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Evaluating the Relative Impact of Fiscal Incentives and Trade Policies on the Returns to Manufacturing in Taiwan 1955-1995

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Abstract

In this paper, an integrated cash flow model is developed to examine the relative impact of tax incentives, financial subsidies, and macroeconomic variables on the profitability of industrial investments. It allows for various variables to interact with each other. An application of the model is carried out for Taiwan, which implemented a variety of fiscal incentives over the past forty years. The principal policy conclusion is that trade and macroeconomic policies are much more important than income tax incentives or subsidized finance policies in determining the success of industrialization process. The effects of any of the fiscal incentives are found generally much smaller than those of the trade policies or the fundamental trends in macroeconomic variables such as the movement of the real exchange rate and the real wage rate.

JEL Codes: H25, F13, O12

Key words: tax incentives, export promotion, industrialization, real exchange rate, trade policy, Taiwan.

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by

Glenn P. Jenkins and Chun-Yan Kuo

I. Introduction

The question of whether fiscal incentives can have a significant impact on industrial investment and economic growth has been the subject of considerable debate.[1] The fiscal incentive policies in countries that have experienced rapid industrialization usually have not been implemented in isolation, but rather as part of a concerted effort by governments including infrastructure and technical support to industries. Equally important in affecting industrialization may be the macroeconomic environment including the movement of the real exchange rate and real wages. Determining which variables have a relatively greater impact on the demand for investment is an interesting, but difficult task. Even with the help of an econometric analysis or a computable general equilibrium model, we would still have serious difficulties in measuring, in a reliable way, the specific response of firms to the components of fiscal incentive packages and economic variables.

Taiwan has been often considered as one of the models of economic growth for developing countries. Since 1955, tax incentives have been popular policy instruments for influencing the allocation of investment.[2] The main purpose of this paper is to develop a set of integrated cash flow models of industrial investments that allow us to evaluate the relative

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[1] See, e.g., T. Viherkentta, Tax Incentives in Developing Countries and International Taxation, (Finland: Finnish Lawyers' Publishing Company, 1991); A. Shah, ed., Fiscal Incentives for Investment and Innovation, (New York: Oxford University Press, 1995).

[2] The total revenue cost of tax incentives accounted for approximately 5 to 9 percent of the total tax collections. Income tax incentives for business were the most common. The next in importance was the business commodity tax credit. The business commodity tax incentives initially increased more rapidly than that of income tax incentives. Their importance, however, declined and finally vanished when the government introduced a European style value-added tax system in April 1986. This is because that, once VAT was introduced, tax credits for input taxes paid represent an intrinsic feature of the VAT system and could no longer be regarded as tax incentives for export promotion.

impact of fiscal incentives and selected macroeconomic variables on the profitability of investments over a forty-year period.

Section II reviews the main fiscal incentives implemented in Taiwan, followed the movement of key macroeconomic variables. Section III presents the model necessary to estimate the impact of fiscal incentives and other economic variables. Section IV describes the data sources, and presents the empirical results obtained through the model's simulation. Section V calculates the increase in factor productivity required for sustainable economic growth, and concluding remarks are made in the last section.

II. Tax Incentives and Macroeconomic Variables

Over the past forty-years, 1955-95, Taiwan has transformed its economy.[3] During the period, the government of Taiwan implemented a variety of fiscal incentives, along with the movements of key macroeconomic variables. The relative importance of these factors on its industrialization is assessed in this paper.

2.1 Business Tax Incentives

The development of the Taiwan's economy can be classified into five strategic stages in which many fiscal incentive measures were launched. With the exception of the last phase, which is still running its course, the tax and other incentives of each of the previous four phases are examined here. These five strategies or phases are described briefly below; details with respect to tax measures by sector are displayed in Table 1.

During the 1950s, industrial development was just beginning in Taiwan. The basic strategy of the Taiwanese government was to follow an import substitution policy. The objective was to reduce Taiwan's international trade deficit. To compliment the import substitution policy the government also started to use tax measures to encourage investment in the sectors that would increase exports.

[3] S.C. Tsiang, "Taiwan's Economic Miracle: Lessons in Economic Development", edited by A.C. Harberger, Economic Policy and Economic Growth, (San Francisco: the Institute for Contemporary Studies, 1985).

The Statute for Encouraging Investment (SEI) was enacted in September 1960 and was in force for the following ten years (1961-70). Two sets of policy instruments were employed. First, tax policies were used to encourage savings, to stimulate investment and to promote exports. The major tax incentives such as the five-year income tax holidays were introduced. On the trade front, the government promoted trade liberalization for exports by establishing export processing zones. At the same time, imports were subject to high tariffs and under tight control in order to protect domestic industries. Second, the government administrative procedures were streamlined to facilitate the development of land for industrial purposes, resulting in a rapid economic expansion during this period.

When the first SEI expired, it was extended for another ten years (1971-80) and the scope of the tax incentives expanded to include both new businesses as well as the expansion of existing firms. The five-year tax holidays incentive was amended so that the enterprise could choose either to use accelerated depreciation or to have the tax holidays begin at the same time as the start of business production.[4] The non-tariff barriers on many commodities were substantially reduced in July 1972 but the tariff rates for some of these goods were increased. Intermediate inputs and machinery imported into the export-processing zone were all exempted from customs duties.

By the end of 1980, the government approved the third phase of the SEI for another ten years (1981-90). A greater emphasis was placed on the promotion of investment in high technology sectors, energy conservation, and pollution control equipment. A scheme was developed to provide business income tax credits for expenditures on research and development.

When the SEI expired at the end of 1990, an assessment by the government of the tax incentives concluded that they were causing an unfair distribution of the tax burden across industries and creating considerable administrative complexity. The incentives were distorting investment decisions due to their encouragement of specific industries and products. As a

[4] During the first SEI, the tax incentive of the five-year tax holidays had begun from the start of the business of the qualified enterprises, which may or may not have begun production right away.

result, the SEI was replaced by the Statute for Industrial Upgrading (SIU). This statute covered the period from January 1991 to June 1998. The new instruments were function-oriented rather than industry-oriented. They focused on the provision of investment tax credits for automated equipment in production, pollution-control equipment and related technologies, and expenditures on R&D, manpower training. It also included tax credits for overseas product advertising and investments in less-developed regions. This package of policies is not evaluated in this study.

2.2 Key Macroeconomic Factors

In addition to the tax incentives, there were major macroeconomic variables that had an important impact on the profitability of industrial investment. Three key factors are identified and their movements over the study period are discussed below.

The Real Exchange Rate

The real exchange rate is a key macroeconomic variable affecting the profitability of firms that engage in export activities. If the domestic currency is depreciated in real terms, exporters will receive more domestic currency each unit of foreign exchange earned, which gives them an incentive to produce more exportable goods. Over the past forty years, Taiwan has experienced a variety of exchange rate regimes.

Prior to 1951, Taiwan maintained a single fixed exchange rate regime, accompanied by quantitative controls on the allocation of foreign exchange. In April 1951, two exchange rate systems were established, the Bank of Taiwan rate on currency and the Foreign Exchange Deposit Certificate rate. Transactions could be done at either of these rates or with a combination of the two. In October 1963, the foreign exchange control system was modified. The exchange rate with respect to the US dollar was set at NT$40. The Taiwan dollar was first re-valued and appreciated against the US dollar in February 1973. In July 1978, the exchange rate was no longer fixed to the US dollar and the Taiwan dollar was permitted to float within determined limits vis a vis the US dollar. Moreover, the businesses earning foreign exchange were no longer required to surrender their foreign exchange earnings to the Central Bank, but

instead they had to open a foreign currency passbook account that they could use for business transactions requiring foreign exchange.

The real exchange rate is expressed as the nominal exchange rate (defined as the number of Taiwan dollars per US dollar) multiplied by the ratio of the world price index to the domestic GDP deflator for Taiwan.[5] The world price index is approximated here by the weighted average of the dollar values of the wholesale price indices of Taiwan's major trading partners in 1985, including the U.S. (61.5 percent), Japan (28.4 percent), Germany (5.2 percent), and Australia (4.9 percent).

The real exchange rate reflects the international purchasing power of the Taiwan dollar. The lower the real exchange rate, the greater the appreciation of the Taiwan dollar with respect to the US dollar and vice versa. We find that the Taiwan dollar depreciated first in 1956, and later in 1959, 1965 and 1966 (see Column 4 of Table 2). Since then, and especially since 1985, it has generally appreciated. From 1985 to 1994, the Taiwan dollar appreciated by almost one-third. By introducing changes in the real exchange rate into the cash flow model through their impact on the market exchange rate, one can assess the relative impacts on the financial returns of the exchange rate as compared to the tax incentives implemented during the past four decades.

Since the basic data used in the cash flow model comes from the 1976 industrial census, the first year's data for each investment project, which will be explained later, is expressed in 1976 dollars (see Column 5 of Table 2). In order to be consistent with the prices of other variables used in the model, the nominal and real exchange rates used in the first year of the investment analysis for each subperiod are converted to NT$38 per US dollar and, for the remaining years, they are adjusted according to their actual movements during the subperiod (see Columns 6, 7, and 8).[6]

[5] See, e.g., A.C. Harberger, "Applications of Real Exchange Rate Analysis", Contemporary Economic Policy, Vol. 7, Issue 2, (1989); J. Brun and R. Luders, (ed.), Macroeconomic Policy and the Exchange Rate, (San Francisco: International Center for Economic Growth, 1999).

[6] Four ten-year investment projects are considered for each of the five selected sectors. The periods of the investment are 1955-1964, 1964-1973, 1970-1979, and 1985-1994. As a result, NT$38 per US dollar is assumed in 1956, 1965, 1971, and 1986, respectively.

The Real Wage

The real industrial wage in Taiwan has risen considerably over the past forty years and this change has had a significant impact on the industrial development of Taiwan, especially in labor-intensive industries. While the growth of real wages is a reflection of the increase in overall labor productivity in the economy, for each firm hiring labor in an open labor market, the real wage increases are seen as an increase in the operating costs. To assess the relative importance of real wage rate changes, it is necessary to construct a time series for the real wage corresponding to the various development phases and then simulate the cash flow of each sector over each of four investment projects.

We use the nominal average monthly earnings of employees in the manufacturing industry as a proxy for reflecting the year-to-year movements of nominal wages and salaries paid by the representative firms in the study. The real wage index is constructed by dividing nominal earnings by the consumer price index. These price indices are normalized to 100 in 1976. Following a similar approach to the one used with the real exchange rate, the real wage index for the first year of each investment project is set equal to unity.

The real wage index reflects the year-to-year fluctuation of labor costs in production. In Taiwan, the real industrial wage rose by approximately 25 percent over the eight-year period from 1956 to 1964, or at a compound growth rate of 2.8 percent per year. The growth in real wages from 1965 to 1973 was 69 percent for a compound annual growth rate of 6.8 percent. Between 1971 and 1979, there was a 74 percent increase in real wages, reflecting a compound growth rate of 7.2 percent. Again, between 1986 and 1994, real wages rose by almost 70 percent, or at a compound growth rate of 6.9 percent. This rapid increase in real wages forced all exporting firms that wished to remain internationally competitive to increase their total factor productivity by implementing many cost cutting measures.

Financial Subsidies

From 1960 to 1986, the macroeconomic policy of Taiwan encouraged positive real interest rates on savings deposits.[7] This high real interest rate policy raised the rate of savings that was used to finance capital formation. Intermittently, the government also provided concessional financing to encourage investments in strategic industries. These enterprises, especially exporters, were eligible to receive preferential interest rates as low as half the general market rate.[8] These export-financing subsidies declined gradually until they were terminated in the early 1980s. The government then provided low interest rate loans to finance investments in new strategic industries, for the purchase of automated equipment, pollution-prevention equipment, and the development of new products. In the following simulations, we evaluate the impact of this measure by setting the rate of subsidy on their financing equal to 6.07 percentage points of the interest rate.[9] This corresponds to the largest rate of subsidy given during the entire period.

III. The Cash Flow Models

To evaluate the relative impact of tax incentives and other economic variables on the rate of return on equity, we have constructed a detailed financial model of the cash flow profile of a typical firm from each sector and calculated the net present value (*NPV*) of an investment performance. The financial models of the investment and operation of these firms enable us to integrate a wide range of tax and tariff measures, as well as the movement of the real exchange rate, real wages, and real interest rates into the analysis of their impact on the financial profitability of the sector.

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[7] S.C. Tsiang, "Taiwan's Economic Miracle: Lessons in Economic Development", edited by A.C. Harberger, Economic Policy and Economic Growth, (San Francisco: the Institute for Contemporary Studies, 1985).

[8] See The Central Bank of China, Economic Research Department, Financial Statistics Monthly, Taiwan District, the Republic of China, (February 1995).

[9] This figure is a half of the nominal interest rate which is calculated as follows:

Interest Rate = (1 + Real Rate + Risk Premium)(1 + Inflation Rate) – 1

where the real interest rate with risk premium is assumed at 5 percent. See Table 3.

The modeling of net cash flows is one of the techniques commonly used for appraising capital investment decisions.[10] To evaluate the relative importance of the policy and macro-economic variables, we set up a series of cash flow models for the investment and operation of selected industries in Taiwan. These models are for a typical firm representing the average value of investment, production, sales, inputs and other such variables that are part of the activities of each sector studied. They are set up for each of the four development stages or policy periods in which tax instruments and economic variables will be examined.

The model estimates the cash flow profile of an investment project, which identifies all the receipts and expenditures that are expected to occur during the lifetime of the project. These receipts and expenditures are converted to annual cash inflows and outflows. From the point of view of the owners of the enterprise, the annual nominal net cash flow -- net of corporate and other taxes -- in year *t*, (CF_{nt}) can be expressed as follows:

$$CF_{nt} = \sum_i E_{nt} P_{fit}\, Q_{it} - \sum_m E_{nt} P_{fmt}\,(1+t_{mt})\, Q_{mt} - \sum_n P_{dnt}\,(1+t_{nt})\, Q_{nt} + \sum_m E_{nt} P_{fmk} Q_{mk} + \sum_n P_{dnk} Q_{nk} + L_t - DS_t - T_t - CB_t \qquad (1)$$

Where E_{nt} is the market exchange rate; P_{fit} is the world price of the *i*th product in year *t*; Q_{it} is the quantity of the *i*th product produced and sold; P_{fmt} is the world price of the *m*th tradable business input including the capital and operating items; Q_{mt} is the quantity of the corresponding *m*th tradable business input purchased; P_{dnt} is the domestic price of the *n*th nontradable business input; Q_{nt} is the quantity of the corresponding *n*th nontradable business input purchased. As equation (1) refers to a cash flow statement, the values of the annual sales are adjusted for changes in accounts receivable and the values of annual purchases are adjusted for the changes in accounts payable. P_{fmk} and Q_{mk} are the world price and quantity of the *k*th tradable liquidated asset while P_{dnk} and Q_{nk} are the domestic price and quantity of the *k*th nontradable liquidated asset. They are treated as a non-taxed cash inflow in the last year of the project. Their values are calculated by depreciating the fixed assets by the appropriate rate of economic depreciation plus the value of working capital at that point in time. L_t is the loans received by the firm; and DS_t represents the annual debt service payment; T_t is the corporate

[10] See, e.g., W.F. Sharpe, Investments, (Englewood Cliffs, New Jersey: Prentice-Hall, INC., 1981); P. Belli, J.R. Anderson, H.N. Barnum, J.A. Dixon, and J.P. Tan, Economic Analysis of Investment Operations – Analytical Tools and Practical Applications, (Washington, DC: the World Bank, 2001).

income taxes and other capital taxes; CB_t is the change in the desired stock cash balances held to facilitate business transactions.

The market exchange rate (E_{nt}) is affected by the real exchange rate (E_{rt}) and the relative domestic to foreign price index. They can be expressed at any point in time (t) as:

$$E_{nt} = E_{rt} \cdot (I_{dt}/I_{ft}) \tag{2}$$

where I_{dt} and I_{ft} are the domestic and foreign price indices in time t, which are the cumulative change in the price level from the reference year to t. The real exchange rate will move through time by the forces of the country's demand and supply of foreign exchange. As mentioned in the previous section, the real exchange rate in the reference year is assumed to be NT$38 per U.S. dollar for each policy period. Over time if the domestic inflation differs from that of the trading partners, the change in the relative domestic and foreign price index must result in an equal change in the market exchange rate.

Any tax incentives related to the income or other capital taxes will affect the amount of taxes payable by the firm, T_t, as shown in equation (1).[11] Moreover, there are also important tax implications associated with indirect tax policies. The price of the ith product, P_{fit}, if tradable, will be the world fob price of the ith product times the market exchange rate. The output tariffs have no impact on export sales and the value of the sales received by the exporters, but they could provide a substantial level of protection to producers selling products domestically, if entry into the domestic market by exporting firms is restricted. The price of a unit of the product, when sold domestically, would increase by the force of the respective tariff rate.[12] As regard the business inputs, they can be either tradable or nontradable and their prices are

[11] Each of the income tax incentives are applied in the spreadsheets estimating the net cashflows exactly as specified by the legislation authorizing each of the tax incentives.

[12] While the output tariffs do not have an impact on export-oriented enterprises, they could provide a substantial level of protection to producers selling products domestically. The gross cash inflow from the sale of a unit of the product in the domestic market will increase by the force of the tariff. For firms supplying the protected domestic market, we expect to find that the PV of the net of tax income stream would be greater than the initial value of the investment, if these firms are as productive as the exporting enterprises. The difference between the NPV of the net income stream of a domestic supplier and that of an exporter in the same sector reflects the potential financial rents a firm can earn, or waste, if the domestic prices are increased by the full amount of the tariffs.

determined by the world cif price plus tariffs if imported and the domestic price if purchased locally.

The nominal net cash flows derived from equation (1) are deflated to derive the real net cash flow (CF_{rt}). The real net cash flows are then discounted by a discount rate (ρ) in order to derive the *NPV* of the cash flows for the investment evaluated as of year *j*:

$$NPV_j = \sum_t [(CF_{rt})/(1 + \rho)^{t-j}] \quad (3)$$

Since Taiwan is a small open economy, its exports can be sold only at prevailing international prices. Imposition of an output tariff does not have an impact on the cash flow or the rate of return of export-oriented firms. A tariff on importable inputs, however, will raise the financial cost of these inputs by the amount of import duties, resulting in a lower *NPV* or a lower rate of return on equity.

Because of the numerous tax incentives, special attention is paid to the calculation of the business income tax and other taxes. For example, the provisions of depreciation expense, interest subsidies, and other tax incentive measures provided by the government influence the magnitude of business income taxes. Each of these tax provisions is modeled in detail and applied to the relevant cash flow variables according to the tax laws in Taiwan at the time.

To develop a base case for each set of industrial investments in each policy period, we calibrate the level of output in the cash flow model so that with all of components of the corresponding policy packages in place, a net of tax real rate of return to equity of 12 percent is earned by the investment in export-oriented firms or the exporting branch of the sector. Because the real discount rate used to evaluate the net cash flow profiles is also 12 percent, the present value (*PV*) of the cash flow generated by the investment will be exactly equal to the *PV* of the initial investment. This implies that on the margin only a competitive rate of return on equity is earned in the exporting activity.

By calibrating the cash flow model in this way for each policy period, we are being consistent with the actual historical situation in Taiwan. For most of this forty-year period, all

of these sectors were able to compete successfully in the export markets, while at the same time producing for the protected domestic market. During the last 15 years, the pressure put on industries by the growth of real wages and the appreciation of the real exchange rate has forced some sectors to retrench or shift product lines in order to obtain the productivity levels needed to earn competitive rates of return.

Once the cash flow model for the typical exporting firm in a sector is calibrated so that the *PV* of the future net of tax income stream equals the *PV* of the initial investment, we can measure the financial impact on the value of the firm arising from each of tax incentives and the movement in real wage rates and the real exchange rate. This is done by moving the value of each of these variables (one at a time) to their pre-incentive values and then evaluating the *PV* of the net of tax cash flows now provided by the same investments in the adjusted policy environment. The difference between the *PV* of the initial value of the investment and the *PV* of this new net cash flow measures the positive or negative impact of the policy variable on the value of the firm.

IV. Empirical Results

In this section, the data employed for analysis are described and the empirical findings are also presented.

4.1 The Data

The basic investment data used in this paper for each sector came from the 1976 Census of Manufacturing in Taiwan. Five cases were studied; they include cotton textile, knitted apparel, plywood, television, and electronics industries. These industries were chosen because they accounted for a high percentage of total exports from Taiwan and had their most rapid growth during the import substitution and export promotion periods.[13] Except for plywood, these sectors continued to be competitive throughout the study period. The plywood sector ceased to be competitive after 1980.

[13] For example, the minimum criteria for a group to be considered was that it should account for at least 3 percent of total exports in any period, and should have relatively rapid growth in some periods.

For each representative firm, the analysis of the investment was carried out for a period of 10 years. Total investment was classified into production machinery and equipment, buildings and infrastructure, and land; these components were estimated on the basis of the average value for the firms in the sector in 1976.[14] For each new investment, land is assumed to be acquired in year 0, while expenditures on buildings and machinery were made in years 1 and 2. Because of the nature of Taiwan's economy, all production machinery and equipment is assumed to be imported from abroad. The economic lives of the fixed assets were based on the data published by the government.[15] This information of economic depreciation rates was used to estimate the residual value of the assets at the end of each analysis period.

The production costs of tradable and nontradable inputs for each typical firm were also obtained from the Manufacturing Census Data. Tradable inputs include material costs and fuel consumption, while nontradable inputs consist of electric power, water, and labor. The labor costs, which were broken down into costs for workers and supervisors/technicians, were also obtained from the same data sources. Overhead costs were also estimated for each representative firm.

For each of the periods covered by the study we maintain the same proportional mix of assets by value for a sector as existed in 1976. However, their productivity in terms of the output the firm produces is allowed to change. This simplifying assumption allows us to focus on the impact of the tax incentives on asset values.

The production of each firm begins in the third year of its life at 85 percent of the full capacity; from year 4 on, the firm was considered to be operating at full production capacity. Inventories were valued on a first-in-first-out basis. Being part of the working capital, accounts receivable were assumed to represent 15 percent of the gross sales, and accounts payable to be 12.5 percent of the gross input purchases. To facilitate transactions, cash balances were

[14] Executive Yuan, 1976 Industrial and Commercial Census of Taiwan-Fukien District of the Republic of China, Volume III, Book I, Taiwan District Manufacturing, published by the Committee on Industrial and Commercial Census of Taiwan-Fukien District of the Republic of China.
[15] See a series of announcements entitled The Durability of Fixed Assets by the Executive Yuan, Republic of China (various years).

assumed to be 10 percent of the gross sales. By the end of the operating period, the residual values include both the value of land and any undepreciated assets.

The analysis of these cases was conducted in constant prices, measured in terms of the 1976 price level. However, to model the impact of the tax system, we needed first to model the nominal cash flows in exactly the way that the taxes were applied according to the legislation. The resulting nominal streams of cash flows are then deflated in order to derive their real values. To simplify the analysis, the annual inflation over the life of the project was assumed at 6.8 percent in Taiwan and 6.1 percent abroad.[16] These rates correspond to the average rate of domestic and world inflation, respectively, from 1960 to 1980. The world price of exported products and tradable inputs was assumed to increase at the foreign inflation rate, while the prices of both domestic products and nontradable inputs grew at the domestic inflation rate. The market exchange rate was adjusted to reflect the actual movements of the real exchange rate during each of the subperiods under examination.

The initial debt/equity ratio for each investment was assumed to be 30/70. The nominal market rate of interest was measured in such a way to compensate for the real time value of money, the possibility of the borrower's defaulting on the loan, and the expected loss of purchasing power attributable to inflation. For the purpose of this analysis, the real interest rate (including any risk premium) was assumed to be 5 percent. Given the inflation rate, the nominal interest rate was estimated to be 12.14 percent. The debt is assumed to be paid off in five years. This implies that the average ratio of debt/equity over the life of the project is somewhat less than 30/70.

Details of these project parameters are summarized in Table 3.

4.2 The Simulation Results

The simulations were carried out for export-oriented firms of the five selective sectors, for all four policy periods. As mentioned earlier, the basic investment data used were obtained

[16] The inflation rates were calculated on the basis of the average annual consumer price index in Taiwan and a trade-weighted world price index for foreign inflation over the period from 1960 to 1980.

from the 1976 Census Manufacturing in Taiwan and the values of all project variables are expressed in 1976 prices. To evaluate the effect of fiscal incentives and macroeconomic variables on industrialization in each of the four policy periods, the magnitudes of the 10-year investment project in each sector are assumed unchanged between the four policy periods, but the values of tax policy, real foreign exchange and real wage all reflect the situation in the respective policy periods studied. For example, the price deflators and tax policy measures in different policy period are summarized in Table 1 while the movement of the real exchange rate is shown in Table 2.

The simulation results are presented in Table 4 by sector and by policy period. The initial value of the assets held by a typical export-oriented firm can be expressed as the *PV* of the fixed capital investment plus inventories and other working capital. Over the life of the project, the *NPV* of the assets may be increased or decreased, depending upon their financial performance. In the base case for each panel project, we included in the cash flow model all the effects of the tax incentives, financial assistance received from the government, as well as changes in the real exchange rate and real wages over the life of the project. In each case, the model was calibrated with the 12 percent real rate of return on equity to generate a *NPV* of zero, thus leaving the initial asset values unchanged. The impact of each of the policy measures as well as the effect of the changes in the macroeconomic variables were then estimated by removing in sequence from the model, the effects of financing subsidies, tax incentives, changes in the real wage, and changes in the real exchange rate and then re-simulating it. The contribution of each incentive or above variable to the asset value was then calculated as the change in the *NPV* from the prior case (starting with the base case) to the next case, in which the effect of one more variable had been removed. The relative sizes of the changes in *NPV* caused by the removal of each of the policy or economic variables gave us an indication of the relative impact of the respective variable on the investment in that industry.

Real Exchange Rate

When policies for both import-substitution and export promotion (1955-64) were simultaneously pursued, the incremental *NPVs* are presented for export-oriented firms in the second column of Table 4. One can see the significant contribution of the devaluation of the

Taiwan dollar to the return on investment in this period. Table 2 shows that the real exchange rate was increased from NT$28.41/US$ in 1955 to NT$53.62/US$ in 1959 and then it fell to NT$45.58/US$ in 1964 as a result of the liberalization of the foreign exchange market.[17] The 60 percent depreciation of the Taiwan dollar over this period caused an increase in the price level of tradable goods relative to nontradable ones, leading to a proportional increase in the gross annual cash inflow and an increase in the supply of exports. This benefit was offset to some extent by the increase in the cost of tradable inputs used in production. This phenomenon affected positively the value of the cotton textile firm by about 26 percent of the initial value of the assets. The effect of the increase in the real exchange rate was especially profound in the knitted apparel, television, and electronics sectors.

After 1960, the Taiwan dollar started to appreciate slowly in real terms, making it more difficult for industries to compete in international markets, even though the impact was offset to some extent by the lower cost of tradable inputs. The third column of Table 4 clearly shows that the lower real exchange rate during the first SEI phase (1964-73) had a considerable adverse effect on the profitability of export-oriented firms in all sectors. The lower real exchange rate, for example, reduced the value of investment in the knitted apparel industry by almost 79 percent and by an even greater impact of 113 percent in the television sector.

As a result of the rapid growth of export earnings and trade surpluses enjoyed by Taiwan, the Taiwanese currency appreciated much faster, especially during the third stage of the SEI (1985-94) in which the real exchange rate declined by more than 25 percent.[18] The appreciation of the Taiwan dollar had an enormous negative impact on the financial performance of all firms, by ranging from more than 84 percent of the initial investment in cotton textile to 493 percent in the television sector.

[17] As a result of the market-based exchange rate policy, the Taiwan dollar depreciated in 1959. Details can be found in S.C. Tsiang, "Taiwan's Economic Miracle: Lessons in Economic Development", edited by A.C. Harberger, Economic Policy and Economic Growth, (San Francisco: the Institute for Contemporary Studies, 1985).

[18] The experience and economic policies of Taiwan during this period have been similar to those of Japan where the strong productivity changes in the traded sectors of the economy have not been realized to the same degree in the non-traded sectors. As a consequence the real exchange rate has declined.

Real Wage Rate

The increase in the real wage rates also had a negative effect on the firms. During the initial period of import substitution and export promotion, the real wage increased by almost 25 percent over the life period, but the bulk of the increase occurred during the last four years of the period. As a result, the impact of the real wage increase on profitability did not offset a significant proportion of the financial benefits given by the change in the real exchange rate.

Real wages in Taiwan have increased approximately 7 percent per annum since 1967. This had substantial negative effect on the financial performance of the businesses as shown in the fourth row of each panel project in Table 4. The effect, however, was not as severe as that of the appreciation of the real exchange rate. Taking the third SEI phase as an example, the impact of the real wage ranged from 10 to 25 percent of the impact of the movement of the real exchange rate.[19]

Financial Subsidies

The impact of concessional financing, shown in Table 4 row 5 of each panel, was positive, but its effect was equal to less than 3 percent of the value of the investments in all sectors and in all study periods. In relative terms, the interest rate subsidy had only a marginal impact on the return on investment. In Taiwan, typically the manufacturing firms are not highly leveraged, and the benefit from reduced interest payments was offset to some extent by the reduction in the value of the tax shield from interest expense deductions for income tax purposes.[20]

[19] The change in total factor productivity in the economy, change in the real wage rate, and the change in the real exchange rate are all related macro-economic variables. However, in terms of any single industry or firm the values of these variables need not be related. If the change in total factor productivity of any firm is not sufficient to offset the change in the real wage and the change in the real exchange rate that are economy wide phenomena, then it will go out of business.

[20] Other researchers have found a similar conclusion. See, e.g., Y.H. Yang, "Government Policy and Strategic Industries: The Case of Taiwan", edited by T. Ito and A.O. Krueger, Trade and Protectionism: NBER-East Asia Seminar on Economics, (Chicago: The University of Chicago Press, 1993).

Tax Incentives

Simulating the effect of each tax incentive measure provided to businesses offers valuable insights. The model was simulated in such way that when a policy or an amendment to the previous policy was introduced in the current period it can be evaluated as an incremental policy change in the current period. However, the results shown in Table 4 present the cumulative impact of the policy changes that were implemented over the successive policy period of the study.

The five-year tax holiday introduced in the first stage of the SEI appeared to have had a modest effect on firms (Table 4 row 7) if they were selling only to the international markets. This is due to the fact that a business could only take advantage of the business income tax exemption for a period of five years from the date of the inception of business. The newly established exporting enterprises did not make full use of the holiday since they could not generate enough profit or positive taxable income in the early years of the business.[21]

During the second stage of the SEI, the modified five-year income tax holiday, along with the amended accelerated depreciation provision, provided firms with an additional positive incentive. As a result, the seventh row of each panel project in Table 4 shows the impact of the tax holiday as well as the amended tax holiday and accelerated depreciation provisions on the initial asset value of investments. For export-oriented firms, the present value of the impact by the modified tax holiday ranged from 4.2 percent of the initial investment in the television sector to 6.2 percent in the electronics sector.

The provision for the deduction of up to 2 percent of the annual export earnings from the taxable income (Table 4 row 8) provided an additional, though modest, incentive for export promotion. The impact attributable to a lower deed tax (Table 4 row 9) was marginal, because it was a one-time benefit and the magnitude of the incentive was also small. The exemption of import duty on imported machinery and equipment (Table 4 row 10) provided a positive impact on all firms. Such benefits increased in the second stage of the SEI because the import duty

[21] The tax holidays could have a much bigger effect on the financial profitability of firms selling primarily to the domestic markets because the high tariff barriers raised the domestic prices of the products, and hence the profitability of these activities.

rates were raised as a result of the second phase of import substitution.[22] However, the benefits were reduced in the third stage of the SEI because of lower import duty rates on machinery and equipment.

During the period of import substitution and export promotion, two important indirect tax measures were introduced. The first measure was an increase in import duties for manufactured products that provided protection to producers selling to the domestic market. The second measure was the duty rebate on imported inputs used in making exported goods that were designed to promote exports.[23] Its impact was determined by the size of the import content of business inputs and the rate of tariffs imposed on these inputs.[24] The impact was enormous, for example, for the knitted apparel sector (Table 4 row 11). The rebate raised the initial asset value by more than 131 percent. Without the duty rebate scheme, it would have been unprofitable to export. Impacts of a similar magnitude are observed for the plywood and television export industries. In the case of cotton textile, the impact was not as significant as other sectors because the rates of duty on imported inputs were relatively low. It is clear that if the duty rebate system had not been implemented, the export promotion program would have been much less effective.

In this analysis we assume that the duty rebate or duty drawback scheme worked effectively and efficiently. This is, however, almost never the case. Duty drawback systems are usually cumbersome, complex, and fraught with delay.[25] To the degree that this program worked inefficiently, the results presented here would overstate the degree that these firms benefited from this program. We find that in later years the government introduced a duty

[22] The objective was to replace imports with domestically produced semi-processed materials and mechanical equipment. See, e.g., K.T. Li, The Evolution of Policy Behind Taiwan's development Success, (New Haven: Yale University Press, 1989).

[23] No rebate is received on domestically purchased inputs whose price would be raised as a consequence of a tariff.

[24] For the country as a whole, the amount of custom duty rebates associated with exports increased from NT$17 million in 1955 to more than NT$23.6 billion in 1980. In percentage terms, it rose from 2.3 percent of total customs duties in 1955 to more than 86.1 percent in 1972, and then gradually declined to 41.5 percent in 1980. See the Ministry of Finance, Department of Statistics, Yearbook of Financial Statistics of the Republic of China, 1999, (June 2000).

[25] See, e.g., G.P. Jenkins and C.Y Kuo, "Promoting Export-Oriented Foreign Direct Investment in Developing Countries: Tax and Customs Issues", Harvard Institute for International Development CAER II Discussion Paper, No. 65, (May 2000).

exemption system to achieve the objectives of the duty rebate system, with more efficient and less administrative burden.

Simulations were also carried out for other policy periods. For export-oriented firms in the first stage of the SEI, an increase in the tariff rates on the materials used in the cotton textile sector made the duty exemption more valuable by 3.5 percent to a total of 7.6 percent (see Table 4 row 11). In contrast, the 20 percent, 40 percent and 11 percent reduction of tariff rates on materials used in the knitted apparel, television and electronics sector, lowered the value of the duty exemption by the respective sector.[26]

During this period, export processing zones were first established in Kaohsiung in December 1966 and subsequently they were expanded to Nantze in January 1969 and Taichung in August 1969. Imports into the zones were duty-free and the products were shipped abroad directly. Materials and other tradable inputs used in the processing zone were mostly imported because they could enter duty free. The trade administration in these zones also operated relatively efficiently. Most of the firms in these zones were engaged in the electronics, cotton textile and knitted apparel, and plastic products sector. On the other front, the customs bonded factories were introduced in 1968 to diminish the congestion of export activities around the export processing zones and also offer increased flexibility and lower costs of production for firms that needed to be close to resources used in production. Investment, employment, and annual exports from these zones and factories all expanded rapidly and contributed to the overall expansion of the Taiwanese economy, especially during the 1970s.

An analysis of the impact of the tax measures was also carried out for the second and third stage of the SEI. Trade liberalization was one of the main policy measures of the third SEI. The first major cut in duty rates took place in 1984. Looking at the average effective tariff rate for the nation as a whole, it was substantially reduced to 26.5 percent in 1985, 9.6 percent in 1990, 8.9 percent in 1993, and 4.5 percent in 1995.[27] Although the cut in import duties on finished products had no impact on export-oriented enterprises, the reduction of tariff rates on tradable inputs lowered the benefits of the duty drawback and tax exemption provisions. These

[26] For example, the 20 percent figure represents a reduction of duty rates from 50 percent to 40 percent in the knitted apparel sector. See Table 1.
[27] Ministry of Finance, Republic of China, (January 1996).

effects are seen in the sectors of knitted apparel, plywood, television, and electronics, as shown in the last column of Table 4. In the case of cotton textile, the benefit increased because of higher duty rates levied on materials that were used in the sector.

In summary, the above simulation results demonstrate that fiscal measures played an important role in Taiwan's industrial policies. However, the findings concerning the relative impacts of the different policy instruments are surprising. The most effective policy instrument was import tariff rebates used in the early stages of export promotion, not the incentive policies related to income taxes. The tax holiday and accelerated depreciation provision provided a small incentive to export-oriented firms. The interest subsidy might have been helpful as well, but its effect was not significant as compared to those of the trade policies, changes in the real wage or in the real exchange rate.

A sound macroeconomic policy was one of the most crucial factors that initially facilitated Taiwan's industrialization process. The unification of the exchange rate and the depreciation of the Taiwan dollar in the late 1950s were the most important instruments in making the export lead industrialization policies profitable for businesses in the initial stage. The market-determined interest rate policy in early 1960s raised the rate of savings that was used to finance capital investment. The stability of the government policies had contributed a great deal to the initial development of the Taiwanese economy. That being said, the policies that caused the real exchange rate to appreciate over time became one of the most important obstacles faced by businesses in expanding their growth in exports. To a lesser extent, the general increase in real wages in the economy also put pressure on individual exporters in their effort to remain competitive in international markets.

V. Productivity Increases to Offset the Increase in Real Wages and the Appreciation of the Currency

During the past thirty years, the appreciation of the real exchange rate and the rise in real wages were a result of a rapid rate of productivity increase in the economy. At the same time, both variables put considerable pressures on exporting businesses overall to remain

competitive in their international markets. Despite these obstacles, Taiwan's economy has continued to grow rapidly.

In this section, we calculate the minimum percentage productivity increase (or total cost reduction) required to maintain the same net of tax real rate of return of 12 percent between the periods covered by this study. Except for plywood, all of the other sectors have survived in some form to 1995 in Taiwan.[28] In order for the survivors to exist they must be earning at least a competitive rate of return. In other words, we are estimating the minimum rate of productivity change that must have been experienced in the sectors that survived all of these periods by examining the dual of the usual way of estimating the change in total factor productivity.[29]

To calculate this percentage productivity increase, we first calibrated the cash flow model in a way similar to the calibrations done for the firms in the previous section. But this time we remove the movements of both the real exchange rate and the real wage. In order to generate the same *PV* of the cash flow as in the initial calibrated model, we multiplied the annual output and associated intermediate inputs by an adjustment factor. These adjustment factors are shown in the second column of Table 5. The third step was to calculate the inverse of the adjustment factor and then to calculate the difference between this value and unity. This difference measures the increase in total factor productivity that must have occurred to offset the increase in real wages and real exchange rate during each specific policy period. To the degree that real world prices of these goods denominated in foreign currency fell during the period, this is a minimum estimate of the increase in productivity required to offset the movement of real wages and the real exchange rate. The results expressed as an annual rate are presented in the third column of Table 5.

[28] For plywood, its demise is traced to the 1980s when many countries banned the sale of logs for export.

[29] Total factor productivity is normally estimated as the difference between the growth in real output and the growth of the quantities of factor inputs employed.

During the period of import substitution and export promotion, the movements of the real exchange rate and of the real wage made a positive contribution to the present value of the net of tax cash flows of the affected industries. No productivity increase was thus necessary to compensate for the changes in these parameter values since the positive effect of the devaluation of the real exchange rate outweighed the negative effect of the rising real wage.

From Table 5 we see that during the first SEI period, if there had been no change in real wages or the real exchange rate the representative firms in the cotton textile industry would have needed to produce only 80 percent of the output they actually did produce in order to earn a 12 percent rate of return. This implies that in the presence of the changes in the real wage and in the real exchange rate, the firms must have had to increase their output by 2.3 percent a year in order to earn the target 12 percent real rate of return on equity.

As the economy moved from the 1960s into the 1970s the pressure put on the exporting sectors by the movements of the real wage and the real exchange rate rose steadily. In the 1980s, the pace accelerated dramatically. During the late 1980s, increase of productivity of capital and labor in the knitted apparel, television and electronics sectors would have had to be 10.8 percent, 13.1 percent and 7.3 percent annually, respectively, in order to maintain the same rate of return on investment. This improvement in the operational efficiency of the firms over such a long period of time is the key to understanding why Taiwan was able to achieve such a rapid rate of economic growth over this forty year period.

VI. Concluding Remarks

In this paper, a model has been developed to assess the impacts of the tax incentives and other economic variables on the returns to investment in selected sectors from 1955 to the mid-1990s in Taiwan. The analysis was carried out in an integrated manner in which the movements of all variables were allowed to interact with each other.

The objective of this analysis was to determine the relative importance of the various tax, trade, and financial policies for the profitability of export-oriented firms producing goods in the international markets. It is a popular belief that the most important fiscal incentives are income tax provisions such as tax holidays, investment tax credits, export sales based income tax credits, and accelerated depreciation. Our results, however, show that the duty drawback and duty exemption programs are by far the most important policy measures for exporting firms. Another popular incentive policy for export promotion is to subsidize the interest rate on export investment finance. Our results indicate that its actual impact on the overall rate of return on the project is marginal.

The devaluation of the Taiwan dollar in late 1950s was a critical turning point in Taiwan's industrial development strategy. This policy enhanced the profitability of investment in the export sector. However, the steady appreciation of the Taiwan dollar over the next three decades imposed a negative impact on the return to investments in the export sectors. The market-oriented interest rate policy had resulted in higher interest rates to savings that was able to finance capital investment needed for the economic development. A rapid rate of total productivity growth prevailed in order to maintain the existing level of profitability in these export-oriented industries. This process accelerated over the period of 1980s. The results of this analysis points to the favourable trade policies, and the rapid cutting of production costs by entrepreneurs that enabled exporting industries to expand while labor was enjoying a rapid increase in real wages. These factors were much more important than the income tax incentives or financial subsidy policies in Taiwan's achievement of a rapid pace of industrialization during the four decade covered by this study.

Table 1

Tax Parameters for Different Sectors in Various Stages

Reference Year[1]	Import Substitution and Export Promotion 1956		First-Stage SEI 1965		Second- Stage SEI 1971		Third-Stage SEI 1986	
Income Tax Rate Structure	Income ($000)	Rate (%)	Income ($000)	Rate (%)	Income ($000)	Rate (%)	Income ($000)	Rate (%)
▪ Bracket 1	0-5	0	0-10	0	0-20	0	0-50	0
▪ Bracket 2	5-50	5	10-50	8	25-50	8	50-100	15
▪ Bracket 3	50-100	10	50-100	14	50-100	14	100+	25
▪ Bracket 4	100+	25	100+	18	100-250	18	n/a	
▪ Bracket 5	n/a		n/a		250+	25	n/a	
Price Deflator (1976=1.0)	0.264		0.443		0.564		1.805	
Tax Holiday	No		Yes		Yes		Yes	
Property Taxes (%)								
▪ Land Value Tax[2]	1.50		1.50		1.50		1.00	
▪ Deed Tax[2]	7.50		3.75		3.75		3.75	
▪ House Tax[3]	2.00		2.00		2.00		2.00	
<u>Cotton Textiles Sector</u>								
(a) Depreciation for Tax Purposes (years): [4]								
▪ M & E	10		10		5		5	
▪ Building	30		30		20		20	
(b) Import Duties								
▪ Output (%)	40.00		45.00		91.00		60.00	
▪ M & E (%)	10.00		20.00		20.00		10.00	
▪ Tradable Inputs (%)	15.00		20.00		28.00		40.00	
▪ Exemption on M & E	No		Yes		Yes		Yes	
▪ Rebate of Duty	Yes		Yes		Yes		Yes	
<u>Knitted Apparel Sector</u>								
(a) Depreciation for Tax Purposes (years): [4]								
▪ M & E	14		14		5		5	
▪ Building	30		30		20		20	
(b) Import Duties								
▪ Output (%)	85.00		70.00		95.00		60.00	
▪ M & E (%)	15.00		15.00		20.00		10.00	
▪ Tradable Inputs (%)	50.00		40.00		65.00		40.00	
▪ Exemption on M & E	No		Yes		Yes		Yes	
▪ Rebate of Duty	Yes		Yes		Yes		Yes	

Reference Year[1]	Import Substitution and Export Promotion 1956	First-Stage SEI 1965	Second- Stage SEI 1971	Third-Stage SEI 1986
Plywood Sector				
(a) Depreciation for Tax Purposes (years): [4]				
▪ M & E	12	12	5	5
▪ Building	30	30	20	20
(b) Import Duties				
▪ Output (%)	35.00	35.00	46.00	15.00
▪ M & E (%)	10.00	13.00	14.00	10.00
▪ Tradable Inputs (%)	25.00	25.00	13.00	1.25
▪ Exemption on M & E	No	Yes	Yes	Yes
▪ Rebate of Duty	Yes	Yes	Yes	Yes
Television Sector				
(a) Depreciation for Tax Purposes (years): [4]				
▪ M & E	10	10	5	5
▪ Building	30	30	20	20
(b) Import Duties				
▪ Output (%)	30.00	20.00	33.00	45.00
▪ M & E (%)	10.00	13.00	20.00	15.00
▪ Tradable Inputs (%)	25.00	15.00	27.00	20.00
▪ Exemption on M & E	No	Yes	Yes	Yes
▪ Rebate of Duty	Yes	Yes	Yes	Yes
Electronics Sector				
(a) Depreciation for Tax Purposes (years): [4]				
▪ M & E	10	10	5	5
▪ Building	30	30	20	20
(b) Import Duties				
▪ Output (%)	20.00	25.00	20.00	40.00
▪ M & E (%)	12.00	13.00	13.00	13.00
▪ Tradable Inputs (%)	18.50	16.50	18.00	15.00
▪ Exemption on M & E	No	Yes	Yes	Yes
▪ Rebate of Duty	Yes	Yes	Yes	Yes

Notes: [1] Reference year refers to the year the tax system applied.

[2] As % of land value.

[3] As % of building and infrastructure.

[4] The method of calculating depreciation is fixed percentage of diminishing book value method.

Table 2

The Movement of the Real Exchange Rate in Taiwan, 1955-94

Year	Nominal Exchange Rate (NT$/US$) (1)	Taiwan GDP Deflator (2)	Weighted World Price Index (3)	Real Exchange Rate (NT$/US$) (4)	Real Exchange Rate Index Using Different Reference Years* (A) (5)	(B) (6)	(C) (7)	(D) (8)
1955	15.55	25.68	46.92	28.41	25.08			
1956	24.78	27.94	48.53	43.04	38.00			
1957	24.78	30.37	49.76	40.60	35.85			
1958	24.78	31.87	50.34	39.14	34.56			
1959	36.38	34.11	50.27	53.62	47.34			
1960	36.38	38.70	50.70	52.40	46.26			
1961	40.00	40.58	50.58	49.86	44.02			
1962	40.00	41.43	50.68	48.93	43.20			
1963	40.00	42.84	50.60	47.25	41.72			
1964	40.00	44.61	50.83	45.58	40.24	37.00		
1965	40.00	44.35	51.90	46.81		38.00		
1966	40.00	45.55	53.59	47.06		38.20		
1967	40.00	47.62	53.80	45.19		36.68		
1968	40.00	50.82	55.76	43.89		35.63		
1969	40.00	54.03	57.09	42.27		34.31		
1970	40.00	55.91	59.24	42.38		34.40	37.74	
1971	40.00	57.58	61.43	42.67		34.64	38.00	
1972	40.00	60.92	64.61	42.42		34.44	37.78	
1973	38.25	70.08	73.98	40.38		32.78	35.96	
1974	38.00	92.77	87.73	35.93			32.00	
1975	38.00	94.70	95.60	38.36			34.16	
1976	38.00	100.00	100.00	38.00			33.84	
1977	38.00	106.31	195.86	37.84			33.70	
1978	36.95	111.94	114.79	37.89			33.74	
1979	36.00	124.79	129.21	37.26			33.18	
1980	36.00	145.01	147.35	36.58				
1981	36.79	162.50	159.45	36.10				
1982	39.12	168.08	161.82	37.66				
1983	40.06	171.31	163.07	38.13				
1984	39.62	172.83	166.58	38.19				
1985	39.86	173.85	164.28	37.67				42.09
1986	37.85	179.73	161.48	34.01				38.00
1987	28.50	180.62	167.54	26.44				29.54
1988	28.12	182.56	175.93	27.10				30.28
1989	26.12	188.23	184.11	25.55				28.55
1990	27.99	195.39	191.80	27.48				30.70
1991	25.75	208.68	203.50	25.11				28.06
1992	25.40	222.87	215.91	24.61				27.50
1993	26.62	238.02	229.08	25.62				28.63
1994	26.62	254.21	243.06	25.45				28.44

Sources: Council for Economic Planning and Development, Executive Yuan, Taiwan Statistical Data Book, (1995).

*Notes: *The real exchange rate index for each year within a sub-period is calculated by multiplying the real exchange rate for that year under Column (4) by the ratio of $38.00 to the real exchange rate for the first year of that investment project.*

Table 3

Basic investment Project Parameters for Representative Firms

(Figures are Expressed in 1976 Prices)

Categories	Cotton Textile	Knitted Apparel	Plywood	Television	Electronics
Investment cost					
Production Machinery (US$000):					
Year 1	310	50	200	100	180
Year 2	240	40	150	70	140
Buildings & Infrastructure(NT$000):					
Year 1	3,400	1,000	3,550	2,500	4,520
Year 2	1,700	500	1,770	1,200	2,260
Land (NT$000):					
Year 0	2,300	500	3,700	1,500	1,850
Economic Service Life (years)					
Machinery & Equipment	10	14	12	10	8
Buildings & Infrastructure	30	30	30	30	30
Input Cost Per Unit of Output					
Tradable Inputs:					
Imported Inputs (US$)	0.05/m	0.14/pc	0.17/m2	14.86/set	4.96/set
Domestic Inputs (NT$)	4.70/m	12.04/pc	5.40/m2	1,049/set	419/set
Non-tradable Inputs (NT$)	0.60/m	0.55/pc	0.30/m2	20.86/set	6.41/set
Import Contents (%)	30	30	55	35	35
Labor Cost Per Month					
Workers (NT$)	4,000	3,000	4,100	3,000	3,040
Supervisors $ Technicians (NT$)	6,300	5,500	7,400	6,400	7,490
Overhead Costs per Year (NT$000)	4,100	2,600	6,600	6,400	10,800
Financing					
Debt/Equity Ratio	30/70	30/70	30/70	30/70	30/70
Suppliers' Credit					
Real Interest Rate Inclusive of Risk Premium (%)	5.00	5.00	5.00	5.00	5.00
Number of Installments	5	5	5	5	5

Table 4

Contribution of Various Factors to the Initial Asset of Export-Oriented Firms

Major Economic Factors	Import Substitution and Export Promotion (1955-64)	First-Stage SEI (1964-73)	Second-Stage SEI (1970-79)	Third-Stage SEI (1985-94)
Cotton textile				
1. Initial Asset Value (thousands of NT dollars)	25,808	24,974	25,043	24,967
2. The Percentage Impact Attributed to (%):				
3. - Real Exchange Rate	26.00	(20.38)	(31.29)	(84.18)
4. - Real Wage	(2.70)	(13.63)	(10.88)	(21.08)
5. - Interest Subsidy	3.00	9.24	4.34	4.35
6. - Tax Incentives				
7. - Tax Holidays or Accelerated Depreciation	-	2.04	5.65	5.65
8. - Taxable Income Reduced by 2 percent of Export Sales	-	1.00	1.00	1.00
9. - Lower Deed Tax	-	0.28	0.28	0.28
10. - Import Duty Exemption on Machinery and Equipment	-	5.90	5.90	2.96
11. - Duty Drawback or Duty Exemption	4.07	7.57	13.27	21.95
Knitted Apparel				
1. Initial Asset Value (thousands of NT dollars)	8,824	9,072	10,071	8,733
2. The Percentage Impact Attributed to (%):				
3. - Real Exchange Rate	143.28	(78.69)	(128.45)	(337.95)
4. - Real Wage	(7.82)	(26.10)	(18.19)	(42.80)
5. - Interest Subsidy	1.69	2.08	2.08	2.39
6. - Tax Incentives				
7. - Tax Holidays or Accelerated Depreciation	-	4.87	7.64	8.81
8. - Taxable Income Reduced by 2 percent of Export Sales	-	5.68	5.11	5.90
9. - Lower Deed Tax	-	0.17	0.17	0.17
10. - Import Duty Exemption on Machinery and Equipment	-	4.03	4.85	2.79
11. - Duty Drawback or Duty Exemption	131.19	69.61	200.04	67.01
Plywood				
1. Initial Asset Value (thousands of NT dollars)	26,804	27,333	26,464	24,996
2. The Percentage Impact Attributed to (%):				
3. - Real Exchange Rate	64.55	(39.26)	(58.08)	(161.28)
4. - Real Wage	(4.67)	(15.58)	(10.09)	(25.67)
5. - Interest Subsidy	2.35	3.12	3.35	3.54
6. - Tax Incentives				
7. - Tax Holidays or Accelerated Depreciation	-	3.55	7.39	7.83
8. - Taxable Income Reduced by 2 percent of Export Sales	-	3.55	3.67	3.88
9. - Lower Deed Tax	-	0.42	0.42	0.42
10. - Import Duty Exemption on Machinery and Equipment	-	3.46	3.85	2.91
11. - Duty Drawback or Duty Exemption	81.33	79.75	49.15	18.51

Major Economic Factors	Import Substitution and Export Promotion (1955-64)	First-Stage SEI (1964-73)	Second-Stage SEI (1970-79)	Third-Stage SEI (1985-94)
Television				
1. Initial Asset Value (thousands of NT dollars)	18,678	20,496	22,546	20,587
2. The Percentage Impact Attributed to (%):				
3. - Real Exchange Rate	212.40	(113.30)	(177.57)	(493.45)
4. - Real Wage	(9.54)	(34.85)	(20.93)	(46.79)
5. - Interest Subsidy	1.75	2.20	2.05	2.05
6. - Tax Incentives				
7. - Tax Holidays or Accelerated Depreciation	-	3.78	4.16	4.56
8. - Taxable Income Reduced by 2 percent of Export Sales	-	7.97	7.25	7.94
9. - Lower Deed Tax	-	0.22	0.22	0.22
10. - Import Duty Exemption on Machinery and Equipment	-	2.22	3.11	2.56
11. - Duty Drawback or Duty Exemption	162.69	37.30	156.35	90.71
Electronics				
1. Initial Asset Value (thousands of NT dollars)	22,814	23,873	24,188	23,620
2. The Percentage Impact Attributed to (%):				
3. - Real Exchange Rate	91.41	(58.35)	(92.00)	(254.70)
4. - Real Wage	(7.23)	(30.53)	(24.18)	(47.99)
5. - Interest Subsidy	2.51	3.23	3.32	3.11
6. - Tax Incentives				
7. - Tax Holidays or Accelerated Depreciation	-	3.45	6.19	6.34
8. - Taxable Income Reduced by 2 percent of Export Sales	-	4.17	4.11	4.21
9. - Lower Deed Tax	-	0.23	0.23	0.23
10. - Import Duty Exemption on Machinery and Equipment	-	4.25	4.20	4.30
11. - Duty Drawback or Duty Exemption	39.23	29.97	35.71	23.90

Table 5
Required Increase in Annual Productivity
by Sector to Maintain Same Rate of Return
(percentage)

Development Phases and Industrial Sectors	Required Proportion of Output	Required Annual Increase in Total Factor Productivity
First-Stage SEI (1964-73)		
▪ Cotton Textile	80.00	2.26
▪ Knitted Apparel	62.90	4.75
▪ Television	58.00	5.60
▪ Electronics	74.20	3.02
Second-Stage SEI (1970-79)		
▪ Cotton Textile	78.10	2.50
▪ Knitted Apparel	54.00	6.36
▪ Television	49.00	7.40
▪ Electronics	69.50	3.71
Third-Stage SEI (1985-94)		
▪ Cotton Textile	60.50	5.15
▪ Knitted Apparel	36.00	10.76
▪ Television	29.30	13.06
▪ Electronics	49.40	7.31

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