the year of estimate with 10% annual depreciation. For instance, KINVFL 1957 is simply equal to the inflow of private capital in 1950, KINVFL 1959 is equal to 0.9 KINVFL 1958 plus the inflow of capital in 1958.

Exports to the United States

Taiwan's exports to the United States are estimated as a function of US disposable personal income and the stock of foreign capital in Taiwan, as follows:

$$XUS = -42.1 + 0.107\ YDUS + 1.38\ KINVFL$$
$$(-1.49)\quad (1.31)\qquad (12.75)$$
$$RB2 = 0.991$$
$$DW = 2.37$$

Where:

XUS = Taiwan's f.o.b. exports to the United States in million US$.

YDUS = Disposable personal income in the United States in billion current US$.

Imports of Raw Materials

Taiwan's c.i.f. imports of raw materials are estimated as a function of (1) the current dollar value of Taiwan's gross domestic product (GDP) at factor cost minus the agriculture and public sector and industrial exports, and (2) exports of industrial goods for the period 1956-67, as follows:

$$MRM = 0.60 + 0.119\left(\frac{INDGDP}{ERFTRX} - EXIND\right) + 0.419\ EXIND$$
$$(1.73)(1.88)\qquad (2.44)$$
$$RB2 = 0.975$$
$$DW = 1.80$$

Where:

MRM = Taiwan's c.i.f. imports of raw materials in million US$.

ERFTRX = Exchange rate for private exports*

*A multiple exchange rate existed up to 1963.

INDGDP = GDP at factor cost minus GDP in agriculture and public administration and defense in current New Taiwanese dollars (NT$).

EXIND = Taiwan's exports of industrial products in million US$.

Imports of Capital Goods

Taiwan's imports of capital goods are estimated as a function of domestically financed fixed investment and foreign fixed investment using annual data for the period 1956-68, as follows:

$$MK = -0.124 + 0.307\left(\frac{ERFM}{FINV} - INVF\right) + 0.921\ INVF$$
$$(-0.01)(9.27)\qquad (4.46)$$
$$RB2 = 0.978$$
$$DW = 1.44$$

Where:

MK = Taiwan's c.i.f. imports of capital goods in million US$.

FINV = Total fixed investment in Taiwan in millions of current NT$.

ERFM = Exchange rate for private imports*

INVF = Inflow of foreign private long-term loans and direct investment.

Imports of Consumer Goods

Taiwan's imports of consumer goods are estimated as a function of total private consumption expenditures on Taiwan using annual data for the period 1956-65, as follows:

$$MC = -2.15 + 0.028\left(\frac{CONFRI}{ERFM}\right)$$
$$(-0.52)(10.10)$$
$$RB2 = 0.894$$
$$DW = 2.30$$

Where:

ERPM = Exchange rate for private imports.*

*A multiple exchange rate existed up to 1963.

MC = Taiwan's c.i.f. imports of consumer goods in million US$.

CONPRI = Total private consumption expenditures on Taiwan in million US$.

Exports of Industrial Products

Taiwan's exports of industrial products are estimated as a function of three independent variables—exports to Japan, exports to less developed countries, and exports to the United States and other developed countries combined, as follows:

$$EXIND = -31.9 + 0.191\ XJ + 0.522\ XLDC + 1.01\ (XUS + XOD)$$
$$(-2.01)\ (0.75)\qquad (2.04)\qquad (7.99)$$
$$RH2 = 0.990$$
$$DW = 1.48$$

Where:

EXIND = Taiwan's f.o.b. exports of industrial products in million US$.

XJ = Taiwan's f.o.b. exports to Japan in million US$.

XLDC = Taiwan's f.o.b. exports to less developed countries in million US$.

XUS = Taiwan's f.o.b. exports to the United States in million US$.

XOD = Taiwan's f.o.b. exports to other developed countries in million US$.

Exports of Services

Taiwan's exports of services are estimated as a function of the value of total merchandise trade using annual data for the period 1950-69, as follows:

$$XSERVS = -29.9 + 0.123\ TMT$$
$$(-5.00)\ (21.90)$$
$$RH2 = 0.974$$
$$DW = 1.97$$

Where:

XSERVS = The sum of gross credits under the following categories in the Basic Global Statement for Republic of China from the *IMF Balance of Payments Yearbook*, non-monetary gold, freight, and insurance on merchandise, other transportation, travel, investment income, government n.i.e., and other services, in million US$.

TMT = Taiwan's total f.o.b. exports plus total c.i.f. imports in million US$.

Imports of Services

Taiwan's imports of services are estimated as a function of the value of total merchandise trade using annual data for the period 1950-69, as follows:

$$MSERVS = -13.0 + 0.0903\ TMT$$
$$(-1.48)\ (10.88)$$
$$RH2 = 0.900$$
$$DW = 2.03$$

MSERVS = The sum of gross debits under the following categories in the Basic Global Statement for Republic of China from the *IMF Balance of Payments Yearbook*; non-monetary gold, other transportation, travel, investment income, government n.i.e., and other services, in million US$.

TMT = Taiwan's f.o.b. exports plus c.i.f. imports in million US$.

The Projections

In order to project Taiwan's exports and current account balance for the period 1970-73, the system of equations is employed along with what we believe to be a reasonable range of assumptions for the exogenous variables.

The system of equations is as follows:

1. $XJ = 69.9 + 1.13\ JNP - 0.0173\ RIJ$
2. $XLDC = -71.9 + 300.0\ ACTLDC$
3. $KINVFL_t = 9\ KINVFL_{t-1} + INVF_t$
4. $XOD = -56.7 + 1.19\ GNPOD + 0.313\ KINVFL$
5. $XUS = -42.1 + 0.107\ YDUS + 1.38\ KINVFL$
6. $EXIND = -31.9 + 0.191\ XJ + 0.522\ XLDC + 1.01\ (XUS + XOD)$
7. $MRM = 68.0 + 0.119\left(\frac{INDGDP}{ERPRIX} - EXIND\right) + 0.419\ EXIND$
8. $ME = -0.124 + 0.307\left(\frac{FINV}{ERPM} - INVF\right) + 0.921\ INVF$
9. $MC = -2.15 + 0.028\frac{CONPRI}{ERPM}$
10. $TMT = XJ + XUS + XLDC + XOD + MRM + ME + MC$
11. $XSERVS = -29.9 + 0.123\ TMT$
12. $MSERVS = -13.0 + 0.0903\ TMT$
13. $CAB = XJ + XLDC + XOD + XUS + XSERVS - MRM - ME - MC - MSERVS$

The assumptions made for the period 1970-73 for the exogenous variables JNP, ACTLDC, GNPOD, YDUS, and INVF were discussed earlier. RIJ—rice inventories in Japan—is held constant because Taiwan's exports of rice to Japan have declined to insignificance in recent years.

The three remaining exogenous variables are all related to Taiwan's domestic economy and are all extrapolations of trends set during the period 1965-69. These three variables are INDGDP, DINV, and CONPRI. INDGDP is gross domestic product at factor cost originating in mining, manufacturing, construction, electricity, gas, water and sanitary services, transportation, storage and communications, wholesale and retail trade, banking, insurance and real estate, and ownership of dwellings. This variable is assumed to grow at 13.3% annually, the rate experienced during the period 1965-69. DINV is total fixed investment in Taiwan minus the inflow of foreign private long-term loans and direct investment. Total fixed investment is assumed to grow at an annual rate of 23% as it did during the period 1965-69, and the assumed foreign private capital inflow is subtracted to yield DINV. CONPRI is total private consumption in Taiwan and it is assumed to grow at 11.2% annually as it did during the period 1965-69.

Application of the system of equations listed above to the exogenous variables given in Table A-3 yields the values for the endogenous variables given in Table A-4.

In order to estimate the effect of the possible imposition of textile restrictions by the United States, Equation 5 in the system above is replaced for the years 1971-73 by Equation 5a, which is given below:

5a. XUSWT = −57.04 0.169 YDUS + 1.03 KINVFL
(−3.27) (3.40) (15.64)

$R^2 = 0.995$

DW = 2.27

Where:

XUSWT = Taiwan's exports to the US excluding manmade and wooden textile products in millions of $.

YDUS = Disposable personal income in the US in millions of $.

INVFL = The stock of foreign private capital in Taiwan in millions of US dollars.

To this estimate of exports to the United States is added the exports of the restricted textile products which would be permitted under the legislation. Application of the altered system of equations to the exogenous variables given in Table A-3 yields the values for the endogenous variables given in Table A-5.

Table A1

Statistics Used in Export Equations

Year	XJ Exports to Japan	JNP Japanese GNP	BIJ Japanese Raw Inventories	XLDC Exports to Less Developed Countries	ACTLDC Activity Index Less Developed Countries	EXIND Exports of Industrial Goods	XUS Exports to the United States	XOD Exports to Other Developed Countries	YDUS Personal Income United States	GNPOD Index of GNP for Other Developed Countries	KINVFL Lagged Foreign Capital Stock
1956	46.200	27.000	2555.000	62.700	0.36724296	17.200	7.100	8.200	293.200	41.45900000	0
1957	52.800	30.400	3019.000	63.700	0.36894300	14.600	3.200	3.000	308.300	44.26869373	3.79999945
1958	65.300	32.000	2270.000	74.400	0.36491097	21.600	9.700	6.100	318.400	46.16143902	2.91999944
1959	65.200	35.900	2384.000	69.200	0.40600893	35.900	13.500	9.300	337.300	49.34208679	16.12799847
1960	83.400	41.100	3339.000	72.500	0.43622795	39.000	18.900	10.800	350.000	54.55113824	19.51519779
1961	77.000	51.100	3630.000	79.300	0.47241094	93.300	43.300	17.300	364.400	58.28009631	34.26067335
1962	52.100	54.900	3620.500	91.400	0.51461965	124.100	53.200	21.600	385.300	62.61579895	45.63730677
1963	105.100	64.000	2794.000	136.700	0.57114697	136.600	54.100	36.200	404.600	67.22059631	45.37357336
1964	113.400	80.100	2917.000	174.200	0.62744430	206.700	80.800	45.200	438.100	74.00729070	54.80620488
1965	117.900	84.500	2339.000	157.400	0.69429834	227.600	96.000	59.300	472.200	81.21618982	62.03258289
1966	130.200	103.500	3124.000	215.100	0.74747438	320.400	117.900	69.300	508.800	87.79969788	79.54732292
1967	147.000	119.400	3363.000	264.000	0.87440388	465.300	171.900	97.400	546.300	92.28239441	102.33258225
1968	131.300	141.900	3440.000	271.400	1.00000000	559.100	292.400	128.800	589.000	100.00000000	210.25329715
1969	162.200	156.400	3448.294	344.700	1.17299911	N.A.	410.700	158.400	629.700	110.50000000	284.02793024

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Table A2

Statistics Used in Import Equations

Year	MIM Imports of Raw Materials	INDGDP Industrial GDP	EXPPRX Official Exchange Rate for Private Exports	EXIND Exports of Industrial Products	MK Imports of Capital Goods	MC Imports of Consumer Goods	ERPM Exchange Rate for Private Imports	FINV Total Fixed Investment	INVF Foreign Investment	CONPRI Private Domestic Consumption
1956	158.000	17681.000291037	26.150	17.200	51.500	17.600	32.250	4591.000	3.500	24312.000
1957	165.000	20783.999947743	26.150	18.600	64.600	19.150	32.250	5283.000	-0.500	28123.000
1958	172.100	23081.999635533	26.050	21.600	70.500	30.600	37.750	6765.000	13.500	31408.000
1959	161.600	20980.999655078	29.420	35.900	82.100	29.300	39.700	8385.000	5.000	36207.000
1960	149.500	31492.999857728	29.900	59.000	74.500	27.200	39.450	10361.000	16.700	43257.000
1961	197.200	36014.999710565	40.000	96.700	93.500	39.300	40.000	11249.000	15.500	47586.000
1962	229.300	43025.999858799	40.000	124.100	87.600	33.150	40.000	11475.000	4.400	51706.000
1963	241.100	48254.000098458	40.000	156.600	88.500	30.200	40.100	13102.000	13.100	56454.000
1964	274.200	57407.000000000	40.000	206.700	107.500	45.300	40.100	14451.000	12.700	63660.000
1965	247.000	63097.000141665	40.000	227.600	163.200	43.200	40.100	15428.000	23.750	71452.000
1966	246.600	75833.999810331	40.000	329.500	183.400	49.600	40.100	23522.000	30.500	78475.000
1967	429.500	80986.000150270	40.000	405.300	291.200	56.700	40.100	29409.000	118.100	86833.000
1968					345.000	72.500	40.100	36220.000	75.500	97927.000

Table A3

Statistics Used in Service Equations

Year	XSERVS Exports of Services	MSERVS Imports of Services	TMT Total Trade in Goods
1956	16,400	24,000	346,200
1957	25,500	23,500	393,000
1958	20,600	34,700	420,300
1959	19,100	34,300	421,200
1960	30,600	38,100	450,500
1961	37,400	34,500	527,000
1962	34,500	37,800	559,200
1963	55,000	42,400	691,500
1964	56,800	51,400	805,800
1965	77,600	70,700	1004,300
1966	117,000	66,300	1102,300
1967	144,800	94,900	1428,200
1968	220,200	195,300	1805,900
1969	238,209	186,600	2268,000

Table A4

Assumed Exogenous Variables

Year	JNP (Billion US$)	RIJ (Thousand Metric Tons)	ACTLDC (Index 1968 = 1)	GNPOD (Index 1968 = 100)	YDUS (Billion US$)	INDGDP (Million US$)	DINV (Million US$)	CONPRI (Million US$)	INVF (no growth) (Million US$)	INVF (25% growth) (Million US$)
					High Estimate					
1970	194.9	5,846.0	1.335	119.3	676.9	2,948.3	1,222.1	3,053.9	130.0	162.5
1971	228.2	5,846.0	1.522	128.9	727.7	3,339.4	1,533.1	3,396.0	130.0	203.1
1972	267.2	5,846.0	1.735	139.2	782.3	3,783.6	1,915.6	3,776.3	130.0	253.9
1973	312.9	5,846.0	1.978	150.3	840.9	4,288.2	2,386.1	4,199.3	130.0	317.4
					Low Estimate					
1970	167.2	5,846.0	1.235	118.5	658.0	2,948.3	1,222.1	3,053.9	130.0	162.5
1971	210.6	5,846.0	1.393	127.0	687.6	3,339.4	1,533.1	3,396.0	130.0	203.1
1972	256.9	5,846.0	1.575	136.1	718.6	3,783.6	1,915.6	3,776.3	130.0	253.9
1973	266.5	5,846.0	1.451	145.9	750.9	4,288.2	2,386.1	4,199.3	130.0	317.4

Table A5

Endogenous Variables Without Textile Restrictions

Million US$

Year	XJ	XLDC	KINVFL	XOD	XUS	EXIND	MRM	MK	MC	TMT	XSERVS	MSERVS	CAB
High Estimate With No Growth In INVF													
1970	189.9	408.9	371.4	201.7	543.7	985.6	714.5	493.7	83.4	2,635.8	294.8	225.1	+122.3
1971	227.7	476.3	464.5	242.3	677.8	1,207.9	827.8	589.2	92.9	3,134.0	356.2	270.1	+200.3
1972	271.9	552.9	548.0	280.8	799.4	1,421.3	944.6	706.6	103.6	3,659.8	421.0	317.6	+253.6
1973	327.3	640.4	624.1	317.6	909.6	1,628.9	1,067.0	851.0	115.4	4,228.3	491.0	368.9	+283.6
Low Estimate With No Growth In INVF													
1970	181.2	372.9	371.4	200.7	541.7	962.0	707.5	493.7	83.4	2,581.0	288.1	220.1	+79.9
1971	207.7	397.4	464.5	240.0	673.6	1,156.2	812.3	589.2	92.9	3,013.0	341.3	259.2	+106.4
1972	237.6	423.3	548.0	277.1	792.8	1,336.4	919.2	706.6	103.6	3,460.1	396.4	299.6	+98.2
1973	271.1	450.7	624.1	312.4	900.0	1,503.9	1,029.5	851.0	115.4	3,930.1	454.3	342.9	+50.6
High Estimate With 25% Growth In INVF													
1970	189.9	408.9	371.4	201.7	543.7	985.6	714.5	513.7	83.4	2,655.8	296.8	226.8	+102.6
1971	227.7	476.3	497.0	252.5	722.7	1,264.7	844.8	634.1	92.9	3,251.0	370.0	280.6	+196.8
1972	271.9	552.9	650.4	312.9	940.7	1,599.9	998.2	782.7	103.6	3,962.9	457.5	344.8	+306.6
1973	327.3	640.4	839.2	384.9	1,206.4	2,003.9	1,179.5	966.1	115.4	4,820.0	563.0	422.2	+433.8
Low Estimate with 25% Growth In INVF													
1970	181.2	372.9	371.4	200.7	541.7	962.0	707.5	513.7	83.4	2,601.1	290.0	221.9	+60.0
1971	207.7	397.4	497.0	250.2	718.8	1,213.0	829.3	634.1	92.9	3,130.4	355.1	269.7	+103.2
1972	237.6	423.3	650.4	309.2	934.1	1,515.0	972.8	782.7	103.6	3,763.3	433.0	326.8	+151.13
1973	271.1	450.7	839.2	379.7	1,196.8	1,878.9	1,142.0	966.1	115.4	4,521.8	526.3	395.3	+205.8

Table A6

Endogenous Variable With Textile Restrictions

Million US$

Year	XJ	XLDC	KINVFL	XOD	XUSWT	EXIND	MRM	MK	MC	TMT	XSERVS	MSERVS	CAB
High Estimate With No Growth In INVF													
1970	189.9	408.9	371.4	201.7	543.7	985.6	714.5	493.7	83.4	2,635.8	294.8	225.1	+122.3
1971	227.7	476.3	464.5	242.3	592.0	1,119.5	801.3	589.2	92.9	3,021.8	342.4	259.9	+137.4
1972	271.9	552.9	548.0	280.8	690.0	1,308.6	910.8	706.6	103.6	3,516.6	403.3	304.7	+173.2
1973	327.3	640.4	624.1	317.6	779.5	1,494.9	1,026.8	851.0	115.4	4,058.0	470.0	353.6	+188.0
Low Estimate With No Growth In INVF													
1970	181.2	372.9	371.4	200.7	541.7	962.0	707.5	493.7	83.4	2,581.0	288.1	220.1	+79.9
1971	207.7	397.4	464.5	240.0	585.4	1,065.4	785.0	589.2	92.9	2,897.6	327.1	248.7	+41.8
1972	237.6	423.3	548.0	277.1	679.7	1,219.9	884.2	706.6	103.6	3,312.1	378.2	286.2	+15.3
1973	271.1	450.7	624.1	312.4	765.2	1,365.1	987.8	851.0	115.4	3,755.7	432.6	326.1	-48.3
High Estimate With 25% Growth In INVF													
1970	189.9	408.9	371.4	201.7	543.7	985.6	714.5	513.7	83.4	2,655.8	296.8	226.8	+102.6
1971	227.7	476.3	497.0	252.5	625.5	1,164.6	814.8	634.1	92.9	3,123.8	354.3	269.1	+125.4
1972	271.9	552.9	650.4	312.9	795.5	1,450.3	953.3	782.7	103.6	3,772.8	434.2	327.7	+200.1
1973	327.3	640.4	839.2	384.9	1,001.1	1,792.4	1,116.1	966.1	115.4	4,551.3	529.9	398.0	+288.0
Low Estimate with 25% Growth In INVF													
1970	181.2	372.9	371.4	200.7	541.7	962.0	707.5	513.7	83.4	2,601.1	290.0	221.9	+60.0
1971	207.7	397.4	497.0	250.2	618.9	1,112.9	798.5	634.1	92.9	3,062.7	346.8	263.6	+31.9
1972	237.6	423.3	650.4	309.2	785.2	1,365.4	926.7	782.7	103.6	3,568.3	409.0	309.2	+42.1
1973	271.1	450.7	839.2	379.7	986.8	1,667.4	1,077.1	966.1	115.4	4,246.9	492.5	370.5	+51.7