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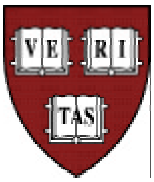

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ABSTRACT

This paper examines the relative impact of tax incentives, trade policies, financial subsidy, real wage and real exchange rate on industrial investment and economic development over the past 40 years in Taiwan using an integrated cash flow model of industrial investments. The model is developed in such a manner that the movements of all the policy and macroeconomic variables are allowed to interact with each other in the economy. The results show that trade and macroeconomic policies are much more important than income tax or subsidized finance policies for the successful industrialization in Taiwan. The effects of the tax incentives and financial subsidy policies are minor in comparison with the impact of the fundamental trends in macroeconomic variables, such as the movement of the real exchange rate and the real wage rate.

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WHICH POLICIES ARE IMPORTANT FOR INDUSTRIALIZATION: THE CASE OF TAIWAN[1]

by

Glenn P. Jenkins and Chun-Yan Kuo

I. INTRODUCTION

The question of whether tax incentives can have a significant impact on industrial investment and economic growth has been a subject of considerable debate.[2] When countries have experienced rapid industrialization and have implemented tax incentives policies, these tax incentives have usually not been implemented in isolation, but rather as part of a concerted governmental effort (usually including administrative, infrastructure, and technical support for the industrialization effort). Determining which tax variables have a greater impact on the demand for investment is an interesting, but extremely difficult task. Even with an econometric analysis or a general equilibrium model, we would have serious difficulties in measuring, in a reliable way, the specific response of the firms to the components of the tax incentive packages.

In this paper, we have a more modest objective. In the context of Taiwan, we attempt to evaluate the relative impact that various tax incentives, trade policies, financing subsidies, and macroeconomic variables (such as the real exchange rate and real wage rate) have on the financial profitability of a given set of investments.

We measure the relative impact of these policy and economic variables on financial returns using an integrated cash flow model of industrial investments. Using such a cash flow model allows us to assess the impact of tax incentives on both the annual cash flow profile of the investment and on its rate of return. This approach can also be used to compare tax factors with other economic variables, which have a potential influence on business decisions. Representative firms from five sectors are used in this analysis. Particular attention will be paid to those sectors which have been actively involved in exporting over time.

The tax incentive policies of Taiwan can be categorized according to the development strategies set out by the government. For the purpose of this analysis, we follow the conventional approach to classification, where five economic development phases are identified over the past 50 years. With the exception of the last phase -- 1991 to present -- which is still running its course, the tax incentives of each of the previous four phases are studied to evaluate their relative impact on the returns on investments.

II. MAJOR BUSINESS TAX INCENTIVES

During the past forty years, many different tax incentives have been used to influence the economic behavior of both individuals and businesses. This paper focuses on business investment. The major tax incentives provided to industries during each of the tax policy phases can be summarized below.[3]

Period A. 1950s: Import Substitution and Export Promotion

During the 1950s, industrial development was just beginning in Taiwan. The basic strategy of the Taiwanese government was to follow an import substitution policy. This policy was reinforced by the desire of the government to reduce its trade deficit through domestic production of importables. The government also started to use tax measures in order to encourage investment in specific sectors. The purposes of major tax measures that were introduced during this phase are listed below:

1. To protect domestic industries and to promote import substitution, tariff rates on imported manufacturing products were raised.

2. In order to increase exports in the world market, the tariffs levied on imported materials used to produce exported goods were rebated.

3. A 10% reduction of business income tax was provided to eligible public utilities, mining and transportation enterprises. Newly established enterprises were given a three-year holiday from the business income tax.

Period B. 1960s: First-Stage Implementation of the Statute for the Encouragement of Investment

The Statute for the Encouragement of Investment (SEI) was enacted in September 1960 and was intended to be in effect for ten years. Two sets of policy instruments were employed. First, tax policies were used to encourage savings, to stimulate investment and to promote exports.[4] Second, administrative procedures were streamlined in order to facilitate the development of industrial land. The major tax incentives provided by this phase of the SEI were as follows:

1. A five year tax holiday was provided to newly established qualified enterprises.

2. A five year tax holiday was also provided on the incremental income resulting from a capital expansion by a qualified enterprise that increased its production by more than 30%.

3. The business income tax paid by a qualified enterprise, including any surcharges, was limited to no more than 18% of its annual taxable income.[5]

4. An amount up to 2% of export sales could be deducted from taxable income. The amount deducted was limited to 25% of the previous year's export sales.

5. Real property purchases were exempt from the deed tax if they were used directly by qualified enterprises for production.

6. A preferential rate of land value tax was provided when the land was used directly for production.

7. Installment payments of custom duties were allowed on the use of imported capital equipment by productive enterprises.

There were other provisions (e.g., exclusion of dividend income from taxation if invested in other enterprises which did not claim tax holiday provisions, a 7% allowance for losses due to foreign exchange rate fluctuations,[6] tax exemption of interest for individuals) that are not considered in this analysis, as they were not directly applicable to the cases evaluated.

Period C. 1970s: Second-Stage Implementation of the SEI

After an evaluation of the first SEI, it was decided that the SEI should be extended for another ten years from 1971 to 1980 with some amendments. For example, a provision for accelerated depreciation was introduced along with the five year tax holiday in order to avoid discrimination against capital-intensive industries. The key amendments included:

1. The five year tax holiday could start one to four years after production and sales began.

2. As an alternative to the five year tax holiday, an accelerated depreciation was provided for newly established qualified enterprises. The useful lives of depreciable assets could be shortened by one third of the normal prescribed years for buildings and by one half for machinery and equipment.[7]

3. A four year tax holiday was provided for a productive enterprise undertaking a capital expansion.

4. The limit on the total of the business income tax and surcharges was raised to 25% (from 18% in the first SEI) of total taxable income.

5. Enterprises that had their shares sold on the open market for the first time were entitled to a 10% reduction of the business income tax for two years if the stocks sold exceeded 20% of the total, and for three years if the percentage was over 30%.

6. The income tax, stamp tax, and deeds tax were suspended from the transaction if an enterprise was approved by the government to merge or consolidate with another business for the purpose of the rationalization of operations or the improvement of management.

7. Production materials and machinery imported into an export-processing zone were exempted from customs duties.

In the area of trade policies, non-tariff barriers were reduced substantially in July 1972 in terms of the number of commodities that could either not be imported at all or could be imported only under strict controls. At the same time, tariff rates for certain commodities were increased.

Period D. 1980s: Third-Stage Implementation of the SEI

By the end of 1980, the government approved the third stage of SEI for another ten years, with the following amendments to the SEI:[8]

1. A qualified enterprise could claim as an investment tax credit from 10% to 15% of the investment made in specified production equipment against its business income tax liability of the current year.

2. Enterprises enjoying a tax holiday or accelerated depreciation had to spend a prescribed percentage of their annual sales on R&D. If the actual spending fell short of the prescribed amount, the firm had to pay the government the shortage for use in R&D. On the other hand, if the actual spending in any one year exceeded the highest amount of such annual expenditure over the past five years, 20% of the excess amount could be credited against its business income tax liability of that year.

3. Energy-saving machinery and equipment could be fully depreciated over a period of two years.

4. Machinery and equipment purchased for pollution control could be fully depreciated over a period of two years. Apparatus imported for R&D in environmental protection was exempt from customs duty.

Period E. 1990s: Enactment of the Statute for Industrial Upgrading

When the SEI expired at the end of 1990, an assessment 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 had distorted investment decisions through their encouragement of specific industries and products. As a result, the SEI was replaced by the Statute for Industrial Upgrading (SIU) from January 1991 to June 1998. The new legislation was function-oriented rather than industry-oriented. The major tax incentives are described below:[9]

1. A company is entitled to a tax credit of 5% to 20% of the amount spent on investment in automated equipment for production and related technologies, pollution-control equipment and related technologies, and expenditures on R&D, manpower training, and the enhancement of product image overseas.

2. A company is entitled to a tax credit of up to 20% of investment spent in less-developed regions.

3. Investments overseas are allowed to set aside a tax-free reserve by a company of up to 20% of the total overseas investment to cover the possible loss of such investment.

4. A non-resident individual or company not permanently established in Taiwan is subject to a 20% tax on dividends from investments approved by the government. No additional personal or business income tax will be applied.

5. A company which engages in a merger or consolidation in order to improve organization and management will be exempt from the stamp and deeds taxes incurred as a result. In addition,

payment of the related land-value increment tax can be deferred until the date of the land title transfer.

Since the SEI was implemented in 1960, tax incentives have been a very popular public policy instrument for investment promotion. This may be seen from the revenue cost of the total tax reductions shown in Table 1. These figures show the benefits received by companies, but by no means represent the impact of tax incentives on their investment decisions.

Generally, the most common tax incentive provisions utilized by businesses are related to income tax. The next most important tax incentive is the business commoditytax credit (i.e., the Multi-Stage Gross Receipt Tax and later the Value-Added Tax (VAT)). In the first half of the study period, the business commodity tax incentives increased more rapidly in importance than did the income tax incentives. The importance of business commodity tax incentives was later reduced and then eliminated when Taiwan introduced a European style VAT system. With the introduction of the VAT, tax credits resulting from the payment of input taxes could no longer be claimed to be a tax incentive to promote export expansion or economic growth, since this feature was already part of the VAT system. In fact, it is questionable if such relief for the sales taxes paid on inputs could be classified as an "incentive", as the absence of the credit would result in a cascading of the tax.

To assess the extent to which various tax incentives in each phase affected the desire to invest, we summarize the tax incentive parameters that will be evaluated in the simulations for the representative firms of different sectors in Appendix 1A, 1B, 1C, 1D and 1E.

In addition to the tax incentives identified above, other tax measures were adopted in order to encourage savings and investment. These included exemptions from personal income tax (e.g., the interest income from savings) and exemptions from business income tax for profits that were re-channeled to finance new investment.

Table 1. Various Tax Reductions Associated with Implementation of the Investment Statute

(millions of current dollars)

	Income Tax		Business			
		As % of	Commodity	Stamp	Other	
Year	Amount	Tax Rev*	Tax	Taxes	Taxes	Total
1961	23.8	2.4	33.5	93.0	0.2	150.5
1962	175.0	21.5	52.7	129.0	43.7	400.4
1963	193.4	25.2	58.6	61.5	0.8	314.3
1964	195.5	17.3	62.7	88.6	1.4	348.2
1965	234.6	17.2	134.1	103.8	17.5	490.0
1966	274.2	21.4	74.3	274.2	18.9	641.6
1967	321.5	23.4	89.3	316.4	19.8	747.0
1968	346.0	19.0	211.8	371.3	18.8	947.9
1969	371.6	14.6	301.9	437.6	9.0	1,120.1
1970	518.4	15.1	387.5	587.2	15.5	1,508.6
1971	609.9	13.5	974.7	976.6	14.4	2,575.6
1972	926.2	14.9	770.8	944.6	22.0	2.663.6
1973	1,231.8	15.9	2,286.8	1,182.0	35.5	4,736.1
1974	3,026.8	22.0	1,679.1	1,628.3	51.9	6,386.1
1975	2,002.7	12.2	3,326.6	1,842.3	63.0	7,234.6
1976	2,805.0	15.3	3,181.8	2,159.5	116.0	8,262.3
1977	2,861.8	12.7	3,080.8	2,660.4	128.9	8,731.9
1978	4,066.7	14.9	3,681.0	2,145.3	48.5	9,941.5
1979	4,702.9	13.2	3,775.9	1,900.8	218.1	10,597.7
1980	5,279.8	11.7	6,871.8	2,375.5	83.8	14,610.9
1981	5,615.9	9.7	6,160.8	2,239.1	322.4	14,338.2
1982	14,963.3	22.8	7,805.2	3,547.2	315.7	26,631.4
1983	10,827.1	16.7	6,993.4	3,027.6	583.3	21,431.4
1984	18,118.3	26.7	10,400.5	3,948.1	873.6	33,340.5
1985	12,626.4	16.6	10,440.9	5,066.0	710.2	28,843.5
1986	18,971.7	23.9	9,436.9	4,271.3	1,913.3**	34,593.2
1987	19,132.8	20.9	591.8	30.1	218.5	19,973.2
1988	24,064.0	19.5	0	0	221.5	24,285.5
1989	35,601.3	22.7	0	0	734.5	36,335.8
1990	31,787.1	14.1	0	0	15,074.9**	46,862.0
1991	41,302.8	21.3	0	0	456.0	41,758.8
1992	40,206.2	18.6	0	0	675.5	40,881.7
1993	35,888.5	15.1	0	0	12.0	35,900.5

Source: Ministry of Finance, Department of Statistics, Yearbook of Financial Statistics of the Republic of China, 1993, (June 1994), Table 68, pp. 262-7.

Notes: *Expressed as a percentage of actual income tax revenues collected.
**Mainly related to the exemption of security transaction tax.

III. KEY MACRO-ECONOMIC VARIABLES

Since 1955, many policy and economic factors have generated tremendous growth in Taiwan's industrial development. With its pro-export policies, the country was able to achieve a rapid growth rate in export sales, employment, and per capita income growth. While the main components of the policy packages for the promotion of exports were income tax incentives, interest rate subsidies, and duty rebates, other major macro-economic variables were also changing. During this period, Taiwan experienced continuously rising real wage rates, and a rising and then falling real exchange rate (expressed as the number of Taiwanese dollars per US dollar). The objectives of this analysis are to determine the relative importance of the various tax incentives and to compare the effects of these policies with those caused by other macro-economic variables.

A. Estimating the Real Exchange Rate

The real exchange rate is a key macro-economic variable affecting firms that engage in export activities. As the domestic currency is depreciated in real terms, exporters receive more domestic currency per unit of foreign exchange earned. This gives them an incentive to produce more goods which can be internationally traded. Over the past 40 years, Taiwan has experienced a variety of exchange rate regimes. Each of these systems has successively become more responsive to market forces.

Before 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 one rate or the other or a combination of both. In March 1955, a system of negotiable exchange certificates was introduced. Essentially, exporters surrendered their foreign exchange earnings to the Bank of Taiwan at a fixed rate and received foreign exchange certificates. The certificates were negotiable and could be traded and purchased by importers at market prices.

On January 13, 1956, commercial banks were permitted to sell exchange certificates on behalf of exporters. The period of validity for exchange certificates was increased from the original 90 to 120 days on August 11, 1956 to 180 days (or 210 days if sold to the Bank of Taiwan) in 1957-58.

The foreign exchange certificate system was extended to apply to all imports and other payments (including government and US aid-financed imports) on July 10, 1960. On October 1, 1963, the foreign exchange control system was modified. The exchange rate versus the US dollar was set at NT$40 buying and NT$40.10 selling. The Taiwanese currency was first re-valued against the US dollar -- NT$37.90 buying and NT$38.10 selling -- on February 16, 1973 and the spread in exchange rates was then reduced to NT$37.95 buying and NT$38.05 selling on December 10, 1974. The Taiwanese dollar was re-valued again on July 11, 1978 at NT$35.95 buying and NT$36.05 selling. At the same time, it was announced that the exchange rate would no longer be aligned with the US dollar in the future.

The foreign exchange policy was relaxed further on February 1, 1979, when it was decided that the Taiwanese dollar would be permitted to float within predetermined limits vis a vis the US dollar. Moreover, any businesses earning foreign exchange were no longer required to surrender their foreign exchange earnings to the Central Bank, but instead were required to open foreign currency passbook accounts. They could draw down these accounts for trade purposes and other payments or trade currencies in the foreign exchange market. The real exchange rate (E_r) is defined as follows:[10]

$$E_r = E_n \cdot (P_w/P_d) \qquad (1)$$

where E_n is the nominal exchange rate expressed in the Taiwanese dollars per US dollar, P_d is the domestic GDP deflator for Taiwan, and P_w is the world price index. 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. These countries include the U.S. (61.5%), Japan (28.4%), Germany (5.2%), and Australia (4.9%). The nominal exchange rates since 1955 can be found in the first column of Table 2. The price indices of Taiwan and the weighted average of

Taiwan's major trading partners are shown in the second and third column of Table 2. These price indices are normalized to 100 in 1976. The real exchange rate index has been calculated and presented in the fourth column for the entire period.

The real exchange rate is the real price of a dollar, reflecting the international purchasing power of the Taiwanese dollar. In other words, the lower the real exchange rate, the greater the appreciation of the Taiwanese dollar and vice versa. One can observe from the fourth column of Table 2 that the real exchange rate depreciated first in 1956, then in 1959, 1965 and 1966. Since then, it generally appreciated, especially since 1985. From 1985 to 1994, the real exchange rate appreciated by almost one-third. By introducing the real exchange rate into the cash flow model, we can assess the impact of real exchange rate movements on the financial rate of return relative to that of the tax incentives implemented during the past four decades.

Since the basic data used in the cash flow model are derived from the 1976 industrial census, the first year's data for each investment project are expressed in 1976 dollars. In order to maintain consistency with the prices of the other variables used in the model, the nominal and the real exchange rates used in year one of the investment analysis completed for a sub-period are converted to NT$38 per US dollar (see Column 5, 6, 7, and 8 of Table 2). For example, the real exchange rate under the sub-period A is NT$38.00 in 1956.

B. Estimating the Real Wage

The real industrial wage paid in Taiwan has been quite variable over the past 50 years. The change in the real wage has had a significant impact on the industrial development in Taiwan, especially in labor-intensive industries. To assess the relative importance of tax incentives versus real wage rate changes, it is helpful to construct a data series for the real wage corresponding to varying development phases and then simulate the cash flow model for each sector (including the actual movement of the real wage) for each of these phases.

Table 2. The Movement of the Real Exchange Rate in Taiwan , 1955-94

Year	Nominal Exchange Rate (NT$/US$) (1)	Taiwan GDP Deflator (1976=100) (2)	Weighted World Price Index (1976=100) (3)	Real Exch. Rate (NT$/US$) (4)	Real Exchange Rate Index Using Different Years As Base* 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	105.86	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.

We use the nominal average monthly earnings of employees in the manufacturing industry as a proxy to reflect the year-to-year movement of nominal wages and salaries for the representative firms under examination. A series of this data is presented in the first column of Table 3. The real wage indices (W_r) can be constructed by dividing the nominal earnings by the consumer price index. This can be expressed as follows:

$$W_r = W_n/P_C \qquad (2)$$

where W_n is the nominal monthly earnings expressed in the Taiwanese dollars and P_C is the consumer price index in Taiwan. These price indices are normalized to 100 in 1976 as presented in the second column. The real monthly earnings in the manufacturing industry are then calculated according to equation (2) and are shown in the third column.

Following the same approach as with the real exchange rate, we can define the real wage index for the first year of each investment project as being equal to unity.[11] For the remaining years, the real wage index is computed by dividing the real monthly earnings for the particular year by the corresponding figure for the first year of each investment project. These results are presented in the last four columns under the heading A, B, C, and D, corresponding to four different tax incentive periods.

The real wage index reflects the year-to-year fluctuation of labor costs in production. One can see that the real industrial wage rose by approximately 25% over the eight year period from 1956 to 1964, or at a compound growth rate of 2.8% per year. The growth in real wages from 1965 to 1973, however, was 69% - for a compound annual growth rate of 6.8%. Between 1971 and 1979, there was a 74% increase in real wages, reflecting a compound growth rate of 7.2%. Again, between 1986 and 1994, real wages rose by almost 70%, or at a compound growth rate of 6.9%. Because of the dramatic increase in real wage growth which began in 1965, exporting firms had to rapidly increase their total factor productivity in order to remain competitive internationally.

Table 3. The Movement of the Real Wage in Taiwan, 1955-94

Year	Nominal Monthly Earnings (NT$) (1)	CPI (2)	Real Monthly Earnings (NT$) (3) (4)	Real Wage Index Using Different Years as Base A (5)	B (6)	C (7)	D
1955	396	26.18	1,513	0.9768			
1956	447	28.85	1,549	1.0000			
1957	465	31.00	1,500	0.9684			
1958	494	32.10	1,538	0.9929			
1959	530	35.24	1,504	0.9709			
1960	625	40.58	1,540	0.9942			
1961	765	42.09	1,818	1.1737			
1962	794	42.40	1,873	1.2092			
1963	827	43.23	1,913	1.2350			
1964	844	43.75	1,929	1.2453	0.9355		
1965	914	44.33	2,062		1.0000		
1966	971	45.22	2,147		1.0412		
1967	1,101	46.75	2,355		1.1421		
1968	1,232	50.43	2,443		1.1848		
1969	1,375	53.00	2,594		1.2580		
1970	1,553	54.90	2,829		1.3720	0.9321	
1971	1,713	56.44	3,035		1.4719	1.0000	
1972	1,990	58.11	3,425		1.6610	1.1285	
1973	2,182	62.76	3,482		1.6887	1.1473	
1974	2,921	92.72	3,150			1.0379	
1975	3,427	97.56	3,513			1.1575	
1976	4,044	100.00	4,044			1.3325	
1977	4,862	107.04	4,542			1.4965	
1978	5,420	113.20	4,788			1.5776	
1979	6,554	124.25	5,275			1.7381	
1980	8,043	147.87	5,439				
1981	9,564	172.02	5,560				
1982	10,467	177.11	5,910				
1983	11,136	179.53	6,203				
1984	12,173	179.47	6,783				
1985	12,697	179.18	7,086				0.9144
1986	13,983	180.44	7,749				1.0000
1987	15,356	181.37	8,467				1.0927
1988	17,012	183.71	9,260				1.1950
1989	19,461	191.80	10,147				1.3095
1990	22,048	199.73	11,039				1.4246
1991	24,469	206.95	11,824				1.5259
1992	26,972	216.20	12,475				1.6099
1993	28,829	222.56	12,953				1.6716
1994	30,727	233.36	13,167				1.6992

Sources: Average monthly earnings of workers in the manufacturing industry are obtained from Directorate-General of Budgets, Accounts & Statistics, Executive Yuan, The Taiwan Economic Indicators, Republic of China, (1963, 1968, 1972, 1984, 1987, 1995).

Notes: The real wage index for each year within a sub-period is calculated by dividing the real wage for that year under Column (3) by the real wage for the first year of that investment project.

C. Measuring the Financial Subsidy

Since 1955, the government has provided subsidized credit intermittently to industrialists who undertake investments in specific sectors. In this paper, we will assess the relative importance of these financial subsidies versus the returns of the investments financed by this credit. From 1960 to 1986, the macroeconomic policy of Taiwan encouraged positive real interest rates on savings deposits. This high interest rate policy led to a high rate of savings available to finance capital formation.

For three decades since the 1950s, the government in Taiwan has used selective credit programs at concessional interest rates to encourage exporters and strategic industries. These enterprises, especially exporters, were eligible to receive preferential loan rates as low as a half of the general market rate.[12] The subsidy on export financing declined gradually until it was terminated in the early 1980s. The government then provided preferential loan rates for capital investment in new strategic industries, for the purchase of automated equipment, pollution-prevention equipment, development of new products, etc. The interest rate subsidy served to reduce the cost of borrowing from 1.75 to 2.75 percentage points below the prime lending rate of commercial banks.

For the purpose of this exercise, we simulate the cash flow model by lowering the cost of borrowing 6.07 percentage points,[13] which would be the greatest subsidy obtainable over the period under examination. The initial debt/equity ratio used in the simulation is 30/70, and it is assumed that the debt will be paid off in five years. This means that the average ratio of debt/equity over the life of the project is somewhat less than 30/70.

IV. EVALUATION OF THE KEY MACRO-ECONOMIC VARIABLES AND TAX INCENTIVES

To evaluate the relative impact of tax incentives on the rate of return, we have constructed cash flow profiles of representative firms and calculated their net present values. These models of the financial and economic return from investments enable us to integrate a

wide range of tax measures, as well as the movement of the real exchange rate, real wages, and real interest rates.

A. Cash Flow Models

The modeling and evaluation of net cash flows is one of the techniques commonly used for appraising capital investment decisions.[14] 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 expressed as annual cash receipts (cash inflows) and annual disbursements (cash outflows). All cash flows are initially estimated in nominal prices and then converted to real prices. The annual nominal net cash flow in year t, (CF_t), from the total investment point of view, is calculated after corporate income taxes have been deducted. It can be expressed as follows:

$$CF_t = R_t - C_t - T_t - CB_t + X_t \qquad (3)$$

where R_t is the total annual cash receipt of the firm, including changes in account receivables; C_t is the annual capital and operating expenditure, considering changes in accounts payable; T_t is the corporate income taxes and other taxes; CB_t is the change in the desired stock cash balances held to facilitate business transactions; and X_t is the residual value of investment, which is treated as a cash inflow in the last year of the project.

Prior to the presentation of simulation results, it may be helpful to point out the fundamental differences between export-oriented and domestic market firms with respect to their cash inflows from sales. Since Taiwan is a small open economy, its tradable products can be sold only at the prevailing international prices. Imposition of a tariff on output would not affect the price of goods sold in international markets and, thus, would have no impact on the cash flow or the rate of return for export-oriented firms. The gross cash inflow per unit of output sold in the international market (R_j^w) will be the world price of the jth product (P_j^w) times the market

exchange rate (E) (translating the world price from the US dollar to the Taiwanese dollar). That is,

$$R_j^w = P_j^w \cdot E \qquad (4)$$

While the import duty on output has no impact on export-oriented enterprises, it could provide a substantial level of protection to producers selling products domestically, if entry into the domestic market by exporting firms is restricted. The gross cash inflow from the sale of a unit of the product in the domestic market (R_j^d) would be increased by the size of tariff rate and can be expressed as follows:

$$R_j^d = P_j^w \cdot E \cdot (1 + t_j) \qquad (5)$$

where τ_j is the rate of tariff imposed on the jth product. By the same token, a tariff on importable inputs will raise the production cost by the amount of import duties, resulting in a lower net present value or a lower rate of return to capital. This holds true whether the inputs are used to produce goods for sale in international markets or in domestic markets.

In this paper, special attention is paid to the calculation of business income tax and other taxes (T_t) because of tax incentives. For example, the magnitude of business income taxes is influenced by the provisions of depreciation expense, interest payments, and other tax incentive measures provided by the government, as mentioned in Section II. Each of these tax variables is modeled according to the applicable tax laws in Taiwan and estimated quantitatively using the investment and industrial data presented in Appendices 1A to 1E.

Since the rate of return on shareholder's equity is a key determinant in the assessment of the viability of a project, the annual net cash flow to total capital is further manipulated to yield the annual net cash flow to equity capital (Cf_t^e) by first adding debt financing and then subtracting interest and principal payments. This can be expressed below:

$$CF_t^e = CF_t + D_t - I_t \qquad (6)$$

where D_t is the amount of debt financing in year t; and I_t is the sum of annual repayment of principal and interest in year t.

CF_t^e is the net return to shareholders in year t. Current dollar net cash flows are deflated to constant dollar net cash flow (CF_t^{e*}) in order to remove the effects of inflation. The constant dollar net cash flow is then discounted by a discount rate (ρ) in order to derive the NPV of the cash flow as of year j as follows:

$$NPV_j = S\,[CF_t^{e*} / (1 + r)^{t-j}] \qquad (7)$$

To evaluate the relative importance of policy and economic variables, we set up a series of cash flow models for a sample of investments in the industrial sectors of Taiwan. These models cover all of the four policy phases in Taiwan that were described in Section II. To begin, we calibrate the level of output in the cash flow model for each of the sub-periods and sectors. With all of components of the corresponding policy packages in place, a minimum real rate of return to equity of 12% (net of tax) is earned by the investment in the exporting branch of the sector. As a real discount rate of 12% is used also to evaluate the net cash flow profiles, the present value of the cash flow, net of tax, generated by the investment will be equal exactly to the present value of the initial investment.

By calibrating the cash flow model in this way for each period, we are being consistent with the actual historical situation in Taiwan. For most of this forty year period, all these sectors were able to compete successfully in the export markets, while at the same time producing for the protected domestic market. In the last 15 years, the pressure put on industry by the growth of wages and the appreciation of the real exchange rate has forced some sectors to retrench or to shift product lines in order to gain the productivity needed to earn a competitive rate of return on investment in this sector. By assuming that the productivity of firms in the export market will

generate at least a competitive rate of return, we conclude that the present value of the income stream from operations net of tax will be at least equal to the cost of the initial investment.

For firms supplying the protected domestic market, we expect to find that the present value of the income stream net of tax would be greater than the initial value of investment, if these firms are as productive as the exporting enterprises. In any event, the difference between the net present value of the net income stream of a domestic supplier and that of an exporter in the same sector reflects the potential rents a firm can receive if the domestic prices are increased by the full amount of the tariffs. For this to happen, entry into the domestic market would have to be restricted in some manner.

Once the cash flow model for the typical exporting firm in a sector is adjusted so that the present value (discounted at 12%) of the future income stream (net of tax) is equal to the present value of the initial investment, the impact of each tax incentive and movement in the real wage rate and real exchange rate can be measured. This can be done by moving the value of each of these variables to their previous, or pre-incentive, values and then evaluating the present value of the new cash flow over the operating life of the project. The difference between the present value of the initial investment expenditures and the present value of this new net cash flow shows the positive or negative impact of the variable over the life of the project.

Which of the following are more important for enhancing the rate of return to exporters - income tax incentives or relief from the indirect and trade taxes on inputs? The models can be used to determine the importance of financial subsidies as policy variables. An estimation is also made of the minimum rate of total productivity increase that must take place in order to maintain the real rate of return on equity while offsetting the increase in the average real wage rate, and in later years, the appreciation of the real exchange rate.

B. Representative Firms

In this paper five cases are presented based on the 1976 Manufacturing Census. These examples include cotton textiles, 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.[15] Furthermore, except for plywood these sectors continued to be important throughout the study period.

For each representative firm, 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.[16] For each new investment, land was 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 were assumed to be imported from abroad. The economic lives of the fixed assets -- machinery and equipment as well as buildings and infrastructure -- were based on the assessment published by the Executive Yuan.[17]

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

The life of each investment project was assumed to be 10 years. The production of each project began in year 2 at 85% of the full capacity and, from year 3, the firm was considered to be operating at full production capacity. Inventories were valued on a first-in-first-out basis. As part of working capital, accounts receivable were assumed to be 15% of gross sales, and accounts payable were considered to be 12.5% of gross input purchases. To facilitate transactions, cash balances were assumed to be 10% of gross sales. By the end of the project, the residual values included the value of land and any undepreciated assets.

The analysis of these cases was carried out in constant prices, measured in terms of the 1976 price level. However, to model the impact of the tax system correctly, we first needed to model the nominal cash flow in a consistent manner and then had to deflate each of the benefit and cost items in order to derive their real values.

To simplify the analysis, we assumed that the annual inflation over the life of the project was 6.8% in Taiwan and 6.1% abroad.[18] These rates corresponded to the average rate of domestic and world inflation, respectively, over the period 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 production costs 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 sub-periods under examination.

The initial debt/equity ratio for each investment was assumed to be 30/70. The nominal market interest rate was measured so as 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%.

Details of these basic project parameters are summarized in Table 4.

Table 4. Basic Investment Project Parameters for Representative Firms

(Figures are Expressed in 1976 Prices)

Categories	Cotton Textiles	Knitted Apparel	Plywood	Televisions	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$)	4.70/m	12.04/pc	5.40/m2	1,049.00/set	419.00/set
Non-tradable Inputs (NT$)	0.60/m	0.55/pc	0.30/m2	20.86/set	6.41/set
Import Content (%)	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

C. Empirical Simulations

We expected to see a significant difference in impact from tax incentives and other economic factors on the profitability of domestic versus exporting firms. The simulations were carried out for both export-oriented and domestic market firms.

1. The Period of Import Substitution and Export Promotion (1955-1964)

The initial value of assets held by an investor can be expressed as the present value of the fixed capital investment plus inventories and other working capital. The figures for the present value of the initial assets in each case are shown in the first row of each investment project in Table 5A. Over the life of the project, the NPV of the asset may be increased or decreased, depending upon the performance of the investment after taking into account all internal and external factors. In the base case for each period, we include in the cash flow model all the effects of the tax incentives, financial assistance received from the government, and changes in the real exchange rate and real wages over the life of the project. In each case, the model is calibrated to generate an NPV of zero, which leaves the initial asset values unchanged. The model is then re-simulated by removing in sequence the financial assistance, tax incentives, changes in real wage, and changes in real exchange rate. The contribution of each factor to the asset value is 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 has been removed. The relative size of the changes in NPV caused by the removal of each of the economic variables will give us an indication of the relative impact of each variable on the incentive to invest.

These incremental NPVs during the period from 1955 to 1964, when policies for simultaneous import-substitution and export promotion were pursued, are presented in Table 5A. One can immediately see a significant contribution from the devaluation of the real exchange rate to the return on investment in this period. The real exchange rate was devalued from NT$28.41/US$ in 1955 to NT$53.62/US$ in 1959, and then appreciated slightly to NT$45.58/US$ in 1964 as a result of the liberalization of the foreign exchange market. The 60% depreciation of the Taiwanese dollar over this period

Table 5A. Contribution of Various Factors to the Initial Asset During the Import Substitution Period (1955-64)

Major Economic Factors	Export-Oriented Firm Amount (NT$000)	Export-Oriented Firm Proportion (%)	Domestic Market Firm Amount (NT$000)	Domestic Market Firm Proportion (%)
Cotton Textiles				
1 Initial Asset Value	25,808	100.00	25,808	100.00
Impact Attributed to:				
2 Real Exchange Rate	6,710	26.00	8,705	33.73
3 Real Wage	(696)	(2.70)	(709)	(2.75)
4 Tax Incentives	1,050	4.07	6,203	24.04
5 Interest Subsidy	774	3.00	757	2.91
Knitted Apparel				
1 Initial Asset Value	8,824	100.00	100.00	
Impact Attributed to:				
2 Real Exchange Rate	12,643	143.28	18,587	210.64
3 Real Wage	(690)	(7.82)	(520)	(5.89)
4 Tax Incentives	11,576	131.19	16,800	190.39
5 Interest Subsidy	149	1.69	144	1.63
Plywood				
1 Initial Asset Value	26,804	100.00	26,804	100.00
Impact Attributed to:				
2 Real Exchange Rate	17,301	64.55	17,549	65.47
3 Real Wage	(1,253)	(4.67)	(943)	(3.52)
4 Tax Incentives	21,799	81.33	31,520	117.59
5 Interest Subsidy	629	2.35	611	2.28
Televisions				
1 Initial Asset Value	18,678	100.00	18,678	100.00
Impact Attributed to:				
2 Real Exchange Rate	39,673	212.40	42,885	229.60
3 Real Wage	(1,781)	(9.54)	(1,336)	(7.15)
4 Tax Incentives	30,387	162.29	0	0
5 Interest Subsidy	326	1.75	316	1.69
Electronics				
1 Initial Asset Value	22,814	100.00	22,814	100.00
Impact Attributed to:				
2 Real Exchange Rate	20,854	91.41	22,114	96.93
3 Real Wage	(1,649)	(7.23)	(1,654)	(7.25)
4 Tax Incentives	8,951	39.23	0	0
5 Interest Subsidy	572	2.51	572	2.51

caused a higher price level of tradable goods relative to non-tradable goods, 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 purchase of tradable inputs used in production. This phenomenon affected producers of all sectors (as shown in the second row of each panel project in Table 5A). The effect of the real exchange rate was especially strong in the knitted apparel, television, and electronics sectors.

A similar, but even stronger, effect of the real exchange rate was evident in domestic market firms, because their annual financial cash flows were also augmented as a result of the depreciation of the real exchange rate by the automatic increase in the size of protective tariffs.

On the other hand, an increase in the real wage rate had an adverse effect on the profitability of business investment. The real wage increased by almost 25% over the life of the project, with the majority of the increase occurring in the last four years of the project.[19] As a result, the impact of the real wage increase on profitability was not as severe as that of the real exchange rate. This can be seen in the third row of each panel project in Table 5A.

The impact of subsidized loans was positive, but did not seem to be significant for all sectors and for all firms, whether they were engaged in international or domestic markets. This is due to the fact that the benefit attributable to reduced interest payments was offset to some extent by the lower deduction of financial charges for income tax purposes. The same conclusions have also been found by other researchers.[20]

Finally, the tax incentives seemed to have a significant effect on business profitability during the 1956-64 period. In this period, there were two important tax measures -- an increase in import duties for manufactured products and a duty rebate on business inputs used in making exported goods (see Table 5B). The first measure would provide a substantial protection to producers selling in the domestic market, as shown in equation (5). For example, the increase in tariff rates on cotton textiles from 30% to 40% in 1955

Table 5B. Contribution of Specific Tax Incentives to asset During the Import Substitution Period

Main Tax Incentives	Export-Oriented Firm Amount (NT$000)	Export-Oriented Firm As % of Asset Value	Domestic Market Firm Amount (NT$000)	Domestic Market Firm As % of Asset Value
Cotton Textiles				
A higher Tariff Rate	-	-	6,203	24.04
Tariff Rebate	1,050	4.07	-	-
Knitted Apparel				
A Higher Tariff Rate	-	-	16,800	190.39
Tariff Rebate	11,576	131.19	-	-
Plywood				
A Higher Tariff Rate	-	-	31,520	117.59
Tariff Rebate	21,799	81.33	-	-
Televisions				
A Higher Tariff Rate	-	-	-	-
Tariff Rebate	30,387	162.29	-	-
Electronics				
A Higher Tariff Rate	-	-	-	-
Tariff Rebate	8,951	-	-	-

raised the NPV of an investment made to supply the domestic market by 24.04% of its initial asset value. Similarly, the increase in the tariff rate on apparel products from 70% to 85% raised the NPV of the net cash flow by 190.39% of its initial asset value. For plywood, the tariff policies also generated an increase in cash flow, yielding an NPV of 117.59% of its initial asset value.

The second measure--the duty rebate program for tariffs on imported inputs--was designed to promote exports. The program was very effective. The rebate raised the initial asset value by more than 131.19% for the export-oriented knitted apparel sector. Without the duty rebate scheme, it would have been very difficult to export profitably. A similar impact is observed for capital investment in the plywood and television sectors. For textiles, the impact was not as significant as for plywood and television, because the rate of duty on inputs was smaller (15%). Nevertheless, the duty rebate raised the initial asset value by 4.07%. The effect of duty rebates of tariffs on inputs is determined by the size of the import content of intermediate inputs and the rate of tariffs imposed on these inputs. No rebate is received on domestically purchased inputs whose price has been raised as a consequence of a tariff. It is clear that had the duty rebate system not been implemented, the export promotion program would have been much less effective. It should be noted that during this period imported production machinery and equipment remained dutiable, even when used to produce goods for exports.

In this analysis we assume that the duty rebate or duty drawback scheme worked at full capacity. This is, however, almost never the case. Duty drawback systems are usually cumbersome, complex, and fraught with delay.

Export promotion was assisted by the depreciation of the Taiwanese dollar in 1959 as a result of the market-based exchange rate policy.[21] The prevailing macroeconomic policy created a flexible and stable environment for the business community. According to the Ministry of Finance statistics, the amount of customs duty rebates associated with exports increased from NT$17 million in 1955 to more than NT$23.6 billion in 1980. The percentage of duty refunds and exemptions rose from 2.3% of total customs duties in 1955 to more than 86.1% in 1972 and then declined to 41.5% in 1980.[22]

In summary, the government adopted two very important tax measures during this period. On the one hand, an increase in import duties for manufactured products protected producers supplying domestic markets from international competition. On the other hand, the duty rebate program (combined with a depreciation of the local currency), enabled the export-oriented enterprises to develop markets internationally.

2. First-Stage Investment Statute (1964-1973)

By the end of 1960, the government recognized that the size of the domestic market limited the growth of the industrial sector; hence, it shifted its industrial policy focus from import substitution to the promotion of export-oriented activities. The earlier devaluation of the currency and promotion of exports became part of the general macroeconomic policy. Real wages also started to rise rapidly.

Duty exemption was provided to imported machinery and equipment in order to stimulate domestic production and industrialization in general. The government also made use of a series of tax incentives in an effort to encourage savings for investment and to promote export expansion.

The cash flow model developed above was employed again to assess the relative importance of these economic variables in influencing the movement toward industrialization in Taiwan. After 1960, the Taiwanese 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 a lower cost of tradable inputs acquired for production. Table 6A shows that the lower real exchange rate during this period had a considerable adverse effect on export-oriented firms in all sectors. For example, the lower real exchange rate reduced the value of an investment in the knitted apparel industry by almost 79%. For the television sector, the effect was greater. This negative effect was even stronger for firms engaged exclusively in producing for the domestic markets, since tradable products sold domestically could only be sold at a lower price (expressed in Taiwanese dollars), due to the lower real exchange rate.

Real wages in Taiwan increased by almost 70% in the manufacturing industry over the period from 1965 to 1974. The adverse effect on business performance was substantial in all sectors, as shown in the third row in Table 6A. This effect, however, was not as severe as the impact of the appreciation of the real exchange rate.

In relative terms, the interest rate subsidy had only a marginal impact on the return on investment. But the combined package of policies in the first stage of the Statute for the Encouragement of Investment made a significant contribution to the private after tax rate of return. Among the five sectors under examination, the export-oriented television and knitted apparel industries benefited the most. Their initial asset values increased by 125.16% and 72.74%, respectively.

Among firms selling to the domestic market, the tax incentives provided in this period made a significant contribution to the financial value of investment in the electronics industry, but only a modest contribution to the rest of the sectors examined (ranging from 7.09% of the initial asset values in the knitted apparel sector to 34.57% in the plywood sector).

Simulating the effect of each tax incentive measure provided to businesses offers valuable insights. The results are presented in Table 6B. The five year tax holiday appeared to have a modest effect on firms if they were fully devoted to international markets. Since a business can only receive the business income tax exemption for five years from the date of inception of business, these newly established enterprises did not generate enough profit or positive taxable income in the early years of the business. They therefore failed to make full use of the tax incentives. However, this tax holiday had a tremendous effect on the financial profitability of firms exclusively engaged in domestic markets because high tariff barriers raised the prices of the product sold and made the domestic enterprises quickly profitable. As a result, the policy prevented competition from abroad and enabled firms to generate substantial profits.

From Table 6B, we also observe that the provision allowing for a deduction of 2% of annual export earnings from taxable income provided an additional, although modest, incentive to export promotion. Likewise, the exemption of duty on machinery and equipment provided a small positive impact for all firms whether they were engaged in domestic or international

markets, due to front-end cost savings. The impact attributable to a lower deed tax was marginal, because it was a one-time benefit and the magnitude of the incentive was small.

The most important tax incentive during this period came from external trade policies. The 20% reduction of tariff rates (from 50% to 40%) imposed on materials used in the knitted apparel, the 40% reduction (from 25% to 15%) for the inputs to the television and the 11% reduction (from 18.5% to 16.5%) for the inputs to the electronics sectors, lowered their total production costs considerably and increased the net cash flow to investors. On the other hand, the increase in the tariff rate on materials used in the production of the textiles industry (from 15% to 20%) reduced the rate of effective protection.

Export processing zones were first established in Kaohsiung in December 1966 and subsequently expanded to Nantze in January 1969 and Taichung in August 1969. Imports were duty-free and products were shipped abroad directly. Materials and other tradable inputs used in the processing zone would most likely be imported because they were duty free, and the trade administration in these zones operated relatively efficiently. Most of the firms were in the electronics, textiles and apparel, and plastic products sectors. The investment, employment, and annual exports from the zones grew rapidly and contributed to the expansion of the Taiwanese economy.

Table 6B shows that the lower customs duty imposed on output in the television sector reduced domestic protection and had a negative impact on the financial net cash flows (equal to a net present value of $38.4 million). This effect was offset by the benefits -- $31.7 million-- gained through the lower tariff on materials used in the production. A similar, but reverse, case can be found in the cotton textile sector. In this case, a higher tariff rate imposed on imports of final products raised the level of protection, while the higher tariff on materials increased the cost of production and reduced the level of protection.

Table 6A. Contribution of Various Factors to Asset During the First SEI Period (1964-73)

Major Economic Factors	Export-Oriented Firm Amount (NT$000)	Export-Oriented Firm Proportion (%)	Domestic Market Firm Amount (NT$000)	Domestic Market Firm Proportion (%)
Cotton Textiles				
1 Initial Asset Value	24,974	100.00	24,974	100.00
Impact Attributed				
2 Real Exchange Rate	(5,090)	(20.38)	(7,296)	(29.21)
3 Real Wage	(3,404)	(13.63)	(3,389)	(13.57)
4 Tax Incentives	1,469	5.88	7,974	31.93
5 Interest Subsidy	1,045	4.18	1,045	4.18
Knitted Apparel				
1 Initial Asset Value	9,072	100.00	9,072	100.00
Impact Attributed to:				
2 Real Exchange Rate	(7,139)	(78.69)	(14,923)	(164.50)
3 Real Wage	(2,368)	(26.10)	(2,287)	(25.21)
4 Tax Incentives	6,599	72.74	643	7.09
5 Interest Subsidy	201	2.08	201	2.22
Plywood				
1 Initial Asset Value	27,333	100.00	27,333	100.00
Impact Attributed to:				
2 Real Exchange Rate	(10,730)	(39.26)	(16,080)	(58.83)
3 Real Wage	(4,258)	(15.58)	(4,258)	(15.58)
4 Tax Incentives	2,998	10.97	9,449	34.57
5 Interest Subsidy	852	3.12	852	3.12
Televisions				
1 Initial Asset Value	20,496	100.00	20,496	100.00
Impact Attributed to:				
2 Real Exchange Rate	(23,222)	(113.30)	(31,250)	(152.47)
3 Real Wage	(7,143)	(34.85)	(5,881)	(28.69)
4 Tax Incentives	25,652	125.16	3,437	16.77
5 Interest Subsidy	451	2.20	441	2.15
Electronics				
1 Initial Asset Value	23,873	100.00	23,873	100.00
Impact Attributed to:				
2 Real Exchange Rate	(13,929)	(58.35)	(17,291)	(72.43)
3 Real Wage	(7,289)	(30.53)	(7,287)	(30.52)
4 Tax Incentives	4,685	19.62	21,984	92.09
5 Interest Subsidy	772	3.23	772	3.23

Table 6B. Contribution of Specific Tax Incentives to Asset During First SEI Period (1964-73)

Main Tax Incentives	Export-Oriented Firm Amount (NT$000)	Export-Oriented Firm As % of Asset Value	Domestic Market Firm Amount (NT$000)	Domestic Market Firm As % of Asset Value
Cotton Textiles				
Total Net Impact	1,469	5.88	7,974	31.93
Impact Attributed to:				
Tax Holiday	510	2.04	4,291	17.18
2% Income Tax Ded. for Export Sale	251	1.01	0	0
Exemption of Duty on M&E	1,477	5.91	1,470	5.89
Lower Deed Tax	71	0.28	69	0.28
Higher Duty Rate on Output	0	0	3,261	13.06
Higher Duty Rate on Materials	(840)	3.36	(1,117)	(4.47)
Knitted Apparel				
Total Net Impact	6,599	72.74	643	7.09
Impact Attributed to:				
Tax Holiday	442	4.87	9,595	105.76
2% Income Tax Ded. for Export Sale	515	5.68	0	0
Exemption of Duty on M&E	366	4.03	366	4.03
Lower Deed Tax	15	0.17	15	0.17
Lower Duty Rate on Output	0	0	(16,680)	(183.86)
Lower Duty Rate on Materials	5,261	57.99	7,347	80.99
Plywood				
Total Net Impact	2,998	10.97	9,449	34.57
Impact Attributed to:				
Tax Holiday	971	3.55	8,393	30.71
2% Income Tax Ded. for Export Sale	971	3.55	0	0
Exemption of Duty on M&E	945	3.46	945	3.46
Lower Deed Tax	111	0.41	111	0.41
Televisions				
Total Net Impact	25,652	125.16	3,437	16.77
Impact Attributed to:				
Tax Holiday	774	3.78	9,721	47.43
2% Income Tax Ded. for Export Sale	1,634	7.97	0	0
Exemption of Duty on M&E	456	2.22	456	2.22
Lower Deed Tax	45	0.22	45	0.22
Lower Duty Rate on Output	0	0	(38,446)	(187.58)
Lower Duty Rate on Materials	22,743	110.96	31,661	154.47
Electronics				
Total Net Impact	4,685	19.62	21,984	92.09
Impact Attributed to:				
Tax Holiday	823	3.45	7,390	30.96
2% Income Tax Ded. for Export Sale	995	4.17	0	0
Exemption of Duty on M&E	1,016	4.26	1,016	4.26
Lower Deed Tax	55	0.23	56	0.23
higher Duty Rate on Output	0	0	10,764	45.09
Lower Duty Rate on Materials	1,796	7.52	2,758	11.55

3. Second-Stage Investment Statute (1970-1979)

After reviewing the investment statutes, the government decided to amend them. Key changes included the modification of the starting point of the five-year income tax holiday from the date that the enterprise began business to the date on which it actually began production. A provision for accelerated depreciation was also introduced. The import tariff rates were also increased, with the exception of duties imposed on electronics products and business inputs used in the plywood industry.

We use the same cash flow model developed earlier to assess the relative importance of key economic variables affecting the financial profitability of these industries. The results are presented in Table 7A. The appreciation of the Taiwanese dollar had a large negative effect on the financial performance of all the tradable goods-produced sectors, as it did during the administration of the first SEI.

The increase of almost 74% in real wages over this period also had an adverse effect on business. Its effect, however, was not as severe as that caused by the appreciation of the domestic currency. The impact of the interest subsidy on loans was positive, was not large enough to be a decisive factor in business decisions. Lastly, the simulation results presented in Table 7A give mixed signals with respect to the impact of the tax measures introduced in the amended SEI.

An analysis of the impact of the set of tax measures shown in Table 7B highlights other factors. The modified five-year income tax holiday, along with the amended accelerated depreciation, provided a good incentive to investments in firms selling to the domestic market. These firms were protected from foreign competition, were able to earn considerable profits, and could utilize fully the five-year tax holiday provision. For those engaged in export-oriented enterprises, the measure had a positive, but only marginal, effect.

Table 7A. Contribution of Various Factors to the Initial Asset During the Second SEI Period (1970-79)

Major Economic Factors	Export-Oriented Firm Amount (NT$000)	Export-Oriented Firm Proportion (%)	Domestic Market Firm Amount (NT$000)	Domestic Market Firm Proportion (%)
Cotton Textiles				
1 Initial Asset Value	25,043	100.00	25,043	100.00
Impact Attributed to:				
2 Real Exchange Rate	(7,837)	(31.29)	(11,692)	(46.69)
3 Real Wage	(2,724)	(10.88)	(2,718)	(10.85)
4 Tax Incentives	(526)	(2.10)	38,224	152.63
5 Interest Subsidy	1,087	4.34	1,088	4.34
Knitted Apparel				
1 Initial Asset Value	10,071	100.00	10,071	100.00
Impact Attributed to:				
2 Real Exchange Rate	(12,936)	(128.45)	(23,928)	(237.59)
3 Real Wage	(1,832)	(18.19)	(1,833)	(18.20)
4 Tax Incentives	(13,504)	(134.09)	24,644	244.70
5 Interest Subsidy	209	2.08	209	2.08
Plywood				
1 Initial Asset Value	26,464	100.00	26,464	100.00
Impact Attributed to:				
2 Real Exchange Rate	(15,370)	(58.08)	(23,076)	(87.20)
3 Real Wage	(2,671)	(10.09)	(2,670)	(10.09)
4 Tax Incentives	9,779	36.95	52,185	197.19
5 Interest Subsidy	886	3.35	885	3.34
Televisions				
1 Initial Asset Value	22,546	100.00	22,546	100.00
Impact Attributed to:				
2 Real Exchange Rate	(40,036)	(177.57)	(53,274)	(236.29)
3 Real Wage	(4,719)	(20.93)	(4,718)	(20.93)
4 Tax Incentives	(27,441)	(121.71)	31,349	139.04
5 Interest Subsidy	463	2.05	459	2.04
Electronics				
1 Initial Asset Value	24,188	100.00	24,188	100.00
Impact Attributed to:				
2 Real Exchange Rate	(22,254)	(92.00)	(30,737)	(127.08)
3 Real Wage	(5,849)	(24.18)	(5,849)	(24.18)
4 Tax Incentives	(808)	(3.34)	(10,060)	(41.59)
5 Interest Subsidy	804	3.32	804	3.32

Table 7B. Contribution of Specific Tax Incentives to Asset During the Second SEI Period (1970-79)

Main Tax Incentives	Export-Oriented Firm Amount (NT$000)	Export-Oriented Firm As % of Asset Value	Domestic Market Firm Amount (NT$000)	Domestic Market Firm As % of Asset Value
Cotton Textiles				
Total Net Impact	(526)	(2.10)	38,224	152.63
Impact Attributed to:				
Tax Holiday or Accelerated Depreciation	906	3.62	6,969	27.83
Higher Duty Rate on Output	0	0	33,291	132.94
Higher Duty Rate on Materials	(1,432)	(5.72)	(2,036)	(8.13)
Knitted Apparel				
Total Net Impact	(13,504)	(134.09)	24,644	244.70
Impact Attributed to:				
Tax Holiday or Accelerated Depreciation	327	3.25	11,058	109.80
Higher Duty Rate on Output	0	0	33,210	329.76
Higher Duty Rate on Materials	(13,831)	(137.33)	(19,624)	(194.86)
Plywood				
Total Net Impact	9,779	36.95	52,185	197.19
Impact Attributed to:				
Tax Holiday or Accelerated Depreciation	986	3.73	9,584	36.22
Higher Duty Rate on Output	0	0	23,468	88.68
Lower Duty Rate on Materials	8,793	33.23	19,133	72.30
Televisions				
Total Net Impact	(27,441)	(121.71)	31,349	139.04
Impact Attributed to:				
Tax Holiday or Accelerated Depreciation	165	0.73	11,675	51.78
Higher Duty Rate on Output	0	0	61,495	272.75
Higher Duty Rate on Materials	(27,606)	(122.44)	(41,821)	(185.49)
Electronics				
Total Net Impact	(808)	(3.34)	(10,060)	(41.59)
Impact Attributed to:				
Tax Holiday or Accelerated Depreciation	674	2.79	4,636	19.17
Lower Duty Rate on Output	0	0	(12,419)	(51.34)
Higher Duty Rate on Materials	(1,482)	(6.13)	(2,277)	(9.41)

The trade policy of raising import tariff rates on manufactured products sold in the domestic market substantially increased the net cash flow to the investment in domestic manufacturing. This was particularly true in the television, textiles and apparel sectors, where the initial asset values increased by more than 272.75%, 132.94% and 329.76%, respectively. On the other hand, the higher import tariff rate levied on materials reduced their value by 185.49%, 8.13% and 194.86% of the value of investment and substantially offset the incentive provided on the output side. In the plywood sector, a higher tariff rate on output together with a lower rate on tradable inputs, contributed significantly to the value of the firm's financial cash flow. A reverse trend was found to be true in the electronics industry. Table 7B shows that the increase in tariff rates imposed on materials had a major negative effect on exported-oriented firms, because the measure raised the overall cost of production. It should be noted that tradable inputs, if purchased domestically, were not entitled to the duty rebate. This can be seen in the textile, apparel, television and electronics sectors, where imports accounted for 30% to 55% of tradable inputs. This was not the case, however, for the plywood sector, in which the tariff rate was reduced from 25% to 13%, resulting in an increase in net cash flow equal to 33.23% of the initial asset value.

4. Third-Stage Investment Statute (1985-1994)

In this section, we present the simulation results obtained for key economic factors, focusing in greater detail on each of the tax incentives amended under the third SEI. As a result of the rapid growth of export earnings and the trade surplus enjoyed by Taiwan, the Taiwanese currency appreciated much faster during this third period than during the previous two periods. Table 8A shows that the greater than 25% decline in the real exchange rate over the period from 1986 to the present had by far the greatest impact on business performance. Likewise, the 70% increase in the real wage had a negative but smaller effect (10% to 20% of the impact caused by the movement in the real exchange rate).

While keeping most of the tax incentives in place, the amendments in the third-stage implementation of the SEI were made mainly to create an investment tax credit and to liberalize trade. The results from the model simulations show that the value of the investment tax credit was marginal, while the tariff policies appeared to be the most important element affecting the

change in the profitability of investment for a newly established enterprise during the period in question. Details are presented in Table 8B.

The first major liberalization of domestic trade in Taiwan took place in 1984. Customs duty rates were reduced considerably thereafter. The substantial cut in import duties on finished products reduced the protection for import-competitive firms, making a significant negative contribution to the financial cash flow of enterprises selling to the domestic market. This can be seen from the second column of Table 8B. For example, a reduction in the tariff rate on plywood from 46% to 15% lowered the initial value of the asset by more than 262.21% over the period of investment. This negative effect was offset somewhat by a reduction in the tariff rates (from 13% to 1.25%) imposed on tradable inputs used for production. The net effect was negative, at approximately 186.20% of the initial asset values. It is clear that at this point the industrial policy was no longer willing to support the domestically-oriented plywood sector. On the contrary, for the television and electronics sectors, the higher import duty imposed on output increased domestic protection and had a positive effect on financial cash flow. This effect was further reinforced by the lower customs duty on tradable materials used in production. While the import duty on output had no impact on export-oriented enterprises, the general reduction of tariff rates on tradable inputs reduced the cost of production and increase competitiveness abroad. This measure clearly provided a stimulus to investment for firms oriented toward international markets. It should be noted that the average effective tariff rate in Taiwan was substantially reduced to 26.5% in 1985, 9.6% in 1990, 8.9% in 1993, and 4.5 in 1995.

Table 8A. Contribution of Various Factors to the Initial Asset During the third SEI Period (1985-94)

Major Economic Factors	Export-Oriented Firm Amount (NT$000)	Export-Oriented Firm Proportion (%)	Domestic Market Firm Amount (NT$000)	Domestic Market Firm Proportion (%)
Cotton Textiles				
1 Initial Asset Value	24,967	100.00	24,967	100.00
Impact Attributed to:				
2 Real Exchange Rate	(21,016)	(84.18)	(43,238)	(173.18)
3 Real Wage	(5,263)	(21.08)	(5,262)	(21.08)
4 Tax Incentives	(2,159)	(8.65)	(27,955)	(111.97)
5 Interest Subsidy	1,087	4.35	1,087	4.35
Knitted Apparel				
1 Initial Asset Value	8,733	100.00	8,733	100.00
Impact Attributed to:				
2 Real Exchange Rate	(29,513)	(337.95)	(64,526)	(738.88)
3 Real Wage	(3,738)	(42.80)	(3,542)	(40.56)
4 Tax Incentives	14,294	163.68	(23,854)	(237.15)
5 Interest Subsidy	209	2.39	210	2.40
Plywood				
1 Initial Asset Value	24,996	100.00	24,996	100.00
Impact Attributed to:				
2 Real Exchange Rate	(40,313)	(161.28)	(68,440)	(273.80)
3 Real Wage	(6,416)	(25.67)	(6,416)	(25.67)
4 Tax Incentives	8,379	33.52	(46,918)	(187.70)
5 Interest Subsidy	885	3.54	885	3.54
Televisions				
1 Initial Asset Value	20,587	100.00	20,587	100.00
Impact Attributed to:				
2 Real Exchange Rate	(101,587)	(493.45)	(143,920)	(699.08)
3 Real Wage	(9,633)	(46.79)	(9,150)	(44.45)
4 Tax Incentives	16,576	80.52	77,100	374.51
5 Interest Subsidy	42	2.05	420	2.04
Electronics				
1 Initial Asset Value	23,620	100.00	23,620	100.00
Impact Attributed to:				
2 Real Exchange Rate	(60,161)	(254.70)	(74,409)	(315.03)
3 Real Wage	(11,336)	47.99)	(11,337)	(48.00)
4 Tax Incentives	2,992	12.67	53,186	225.18
5 Interest Subsidy	735	3.11	735	3.11

Table 8B. Contribution of Specific Tax Incentives to Asset During the Third SEI Period (1985-94)

Main Tax Incentives	Export-Oriented Firm Amount (NT$000)	Export-Oriented Firm As % of Asset Value	Domestic Market Firm Amount (NT$000)	Domestic Market Firm As % of Asset Value
Cotton Textiles				
Total Net Impact	(2,159)	(8.65)	(27,955)	(111.97)
Impact Attributed to:				
Lower Duty Rate on Output	0	0	(24,581)	(98.45)
Higher Duty Rate on Materials	(2,159)	(8.65)	(3,070)	(12.30)
Change from MGRT to VAT	0	0	(304)	(1.22)
Knitted Apparel				
Total Net Impact	14,291	63.68	(23,854)	(237.15)
Impact Attributed to:				
Lower Duty Rate on Output	0	0	(43,115)	(493.70)
Lower Duty Rate on Material	14,294	163.68	19,756	226.22
Change from MGRT to VAT	0	0	(495)	(5.67)
Plywood				
Total Net Impact	8,379	33.52	(46,918)	(187.70)
Impact Attributed to:				
Lower Duty Rate on Output	0	0	(65,543)	(262.21)
Lower Duty Rate on Materials	8,379	33.52	19,000	76.01
Change from MGRT to VAT	0	0	(628)	(2.51)
Televisions				
Total Net Impact	16,576	80.52	77,100	374.51
Impact Attributed to:				
Higher Duty Rate on Output	0	0	53,640	260.55
Lower Duty Rate on Materials	16,576	80.52	24,635	119.66
Change from MGRT to VAT	0	0	(1,175)	(5.71)
Electronics				
Total Net Impact	2,992	12.67	53,186	225.18
Impact Attributed to:				
Higher Duty Rate on Output	0	0	49,172	208.18
Lower Duty Rate on Materials	2,992	12.67	4,598	19.47
Change from MGRT to VAT	0	0	(584)	(2.47)

5. Summary

The above simulation results have demonstrated that tax incentives played an important role in the industrial policies of Taiwan. But often the relative impacts of the different instruments are surprising. The most important instruments were the external tariff policies and export rebates used in the early stage of export promotion, rather than the incentive policies related to income taxes. The 5-year tax holiday provision provided an incentive to profitable companies selling to the domestic market, but did little for export-oriented firms. The interest subsidy might have been helpful, but was not a significant factor compared to other tax, trade, real wage or exchange rate effects.

A sound macroeconomic policy was one of the most crucial programs implemented in Taiwan. In the latter part of 1950s, the exchange rate was unified and the Taiwanese dollar depreciated. At the initial stages this was probably the most effective instrument in promoting export lead industrialization. As a result of rapid economic growth in productivity in the tradable goods sector along with a lack of similar productivity growth in the domestic sectors, the real exchange rate started to appreciate. This macroeconomic phenomenon became one of the most important obstacles faced by businesses in expanding their growth in exports. To a lesser extent, the increase in real wages also placed pressure on exporters in their effort to remain competitive in international markets.

V. EVALUATION OF PRODUCTIVITY INCREASES NEEDED TO OFFSET INCREASES IN REAL WAGES AND CURRENCY APPRECIATION

As discussed earlier, the appreciation of the real exchange rate and the rise in real wages both put considerable pressure on businesses to remain competitive in international markets during the past 30 years. Yet the economy in Taiwan has continued to be one of the fastest growing in the world.

In this section, we calculate the minimum percentage increase in productivity required in order to maintain the same rate of return net of tax. To make this estimation, we first calibrate

the cash flow model as before for exporting firms, but remove the movements of both the real exchange rate and the real wage. We then multiply the annual output and associated business inputs by an adjustment factor in order to generate the same present value of the cash flow as in the initial calibrated model. The third step is to calculate the inverse of the above factor of the annual output and then to calculate the difference between this value and unity. This is a measure of the minimum increase in productivity required in order to maintain the initial value of the investment over time.

Table 5A shows that during the period of import substitution and export promotion, the movement of the real exchange rate and the real wage made a positive contribution to the present value of the cash flows of these industries. Hence, no productivity increase was required to compensate for the changes in these parameter values. The positive effect of the devaluation in the real exchange rate outweighed the negative effect of the rising real wage.

The first column of Table 9 presents the proportion of the annual output of the base case that would have required the earning of 12% of the real rate of return to equity capital or the maintenance of the initial asset value if there had been no real wage increase or appreciation in the value of the domestic currency. For example, if, during the first SEI period, the effects of the changes in the real exchange rate and real wage had been removed, the representative firms in the textile industry would have needed to produce only approximately 80% of the output from the same investment in order to earn a 12% rate of return. In other words, the firms must have had to increase their average level of productivity by 25% in order to earn the targeted 12% real rate of return to equity (see Table 9, Column 2).

As the economy moved from the 1960's into the 1970's the pressure put on these exporting sectors by the movement of real wages and the real exchange rate increased. In the 1980's, however, the pace accelerated. For example, in the case of knitted apparel, televisions and electronics during the late 1980's, the average level of productivity of capital and labor in these sectors would have to have been 178% , 241% and 102% higher, respectively, than they were during the 1970's in order to achieve the same rate of return on their investment.

In some cases, the firms could not achieve this rate of productivity growth and chose to move their operations offshore. During this period, a number of new high technology industries were developed that grew rapidly and took over the lead in exports that had been held by other more labor-intensive traditional sectors.

Table 9. Required Increase in Productivity by Sectors to Maintain Same Rate of Return (percentage)

	Proportion of Output Required	Required Productivity Increase
During the First SEI Period (1965-74)		
Cotton Textiles	80.00	25.00
Knitted Apparel	62.90	59.00
Plywood	74.00	35.10
Televisions	58.00	72.40
Electronics	74.20	34.70
During the Second SEI Period (1970-79)		
Cotton Textiles	78.10	28.00
Knitted Apparel	54.00	85.20
Plywood	70.00	42.90
Televisions	49.00	104.10
Electronics	69.50	43.90
During the Third SEI Period (1985-94)		
Cotton Textiles	60.50	65.30
Knitted Apparel	36.00	177.80
Plywood	49.50	102.00
Televisions	29.30	241.30
Electronics	49.40	102.40

VI. CONCLUSIONS

In this paper we have set out to analyze the effects of the major tax, trade, wage and exchange rate variables over the period from 1955 to the 1990's on the returns to investment for selected sectors. The analysis is carried out in an integrated manner in which the movements of all the variables are allowed to interact with each other.

One objective of this analysis is to determine the relative importance of the various tax, trade, and financial policies on the profitability of firms producing goods for export and of firms supplying domestic consumers with the same products. It is a popular belief that the most important tax based policies are those delivered through the income tax, such as tax holidays, investment tax credits, export sales-based income tax credits and accelerated depreciation. Reality is quite different. It is the duty remission (drawback or exemption) programs that are by far the most important policy measures for the exporting firms. The income tax based incentives are much more important for firms selling to domestic consumers.

Interest rate subsidies for export investment finance are another popular incentive policy to promote exports. Our results indicate that their actual impact on the overall rate of return on the project is marginal.

The movements of the real wage rates paid to industrial labor, especially since 1965, have had a major impact on the financial return to the investments in the sectors studied here. In most cases the negative impact of real wage growth alone more than offset the positive impacts of all the incentives provided through the domestic income and sales tax systems.

The devaluation of the Taiwanese dollar in 1956 was a critical turning point in the industrial development strategy of Taiwan. For the next decade, devaluation was the dominant policy variable that enhanced the profitability of the export sector investments. For the next three decades, the steady appreciation of the Taiwanese dollar was a key variable in the determination of the return to investments in the export sector. A rapid rate of total productivity growth was required in order to maintain the existing level of profitability in these export-oriented industries.

This process accelerated during the 1980's. In summary, we have found that trade and macro-economic policies are much more important than income tax policies or subsidized finance policies in the determination of successful industrialization policies. Furthermore, we conclude that the effects of the latter policies are minor in comparison with the impact of the growth of the real wage rates and the movement of the real exchange rate.

Appendix 1A

Tax Parameters for the Cotton Textiles Sector

Reference Year*	Import Substitution 1956		1st Stage SEI 1965		2nd Stage SEI 1971		3rd 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	20-50	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)	0.264		0.443		0.564		1.805	
Depreciation/ Life for Tax Purposes (yrs)(1)								
M & E	10		10		5		5	
Building	30		30		20		20	
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	
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	
Commodity Taxes								
Sales Tax or VAT (%)	0.60		0.60		0.60		5.00	
VAT	No		No		No		Yes	

Notes: (1) The method of calculating depreciation is fixed percentage of diminishing book value method.
(2) As % of land value.
(3) As % of building and infrastructure.
*Reference year refers to the year the system applied.

Appendix 1B

Tax Parameters for the Knitted Apparel Sector

	Import Substitution		1st Stage SEI		2nd Stage SEI		3rd Stage SEI	
Reference Year*	1956		1965		1971		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	20-50	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)	0.264		0.443		0.564		1.805	
Depreciation/ Life for Tax Purposes (yrs)(1)								
M & E	14		14		5		5	
Building	30		30		20		20	
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	
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	
Commodity Taxes								
Sales Tax or VAT (%)	0.60		0.60		0.60		5.00	
VAT	No		No		No		yes	

Notes: (1) The method of calculating depreciation is fixed percentage of diminishing book value method.
(2) As % of land value.
(3) As % of building and infrastructure.
* Reference year refers to the year the tax system applied.

Appendix 1C

Tax Parameters for the Plywood Sector

Reference Year*	Import Substitution 1956		1st Stage SEI 1965		2nd Stage SEI 1971		3rd 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	20-50	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)	0.264		0.443		0.564		1.805	
Depreciation/ Life for Tax Purposes (yrs)(1)								
M & E	12		12		5		5	
Building	30		30		20		20	
Tax Holiday	No		Yes		Yes		Yes	
Property Taxes (%)								
Land Value Tax(2)	1.50		1.50		1.50		1.0	
Deed Tax(2)								
House Tax(3)	7.50		3.75		3.75		3.75	
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	
Commodity Taxes								
Sales Tax or VAT (%)	0.60		0.60		0.60		5.00	
VAT	No		No		No		Yes	

Notes: (1) The method of calculating depreciation is fixed percentage of diminishing book value method.
(2) As % of land value.
(3) As % of building and infrastructure.
* Reference year refers to the year the tax system applied

Appendix 1D

Tax Parameters for the Televisions Sector

Reference Year*	Import Substitution 1956		1st Stage SEI 1965		2nd Stage SEI 1971		3rd 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	20-50	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)	0.264		0.443		0.564		1.805	
Depreciation/ Life for Tax Purposes (yrs)(1)								
M & E	10		10		5		5	
Building	30		30		20		20	
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	
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	
Commodity Taxes								
Sales Tax or VAT (%)	0.60		0.60		0.60		5.00	
VAT	No		No		No		Yes	

Notes: (1) The method of calculating depreciation is fixed percentage of diminishing book value method.
(2) As % of land value.
(3) As % of building and infrastructure.
* Reference year refers to the year the tax system applied.

Appendix 1E

Tax Parameters for the Electronics Sector

	Import Substitution		1st Stage SEI		2nd Stage SEI		3rd Stage SEI	
Reference Year*	1956		1965		1971		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	$0-500
Bracket 2	5-50	5	10-50	8	20-50	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)	0.264		0.443		0.564		1.805	
Depreciation/ Life for Tax Purposes (yrs)(1)								
M & E	10		10		5		5	
Building	30		30		20		20	
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	
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	
Commodity Taxes								
Sales Tax or VAT (%)	0.60		0.60		0.60		5.00	
VAT	No		No		No		Yes	

Notes: (1) The method of calculating depreciation is fixed percentage of diminishing book value method.
(2) As % of land value.
(3) As % of building and infrastructure.
* Reference year refers to the year the tax system applied.

Appendix 2

Tax Refunds for Exportation

(NT$millions)

Fiscal Year	Customs Duties			Commodity Tax			Remaining Tax	
	Tax Refunds	Tax Revenues	% Ratio	Tax Refunds	Tax Revenues	% Ratio	Tax Refunds	Tax Revenues
1955	17	742	2.35	1	477	0.19	3	568
1956	35	837	4.16	2	583	0.31	5	614
1957	35	1,180	2.93	20	674	2.97	5	746
1958	86	1,305	6.56	22	802	2.77	11	563
1960	183	1,354	13.52	76	894	8.47	49	1,401
1961	222	1,532	14.47	133	1,066	12.50	69	653
1962	332	1,641	20.25	248	1,018	24.34	125	707
1963	405	1,872	21.62	188	1,452	12.97	144	767
1964	871	2,245	38.80	322.	1,789	18.01	275	921
1965	897	2,897	30.98	440	2,074	21.21	324	1,154
1966	1,116	3,426	32.57	480	2,390	20.07	370	1,344
1967	1,501	3,706	40.50	645	2,936	21.96	513	1,487
1968	1,847	4,714	39.18	841	3,654	23.03	640	1,973
1969	2,125	5,838	36.40	1,058	5,657	18.70	749	2,902
1970	3,297	6,696	49.24	1,577	6,272	25.14	1,167	3,332
1971	5,474	7,078	77.33	2,401	6,999	34.31	2,123	3,505
1972	8,853	10,287	86.05	3,070	8,235	37.28	1,201	2,717
1973	10,380	14,363	72.27	4,291	11,419	37.58	1,638	2,635
1974	11,514	24,904	46.23	4,403	13,879	31.73	1,751	5,844
1975	12,838	23,527	54.56	5,291	14,018	37.74	1,855	4,816
1976	12,270	29,078	42.20	6,553	17,565	37.31	1,780	5,802
1977	18,318	32,023	57.20	7,940	19,538	40.64	2,690	6,043
1978	16,194	40,027	40.46	8,623	23,967	35.98	2,364	7,941
1979	21,597	53,597	40.29	11,530	32,761	35.19	2,930	9,952
1980	23,667	57,003	41.52	8,410	41,678	20.18	4,164	11,408
1981	22,640	57,781	39.18	2,821	49,202	5.73	3,895	13,216
1982	21,706	56,323	38.54	2,949	48,195	6.12	3,650	12,658
1983	16,745	55,570	30.13	4,213	48,171	8.75	3,682	12,089
1984	18,863	67,622	27.89	5,563	54,471	10.21	4,494	14,523
1985	21,869	66,873	32.70	7,297	54,573	13.37	3,846	14,078
1986	15,700	63,838	24.59	7,701	49,526	15.55	2,946	12,657
1987	17,417	76,267	22.84	2,320	51,805	4.48	2,919	15,855
1988	16,136	78,583	20.53	396	66,105	0.60	2,442	12,394
1989	9,691	89,387	10.84	266	79,870	0.33	454	13,833
1990	5,842	81,880	7.13	302	85,061	0.36	2	3,394
1991	4,425	79,269	5.58	176	85,823	0.20	0	0
1992	3,962	88,429	4.48	100	113,470	0 09	0	0
1993	4,154	99,928	4.16	117	136,499	0.09	0	0

Sources: Ministry of Finance, Yearbook of Financial Statistics of the Republic of China, 1993, (June 1994).

REFERENCES

Anthony, R. N. and J. S. Reece, Management Accounting, Text and Cases, (Homewood, Illinois: Richard D. Irwin, INC., 1975).

Biggs, T.S., "Financing the Emergence of Small and Medium Enterprise in Taiwan: Financial Mobilization and the Flow of Domestic Credit to the Private Sector," paper prepared for Employment and Enterprise Development Division, Office of Rural and Institutional Development, Bureau of Service and Technology, U.S. Agency for International Development, Washington, D.C. (August 1988).

Chen, T.J. and C.M. Hou, "The Political Economy of Tariff Policy in the Republic of China on Taiwan," Industry of Free China, (November 1991).

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.

Executive Yuan, a series of announcements entitled The Durability of Fixed Assets.

Fei, J.C.H., G. Rains and S.W.Y. Kuo, Growth with Equity, the Taiwan Case, (London: Oxford University Press, 1979).

Ho, C. C., "Export Processing Zones," edited by C.H.C. Kao and J. Lee, The Taiwan Experience, 1949-1989, (Taipei: Commonwealth Publishing Co., LTD, 1991; in Mandarin).

Harberger, A.C., Trade Policy and the Real Exchange Rate, (Washington, D.C.: The Economic Development Institute of the World Bank, March 1988).

Kuo, S.W.Y., The Taiwan Economy in Transition, (Boulder, Colorado: Westview Press, Inc., 1983).

Li, K.T., The Evolution of Policy Behind Taiwan's Development Success, (New Haven: Yale University Press, 1989).

Pack, H., "New Perspectives on Industrial Growth in Taiwan," edited by G. Rains, Taiwan: from Developing to Mature Economy, (Boulder, Colorado: Westview Press, Inc., 1992).

Pai, P.P.Y., "Tax Policy and Economic Development in the Republic of China," Industry of Free China, (December 1991).

Shah, A., editor, Fiscal Incentives for Investment and Innovation, published for the World Bank, (New York: Oxford University Press, 1995).

Sharpe, W. F., Investment, (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1981).

Shome, P., ed., Fiscal Issues in South-East Asia: Comparative Studies of Selected Countries, (Singapore: Oxford University, 1986).

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

The Ministry of Finance, Department of Statistics, Yearbook of Financial Statistics of the Republic of China, 1993, (June 1994), Table 69, p. 266.

The Ministry of Finance, Taxation and Tariff Commission, Guide to ROC Taxes, 1995.

Tsiang, S.C., "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).

Tsiang, S.C., "Reasons for Taiwan's Economic Takeoff," edited by Institute of Strategic and International Studies, Lessons from Taiwan -- Pathways to Follow and Pitfalls to Avoid, (Malaysia: ISIS, 1986).

Viherkentta, T., Tax Incentives in Developing Countries and International Taxation, (Finland: Finnish Lawyers' Publishing Company, 1991).

Wu, R.I., "Taiwan's Industrialization," edited by Institute of Strategic and International Studies, Lessons from Taiwan: Pathways to Follow and Pitfalls to Avoid, (Malaysia: ISIS, 1986).

Wu, R.I., "The Evolution of Development Policy in Taiwan," Singapore Economic Review, (October 1991).

Yang, Y.H., "Government Policy and Strategic Industries: The Case of Taiwan," edited by T. Ito and A. O. Krueger, Trade and Protectionism: NEBR-East Asia Seminar on Economics, Volume 2, (Chicago: The University of Chicago Press, 1993).

Yu, M.I., "The ROC's Experience in Using Tax Incentives for Promoting Economic Growth," paper presented in the Eight CESTO Meeting, Taxation and Tariff Commission, Ministry of Finance, the Republic of China, (March 1993).

ENDNOTES

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[2] See, e.g., P. Shome, ed., Fiscal Issues in South-East Asia: Comparative Studies of Selected Countries, (Singapore: Oxford University, 1986); T. Viherkentta, Tax Incentives in Developing Countries and International Taxation, (Finland: Finnish Lawyers' Publishing Company, 1991); A. Shah, editor, Fiscal Incentives for Investment and Innovation, published for the World Bank, (New York: Oxford University Press, 1995).

[3] See, e.g., K.T. Li, The Evolution of Policy Behind Taiwan's Development Success, (New Haven: Yale University Press, 1989); Patrick P.Y. Pai, "Tax Policy and Economic Development in the Republic of China," Industry of Free China, (December 1991); Ming-I Yu, "The ROC's Experiences in Using Tax Incentives for Promoting Economic Growth," paper presented at the Eighth CESTO Meeting, Taxation and Tariff Commission, Ministry of Finance, the Republic of China, (March 1993).

[4] There were other incentives for export promotion contained in the Statute of Loan for exports enacted in March 1962. Export oriented firms could apply for low interest loans at an annual rate of 7.5% to finance their operations (versus the market rate of 18% to 20%).

[5] In 1960, the highest marginal rate of business income tax was 25% on annual taxable income with a surcharge of 30% of the taxes due for defense. The resulting total marginal tax rate could be as high as 32.5%.

[6] When a qualified enterprise borrowed money abroad and incurred a foreign debt, it was allowed an amount of up to 7% of the accumulated foreign debt to be taken as a loss.

[7] Beginning in January 1971, depreciation for new enterprises for business income tax purpose was accelerated: for machinery and equipment with a service life of ten years or more to five years, and by one half if service life was less than ten years by dropping any amount less than a year, and for building, construction work, and transport equipment by one third by dropping any amount less than a year.

[8] Other incentives included an annual tax exemption of up to NT$360,000 personal interest and dividend income in order to encourage individuals to save.

[9] See the Ministry of Economic Affairs, Industrial Development and Investment Center, Statute for Upgrading Industries, Promulgation on December 29, 1990 (July 1994).

[10] A.C. Harberger, Trade Policy and the Real Exchange Rate, (Washington D.C.: The Economic Development Institute of the World Bank, March 1988).

[11] Thus, the real wage index is equal to one for 1956, 1965, 1971 and 1986.

[12] See, e.g., Tyler S. Biggs, "Financing the Emergence of Small and Medium Enterprise in Taiwan: Financial Mobilization and the Flow of Domestic Credit to the Private Sector," paper presented for Employment and Enterprise Development Division, Office of Rural and Institutional Development, Bureau of Science and Technology, U.S. Agency for International Development, Washington, D.C., (August 1988); and The Central Bank of China, Economic Research Department, Financial Statistics Monthly, Taiwan District, the Republic of China, (February 1995).

[13] 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

[14] See, e.g., Robert N. Anthony and James S. Reece, Management Accounting, Text and Cases, (Homewood, Illinois: Richard D. Irwin, INC., 1975); William F. Sharpe, Investments, (Englewood Cliffs, New Jersey: Prentice-Hall, INC., 1981).

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

[16] See 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. Details can be found in Table 11, Assets Actually Employed by Manufacturing Enterprise Units, by Locality and by Kind of Assets.

[17] See a series of announcements entitled The Durability of Fixed Assets by the Executive Yuan.

[18] This was based on 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.

[19] See the fourth column of Table 3 under the heading A.

[20] See, e.g., Ya-Hwei Yang, "Government Policy and Strategic Industries: The Case of Taiwan," edited by Takotoshi Ito and Anne O. Krueger, Trade and Protectionism: NBER-East Asia Seminar on Economics, Volume 2, (Chicago: The University of Chicago Press, 1993)

[21] See, e.g., 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), Chapter 11; and S.C. Tsiang, "Reasons for Taiwan's Economic Takeoff," edited by Institute of Strategic and International Studies, Lessons from Taiwan: Pathways to Follow and Pitfalls to Avoid, (Malaysia: ISIS, 1986).

[22] See the Ministry of Finance, Department of Statistics, Yearbook of Financial Statistics of the Republic of China, 1993, (June 1994), Table 69, p. 266.

5