

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: Trade and Protectionism, NBER-EASE Volume 2

Volume Author/Editor: Takatoshi Ito and Anne O. Krueger, editors

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-38668-6

Volume URL: http://www.nber.org/books/ito_93-2

Conference Date: June 19-21, 1991

Publication Date: January 1993

Chapter Title: Government Policy and Strategic Industries: The Case of Taiwan

Chapter Author: Ya-Hwei Yang

Chapter URL: <http://www.nber.org/chapters/c8082>

Chapter pages in book: (p. 387 - 411)

Government Policy and Strategic Industries: The Case of Taiwan

Ya-Hwei Yang

Governments of less developed countries (LDCs) usually adopt policies that will stimulate economic growth in their countries. The effects of these policies, therefore, should be evaluated. In its process of economic development, Taiwan has adopted several different economic strategies. In the 1950s, an import-substitution policy was followed to reconstruct the economy after the Second World War. In the 1960s, an export-promotion policy was put forward to stimulate exports and to speed up economic growth. At that time, labor-intensive industries were comparatively advantageous and became the key industries that gained the support of the government. After the oil crises of the 1970s, capital intensive and technology-intensive industries became the new key industries. In the 1980s, because higher wages resulted in a loss of comparative advantage in the production of labor-intensive products, and because the technology level of Taiwan was still far behind that of the developed countries, bottlenecks occurred in Taiwan's development. So, in order to promote industrial development and improve the country's industrial structure, the concept of "strategic industries" was adopted as one of the means to overcome these bottlenecks. (For reviews of Taiwan's economic development, see Li and Yu [1982] and Kuo [1983].)

Preferential policies for strategic industries began to be introduced in 1982, and six criteria were adopted that the strategic industries must meet. The six criteria are as follows: high linkage effect; high market potential; high technological intensity; a high degree of value added; a low energy coefficient; and a low level of polluting emissions. Most of the selected products have been in the mechanical products, information, and electronics sectors. The list of selected products has been changed four times, and a few products in the biochemical and material industries were included after 1986.

Ya-Hwei Yang is a research fellow at the Chung-Hua Institution for Economic Research, Taipei.

Taiwan's government offers two preferential measures to subsidize the strategic industries: preferential loans and technology and management assistance. Preferential loans are administered through two channels: the pool of funds administered by the Bank of Communications and that administered by the Medium Business Bank of Taiwan. The funds for both are partially supplied by the government's Development Fund. The funds managed by the Bank of Communications were disbursed in four phases, from 1982 to 1989, with 10 billion New Taiwan dollars (NT \$) having been put in the pool in the first phase and NT \$20 billion in each of the following phases. The funds issued by the Medium Business Bank were disbursed in three phases, with NT \$8 billion having been put in the pool in the first and second phases and NT \$12 billion in the third phase. The preferential loan rates are 1.75–2.75 percent lower than the prime rate of general commercial banks. The funds can be used for several purposes besides new investment projects, such as the purchase of automated equipment, domestically produced machines, the pollution-prevention equipment, the production of exports, and the development of new products, as shown in table 14.1. Of the preferential loans, 32.14 percent actually go to strategic industries. These strategic loans are the focus of this paper.

As for technology and management assistance, the Ministry of Economic

Table 14.1 Preferential Medium- and Long-Term Loans, 31 December 1988 (NT \$thousand)

	Bank of Communications	Medium Business Bank of Taiwan	Total
Investment project for strategic industries	4,866,252 (20.28)	29,238,576 (35.609)	34,104,828 (32.142)
Investment project for automated equipment	7,045,254 (29.36)	26,575,925 (32.366)	33,621,179 (31.686)
Investment project for domestically produced machines	8,700,725 (36.26)	21,584,814 (26.288)	30,285,539 (28.542)
Investment projects for environmental protection and pollution-prevention program	. . .	4,146,611 (5.050)	4,146,611 (3.908)
GMP projects	. . .	41,930 (.052)	41,930 (.040)
Cooperative exports and new product development	3,385,215 (14.10)	. . .	3,385,215 (3.190)
Projects supported by CEPD	. . .	521,764 (.635)	521,764 (.492)
Total amount	23,997,446 (100.00)	82,109,620 (100.00)	106,107,066 (100.00)

Note: CEPD = Council for Economic Planning and Development; GMP = Good Manufacture Product. Figures in parentheses are percentages.

Affairs asked six governmental consulting institutions to advise local firms. The government also subsidized 60 percent of the total consulting expenses of the firms, up to a total of NT \$1 million.

In 1991, a new preferential plan for strategic industries was promulgated. The total amount of the plan is NT \$30 billion. This plan will be executed by the Bank of Communications (Central Development Bank). By law, the difference between the preferential interest rate and the prime rate of the Bank of Communications must be smaller than 2 percent. The selected industrial items include investments in pollution-prevention equipment, the establishment of plants, energy-saving equipment, public parking lots, mass transportation equipment, and automation equipment. In addition, the idea of "star industries" was adopted by the government in 1989. In the Six-Year National Development Plan for Taiwan, which got under way in 1991, the development of "new industries" was stated to be one of the plan's targets. The criteria for new industries are similar to those for strategic industries.

Generally speaking, governments always want to stimulate economic growth by speeding up the development of certain specific industries. No matter whether the industries are called key industries, strategic industries, or new industries, industrial promotion is one of the main policies of governments. Furthermore, this type of policy is common in the LDCs.

Although preferential policies for strategic industries in Taiwan have been used for over eight years, no in-depth or thorough evaluation has been done on this subject. The purpose of this study is to provide an evaluation framework to investigate the effects of the strategic industry preferential policy, especially the effects of the preferential loan policy, and of the program for technology and management assistance.

Scholars have different viewpoints as to the effects of industrial policy. Scholars supporting the balanced growth theory believe that all sectors should develop simultaneously under an equilibrium between demand and supply (see Nurkse 1953; and Yotopoulos and Nugent 1973). Scholars supporting the unbalanced growth theory recommend a "disequilibrium development strategy" requiring the government to intervene in the market and select key industries in order to pull along the growth of the whole economy (see Hirschman 1953). Infant industry protection is usually employed in the beginning stage of economic development in order to help the growth of infant industries by lessening foreign competition (see Dervis and Page 1984). Also, after Adam Smith propounded the value of the invisible hand, the development of a free economy has become the target of the developed countries. However, market failure theory agrees that governments may intervene in the marketplace in the case of market failure, that is, when the market mechanism fails to reflect the true cost of resources or fails to use resources efficiently, such as in the case where an externality exists (see Pigou 1918).

Comparing the different theories, developing countries tend to accept the infant industry protection theory and the unbalanced growth theory.

It is still not certain how to identify key industries under these criteria.¹ The government of Taiwan has established six criteria for industries to meet in order to be classified as strategic. Shea (1983) points out that these criteria contradict each other. He proposes that a product that contains a large amount of value added probably has a low linkage effect. Wu, Lee, and Yu (1988) comment that some criteria, such as market potential and pollution, are hard to measure by econometric indexes. They try to identify what industries would be selected under each individual criterion. They find that different industries would be selected under each individual criterion. Almost no industries meet all the criteria.

14.1 Theoretical Framework and Empirical Approach

To evaluate the effects of preferential policies, the following questions need to be answered:

1. Is the selection of strategic industries (which receive preferential treatment) necessary for stimulating economic growth?
2. Are the criteria used for selecting strategic products suitable for achieving the role of key industries?
3. Are the process of and measures for executing policy effective in improving the investment position and performance of firms?

The complete framework for evaluation can be summarized as in figure 14.1. There are two main areas that are evaluated: policy execution and policy direction. If preferential loans can really help economic growth, they probably work through various types of channels. The effectiveness of each channel should be tested. To evaluate the effectiveness of these channels, the following null hypotheses and alternative hypotheses should be tested:

NULL HYPOTHESIS 1. Preferential loans provide a stable source of funds and lessen the cost of capital.

ALTERNATIVE HYPOTHESIS 1A. Even without preferential loans, firms could still find other sources of funds.

ALTERNATIVE HYPOTHESIS 1B. The decrease in interest burden provided by the preferential loans is not important in the firms' investment decisions when compared to the total expenses of the firms.

NULL HYPOTHESIS 2. With low-cost funds, the subsidized firms increase their investments.

ALTERNATIVE HYPOTHESIS 2. Other factors play a more important role in the investment decision process of firms, such as market potential, profitability, etc.

1. For discussions of the criteria, especially linkage effects, see, e.g., Laumas (1975, 1976) and Yotopoulos and Nugent (1973, 1976).

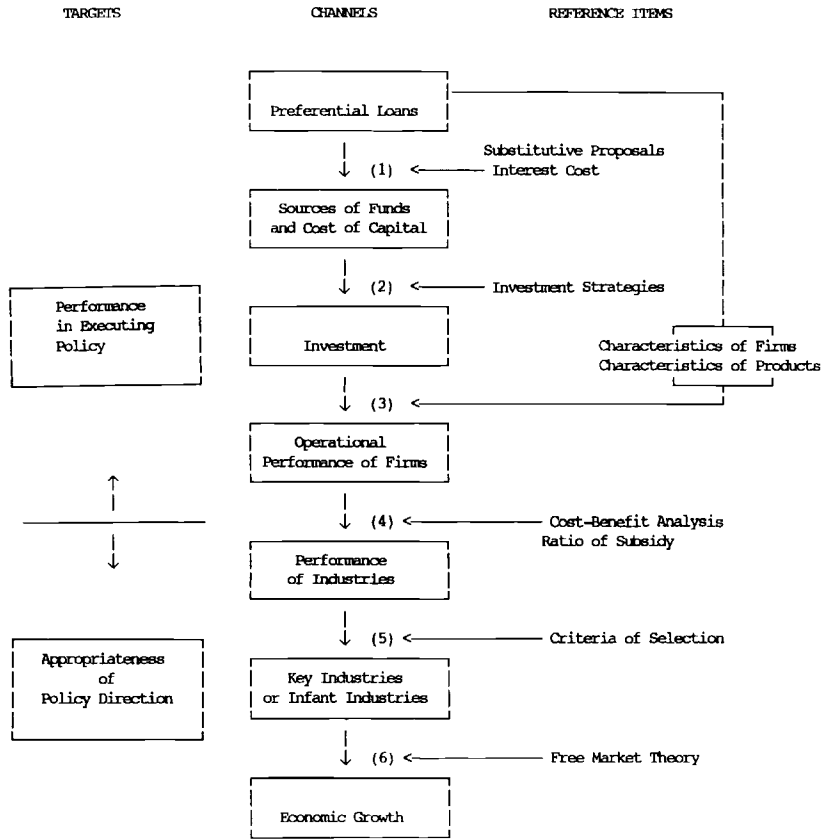


Fig. 14.1 Evaluative framework for effects of preferential loans on the strategic industries

NULL HYPOTHESIS 3. A high level of investment using preferential loans results in better operational performance.

ALTERNATIVE HYPOTHESIS 3. A good company with a high frequency of investment and a sound financial situation maintains a high level of operational performance, whether subsidized or not.

NULL HYPOTHESIS 4. The subsidized firms drive the growth of the whole industry.

ALTERNATIVE HYPOTHESIS 4A. Even though preferential policy results in better performance in the subsidized firms, the opportunity cost of moving the funds away from others is greater.

ALTERNATIVE HYPOTHESIS 4B. The number of subsidized firms is too small to influence the whole industry.

NULL HYPOTHESIS 5. The subsidized industries play the role of key industries or infant industries and drive the whole economy.

ALTERNATIVE HYPOTHESIS 5. If the criteria for selecting key or infant industries are inappropriate, there is resource distortion.

NULL HYPOTHESIS 6. Preferential policies for strategic industries help the economy grow faster.

ALTERNATIVE HYPOTHESIS 6. If the government does not intervene in the market and just lets the invisible hand of the market play its role, then the economy as a whole would be more efficient.

This study tests these hypotheses and examines the strength of each channel shown in figure 14.1. As for technology and management policy, its effect is tested following an approach similar to the one used to study the effect of preferential loan policy.

The ratio of subsidized firms should also be looked at. Both the number of firms and the amount of assistance are used as the measure indexes. The numbers of the firms receiving preferential loans from the Bank of Communications and the Medium Business Bank of Taiwan are 568 and 876, respectively. The number of firms receiving consultation assistance from the Ministry of Economic Affairs is 364. The total number of firms in the mechanical industry and the information and electronics industry is 17,796. Therefore, the preferential loan ratio is 8.1 percent (i.e., $[568 + 876]/17,776$). The consultation assistance ratio is 2.0 percent (i.e., $364/17,796$).

The ratio of preferential loans can now be observed. Taking the amount of preferential loans to strategic industries as the numerator and the loans to privately owned metal products as the denominator, we can calculate the ratio of 22.6 percent at the end of 1988. Taking the same numerator and the medium- and long-term loans to the metal products and machinery industry extended by financial institutions as the denominator, the ratio is 63.7 percent.

The data given above reveal the following phenomenon. The ratio of preferential loans is much higher than the ratio of the number of subsidized firms. A small number of firms in selected industries have acquired a big portion of medium- and long-term loans.

Questionnaires were sent to firms in the mechanical products and the information and electronics industries. The sample includes (1) those firms that acquired strategic preferential loans provided by the Bank of Communications and by the Medium Business Bank of Taiwan; (2) those firms that acquired technical and management assistance provided by the Industry Development Bureau, Ministry of Economic Affairs; (3) those firms that applied for preferential loans but were rejected; and (4) those firms that did not apply for preferential loans.

The questionnaire format is described in figure 14.2. The analytic framework of the questionnaire is divided into several sections. First, the surveyed firms are asked whether they understand the preferential policy. This question

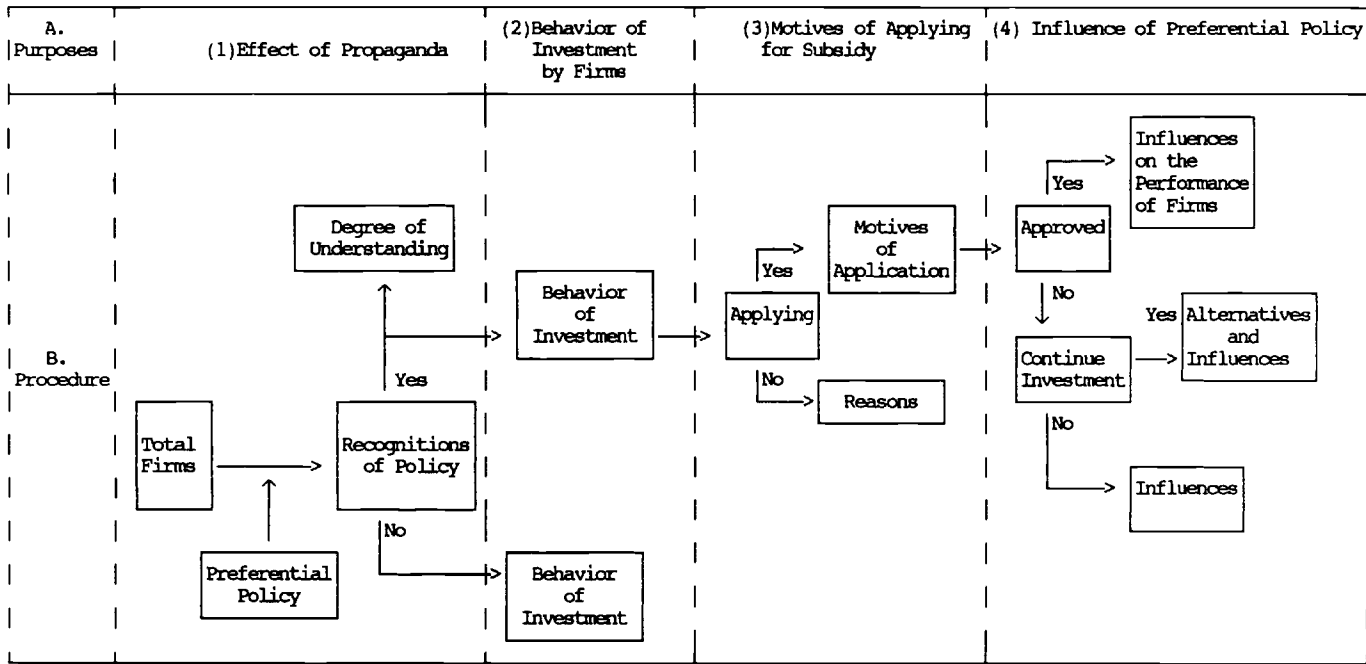


Fig. 14.2 Analytic framework of questionnaires

is used to measure the effect of propaganda. Second, questions regarding the decision process that is used in the firms' investment decisions are posed to analyze the firms' behavior in making investments. Third, firms are asked to explain why they did or did not apply for preferential loans. Finally, those firms that acquired preferential loans are asked to answer some questions about their operations. Those firms that did not acquire preferential loans are also asked whether they continued with their investment plans using an alternative source.

To evaluate the influence of preferential loans on the operation of firms, a "path analysis" was conducted. This approach is shown in figure 14.3. Suppose that an effective preferential loan policy has three effects: (1) a decrease in interest burden;² (2) an increase in fixed capital growth; and (3) improvement in operational efficiency (i.e., an increase in sales, profitability, or the productivity of capital and labor). The degree of these three factors might also be influenced by the characteristics of the individual firms. The characteristics of the firms include the industry that it is in, its scale of production, its technology level, its investment mood, and its credibility. Since the possible channels are so numerous, the degree of influence of each channel must be tested by path analysis.

The number of questionnaires distributed and returned is shown in table 14.2. In all, 3,033 questionnaires were distributed at the end of 1988; of these, the returned ratio was 11.7 percent, and the valid ratio was 10.6 percent.

The structure of valid samples can be described as follows (table 14.3).

1. In the valid sample, 58 percent of the firms are in the mechanical industry (i.e., 186/322), and 42 percent are in the information and electronics industry (i.e., 136/322).

2. In the valid sample, 15.8 percent of firms acquired preferential loans from the Bank of Communications, 32.6 percent of firms acquired preferential loans from the Medium Business Bank of Taiwan, and 8.4 percent of firms acquired assistance in technology and management from the Ministry of Economic Affairs. The other 43.2 percent of the sample did not receive either preferential loans or consultation assistance from the government.

3. A firm can be called a small or medium-sized business when its capital is less than NT \$40 million or its number of employees is less than two hundred, according to the government definition. Usually, the customers of the Medium Business Bank are small and medium-sized businesses. In our survey, 65 percent of the valid sample are small and medium-sized businesses, and 35 percent are big businesses. In terms of the number of employees, 75.2 percent of the valid sample are small and medium-sized businesses. The mechanical industry has a higher ratio of small and medium-sized businesses than the information and electronics industry has.

2. The interest burden is measured by the ratio of interest cost over total expenses.

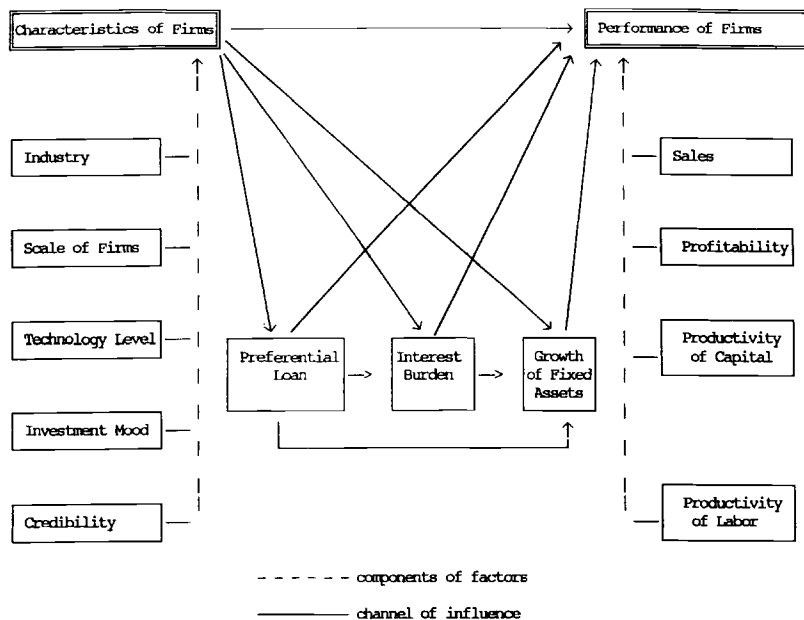


Fig. 14.3 Path analysis of influential factors on the performance of firms

Table 14.2 Ratio of Return and the Ratio of Valid Questionnaires

Category of Samples	No. Distributed	No. Returned	Return Ratio (%)	No. Obsolete	No. Valid	Valid Ratio (%)
Finance from the Bank of Communication	257	57	22.1	6	51	19.8
Finance from the Medium Business Bank of Taiwan	614	105	17.1	0	105	17.1
Guidance of technology and management	189	27	14.3	0	27	14.3
No finance and no guidance	1,973	168	8.5	29	139	7.1
Total	3,033	357	11.7	35	322	10.6

14.2 The Effect of a Preferential Loan Policy

Several topics are dealt with in this section. First, the effectiveness of preferential policy information programs is analyzed (table 14.4). Surveyed firms were asked how much they understand about this policy? It was found that 59 percent of the surveyed firms have little understanding of the government's

Table 14.3 Structure of Samples (No. of firms)

	Mechanical Industry	Information and Electronics Industry	Total
Kind of subsidy:			
Finance from Bank of Commu- nications	27 (14.5)	24 (17.6)	51 (15.8)
Finance from Medium Business Bank of Taiwan	80 (43.0)	25 (18.4)	105 (32.6)
Assistance of tehnology and management	6 (3.2)	21 (15.4)	27 (8.4)
No subsidy	73 (39.2)	66 (48.5)	139 (43.2)
Total	186 (100.0)	136 (100.0)	322 (100.0)
Size of firms (A):			
Capital < NT \$40 million	136 (75.1)	68 (51.1)	204 (65.0)
Capital \geq NT \$40 million	45 (24.9)	65 (48.9)	110 (35.0)
Total	181 (100.0)	133 (100.0)	314 (100.0)
Size of firms (B):			
No. of employees < 200	163 (89.1)	76 (56.3)	239 (75.2)
No. of employees \geq 200	20 (10.9)	59 (43.7)	79 (24.8)
Total	183 (100.0)	135 (100.0)	318 (100.0)

Note: Figures in parentheses are percentages.

Table 14.4 Effect of Propaganda (no. of firms)

	Industry			Size of Firms		
	Mechanical Products	Information and Electronics	Total	Big	Medium and Small	Total
Deep understanding	44 (23.7)	34 (25.6)	78 (24.5)	46 (42.6)	32 (15.6)	78 (24.9)
A little understanding	112 (60.2)	74 (55.6)	186 (58.3)	58 (53.7)	126 (61.5)	184 (58.8)
Little understanding	29 (15.6)	23 (17.3)	52 (16.3)	4 (3.7)	44 (21.5)	48 (15.3)
No understanding	1 (.5)	2 (1.5)	3 (.9)	...	3 (1.5)	3 (1.0)
Total	186 (100)	133 (100)	319 (100)	108 (100)	205 (100)	313 (100)

Note: Figures in parentheses are percentages.

preferential policies. The degree of understanding of the large firms is generally more extensive than that of the medium-sized and small firms.

As far as investment behavior is concerned, surveyed firms were asked to rank the six most important factors in the investment decision. These factors are shown in table 14.5. The market potential was ranked as the number one factor in a firm's investment decisions. The factors of financial cost and credit availability were ranked fifth and sixth, respectively. Kendall's coefficient of concordance was then used to test whether the rank given by each firm is consistent. The hypothesis of concordance was supported. This result reveals that the finance factor does not dominate other factors in the investment decision-making process of the firms.

The question of what a firm would have done had it not acquired the preferential loan was then raised with the subsidized firms. Table 14.6 shows the results of this question. In all, 53.7 percent of the firms answered that they would have continued with their investment projects by finding another source of funds without delay, and 38.8 percent of the firms would have continued their investment projects with perhaps a few years of delay. The average delay period mentioned is two years.

Some of the reasons given for why firms did not apply for preferential loans are also observed. Other available sources of funds and no understanding of the policy were the two major factors for the firms that did not apply.

Next, a path analysis is used to test the following four hypotheses:

THEME 1. The characteristics of the firms influence the probability of their receiving preferential loans.

THEME 2. Strategic preferential loans help decrease the interest burden of firms.

Table 14.5 Rank of Importance of Factors Influencing Investment and Kendall's Coefficient of Concordance

Industry	Criterion for Investment					
	Market Potential	Short-Run Profitability	Promotion of Technical Level	Competitive Situation	Credit Availability	Cost of Capital
Total Firms	1	3	2	4	5	6
	Kendall's $W = .3632$, $\chi^2 = 493.93$, $p = .0^*$					
Mechanical products industry	1	3	2	5	4	6
	Kendall's $W = .3288$, $\chi^2 = 254.81$, $p = .0^*$					
Information and electronics industry	1	3	2	4	6	5
	Kendall's $W = .4187$, $\chi^2 = 240.73$, $p = .0^*$					

*Kendall's W is significant at the 5 percent level.

Table 14.6 Questions on the Possibility of Receiving Alternative Sources of Funds Answered by Those Who Received Strategic Loans

Possible Decisions	No. Surveyed that Received Financing from:		Total (ratio)
	Bank of Communications	Medium Business Bank of Taiwan	
Continuing investment projects using other financial sources	28	51	79 (53.7)
Postpone the execution of the investment project for a few years	15	42	57 (38.8)
Stop the investment project	2	9	11 (7.5)
Total	45	102	147 (100.0)

THEME 3. Strategic preferential loans cause a greater level of fixed asset accumulation in subsidized firms than in nonsubsidized firms.

THEME 4. Strategic preferential loans increase the operational performance of subsidized firms compared to that of nonsubsidized firms.

For the empirical part of this study, some factors must be quantified. (a) First we must consider the characteristics of firms:

1. *Scale of firms*: the paid-in capital of firms at the end of 1988;
2. *Technology level*: the ratio of engineers and technical persons to total employees;
3. *Financial status*: the financial status required for maintaining the firm's current capacity level and for enlarging its capacity;³
4. *Investment mood*: evaluated using the following categories: the frequency of a firm's investments, the depth of the evaluation employed in the investment decision-making process, the importance of the investment to the firm's growth, and the understanding of the technology by the employees who are responsible for the firm's investment activities;⁴
5. *Credibility*: evaluated in the following areas: the availability of short-term credit to the firm and the availability of medium- and long-term credit to the firm.⁵

3. There are two questions in the questionnaires regarding financial status: the degree of the firm's ability to maintain the current capacity based on the current financial status and the degree of the firm's financial sufficiency to expand its capacity. The answer to each question was reported on an ordinal scale ranging from 1 to 5. This method is used to quantify variables so that mathematical computation can be executed.

4. The method used for quantifying variables is the same as that mentioned in n. 3 above.

5. The answer to each question regarding the firm's investment mood and credibility is reported on an ordinal scale ranging from 1 to 5.

(b) Then we must consider the decision of the firms whether to acquire preferential loans. The to-acquire case is represented by the dummy variable 1 and the not-to-acquire case by the dummy variable 0. (c) The interest burden is the ratio of the average interest cost to the total expenses of the firm in the years from 1985 to 1988. (d) The fixed asset formation is: The average growth rate of fixed capital from 1985 to 1988. (e) Four variables are used to determine the performance of firms for the years from 1985 to 1988:

1. *Growth of sales*;
2. *Profitability*: the ratio of profits to revenues;
3. *Productivity of capital*: the ratio of average sales to capital;
4. *Productivity of labor*: the ratio of average sales to the number of employees.

The combining of several variables to represent each characteristic of the firms, that is, to form a representative variable, is achieved using a principal components analysis.⁶ The growth of sales and profitability are combined to form a term to represent operational performance. The variables of productivity of capital and of labor are combined to form a term to represent productivity performance. The following discriminate equation and regression equations are then tested. This method is called path analysis:

$$\begin{aligned}
 (1) \quad X6 &= a_{11}X1 + a_{12}X2 + a_{13}X3 + a_{14}X4 + a_{15}X5, \\
 (2) \quad X7 &= a_{21}X1 + a_{22}X2 + a_{23}X3 + a_{24}X4 + a_{25}X5 + a_{26}X6, \\
 (3) \quad X8 &= a_{31}X1 + a_{32}X2 + a_{33}X3 + a_{34}X4 + a_{35}X5 + a_{36}X6 \\
 &\quad + a_{37}X7, \\
 (4) \quad X9 &= a_{41}X1 + a_{42}X2 + a_{43}X3 + a_{44}X4 + a_{45}X5 + a_{46}X6 \\
 &\quad + a_{47}X7 + a_{48}X8, \\
 (5) \quad X10 &= a_{51}X1 + a_{52}X2 + a_{53}X3 + a_{54}X4 + a_{55}X5 + a_{56}X6 \\
 &\quad + a_{57}X7 + a_{58}X8,
 \end{aligned}$$

where X1 is the technology level, X2 is the scale of firms, X3 is sufficiency of funds, X4 is the investment mood, X5 is credibility, X6 is subsidized or not, X7 is the interest burden, X8 is growth of fixed capital, X9 is operational efficiency (sales and profitability), and X10 is production efficiency (productivity of capital and labor).

The results are shown in table 14.7. The following conclusions can be drawn:

1. From equation (6) (see table 14.7), the most significant item influencing the availability of preferential loans is the firm's investment mood. The other factors are not important in the issuance of preferential loans.

6. For further information on the principal components analysis, see Judge et al. (1980).

Table 14.7 Path Analysis Regression of All the Surveyed Firms (N = 289)

Explained Variable	Explanatory Variable								\bar{R}^2	F	
	X1	X2	X3	X4	X5	X6	X7	X8			
(6): X6	.065 (.294)	-.173 (.209)	.141 (.301)	.984 (26.80)*	-.114 (.180)					***	2.4298**
(7): X7	.004 (.832)	.004 (.131)	-.171 (-2.988)*	.019 (-.024)	.019 (-.024)	-.015 (-.329)				.0403	1.9633
(8): X8	-.051 (-.801)	-.060 (-.961)	.000 (-.013)	.193 (3.012)*	-.055 (-.887)	.040 (.627)	.000 (.003)			.050	1.9869
(9): X9	.136 (2.282)*	.196 (3.355)*	.065 (1.029)	.231 (3.840)*	-.052 (-.882)	-.038 (-.673)	.024 (.283)	.235 (3.973)*		.1833	7.0119**
(10): X10	-.008 (-.136)	.093 (1.454)	-.094 (-1.461)	-.014 (-.219)	-.068 (-1.079)	.039 (.601)	-.061 (-.965)	-.071 (-1.105)		.0288	.9262

Note: *t*-statistics are given in parentheses.

*Significant coefficient at the 5 percent level.

**Goodness of fit is acceptable.

*** $p = .0015$.

2. From equation (7), it is found that preferential loans do not significantly influence interest burden.⁷

3. From equation (8), it is found that preferential loans do not stimulate fixed capital formation significantly.

4. From equation (9), it is found that preferential loans have no close relation with operational performance. Also, those firms that have a higher level of technology, a more active investment mood, a larger scale of production, and more capital have better operational performance.

The effect of preferential loans on various industries was also tested. The regressions on firms in the mechanical products industry are shown in table 14.8. The regressions on the firms in the information and electronics industries are shown in table 14.9. Similar results are obtained in both cases: preferential loans do not significantly influence interest burden, investment, or operational performance. Investment mood probably plays more of a role in a firm's investment activities.

14.3 The Effect of Assistance in Management and Technology

The Ministry of Economic Affairs provided strategic-product-producing firms with technology and management assistance, through six relevant institutions. Financial support to defray the cost of the assistance was given to the firms, covering up to 60 percent of the total expense, with a ceiling of NT \$1 million. The effects of the assistance are analyzed in this section.

A firm can obtain management and technology assistance from one or more sources: the government, academic institutions (e.g., universities), parent companies, private consulting companies, or foreign companies. Most firms (i.e., 54 percent of those surveyed) said that they would continue to ask for consultation whether or not they obtained financial support from the Ministry of Economic Affairs, as shown in table 14.10.

In the questionnaire, some questions regarding the degree of satisfaction of the assistance-receiving firms were asked; the answers are expressed by ordinal rank. The measures of the correlation coefficients between the level of satisfaction, the amount of financial support, and the ratio of financial support to total expenses are shown in table 14.11. All the coefficients are nonsignificantly negative. Therefore, the amount and the ratio of financial support do not seem to play an important role in the technology and management improvement activities of the firms.

The degree of satisfaction, as regards the various assistance areas, can be further analyzed. From figure 14.4, it can be seen that the government-assisted firms are more satisfied than the others in the area of technology,

7. Not all the equations of path analysis have satisfying goodness of fit. However, the key purpose of this study is to emphasize the influence of preferential policies. Other factors influencing the behavior of firms are not analyzed in depth.

Table 14.8 Path Analysis Regressions for the Mechanical Products Industrys ($N = 168$)

Explained Variable	Explanatory Variable								\bar{R}^2	F	
	X1	X2	X3	X4	X5	X6	X7	X8			
X6	-.028 (.032)	.242 (.888)	.151 (.450)	.974 (21.95)*	.015 (.037)					***	2.5745**
X7	-.033 (-.197)	-.045 (-.596)	-.168 (-2.392)*	.102 (.817)	-.099 (-1.333)	-.110 (-1.363)				.0643	1.9643
X8	-.008 (-.099)	-.033 (-.390)	-.074 (-.911)	.228 (2.672)*	-.152 (-1.838)	.055 (.647)	-.027 (-.323)			.0861	2.0034
X9	.114 (1.466)	.132 (1.674)*	.026 (.262)	.263 (3.090)*	.019 (.220)	-.101 (-1.204)	.002 (-.091)	.224 (2.789)*		.1612	3.4346**
X10	.038 (.471)	.027 (1.091)	-.078 (-.976)	.000 (-.003)	.008 (.105)	.014 (.171)	-.095 (-1.174)	-.066 (-.814)		.0973	1.9877

Note: t -statistics are given in parentheses.

*Significant coefficient at the 5 percent level.

**Goodness of fit is acceptable.

*** $p = .0007$.

Table 14.9 Path Analysis Regression for the Information and Electronics Industry (N = 119)

Explained Variable	Explanatory Variable								\bar{R}^2	F	
	X1	X2	X3	X4	X5	X6	X7	X8			
X6	-.340 (.997)	-.176 (.001)	.097 (.038)	.946 (8.441)*	-.059 (.284)					***	1.1432**
X7	.082 (.806)	.036 (.339)	-.170 (-1.725)*	-.100 (-1.015)	.089 (1.944)	.078 (.748)				.1204	1.9887
X8	-.077 (-.759)	-.148 (-1.438)	.134 (1.298)	.127 (1.243)	.039 (.382)	.043 (.419)	.041 (.397)			.1981	1.7337
X9	.218 (2.356)*	.243 (2.614)*	.144 (1.509)	.169 (1.826)*	-.165 (-1.810)	.106 (1.082)	.057 (.553)	.250 (2.734)		.2502	4.0467**
X10	-.158 (-1.544)	-.011 (-.109)	-.051 (-.486)	.037 (.352)	-.118 (-1.150)	-.043 (-.423)	.075 (.726)	-.079 (-.774)		.0515	.6590

Note: *t*-statistics are given in parentheses.

*Significant coefficient at the 5 percent level.

**Goodness of fit is acceptable.

*** $p = .0473$.

Table 14.10 Answers of Surveyed Firms Regarding Whether Financial Support Obtained from the Government (no. of firms)

	Large Firms	Small and Medium Firms	Mechanical Products Industry	Electronics and Information Industry	Total
Continue project, regardless of obtaining preferential support or not, to pay for assistance	6 (35.3)	17 (68.0)	17 (54.8)	6 (54.5)	23 (54.8)
Preferential policy speeds up the guidance project	8 (47.1)	5 (20.0)	10 (32.3)	3 (27.3)	13 (31.0)
Preferential policy determines the guidance project	3 (17.6)	3 (12.0)	4 (12.9)	2 (18.2)	6 (14.3)
Total	17	25	31	11	42 (100)

Note: Figures in parentheses are percentages.

Table 14.11 Correlation Coefficient between the Firms' Level of Satisfaction and Financial Support

	Degree of Satisfaction	Amount of Financial Support	Ratio of Financial Support
Degree of satisfaction	1.0000		
Amount of financial support	-.1832	1.0000	
Ratio of financial support	-.3000	-.0997	1.0000

especially with regard to research and automation. Consulting companies, making up the greatest part of nongovernment-assigned institutions, seem to give firms a greater degree of satisfaction in the areas of financial management and marketing.

In evaluating the effects of technological and management assistance on the firms' operational performance, a path analysis is used. The results are reported in figures 14.5 and 14.6. It is found that assistance promotes a greater level of production performance. Higher-tech firms usually do not ask the government for support but do ask other types of consultation institutions for assistance. It is also revealed that the government does aid in the dissemination, but not the upgrading, of technology. However, whether a firm obtains assistance through the government or through other institutions is not a key factor influencing production performance.

Empirical studies of the mechanical products and the information and elec-

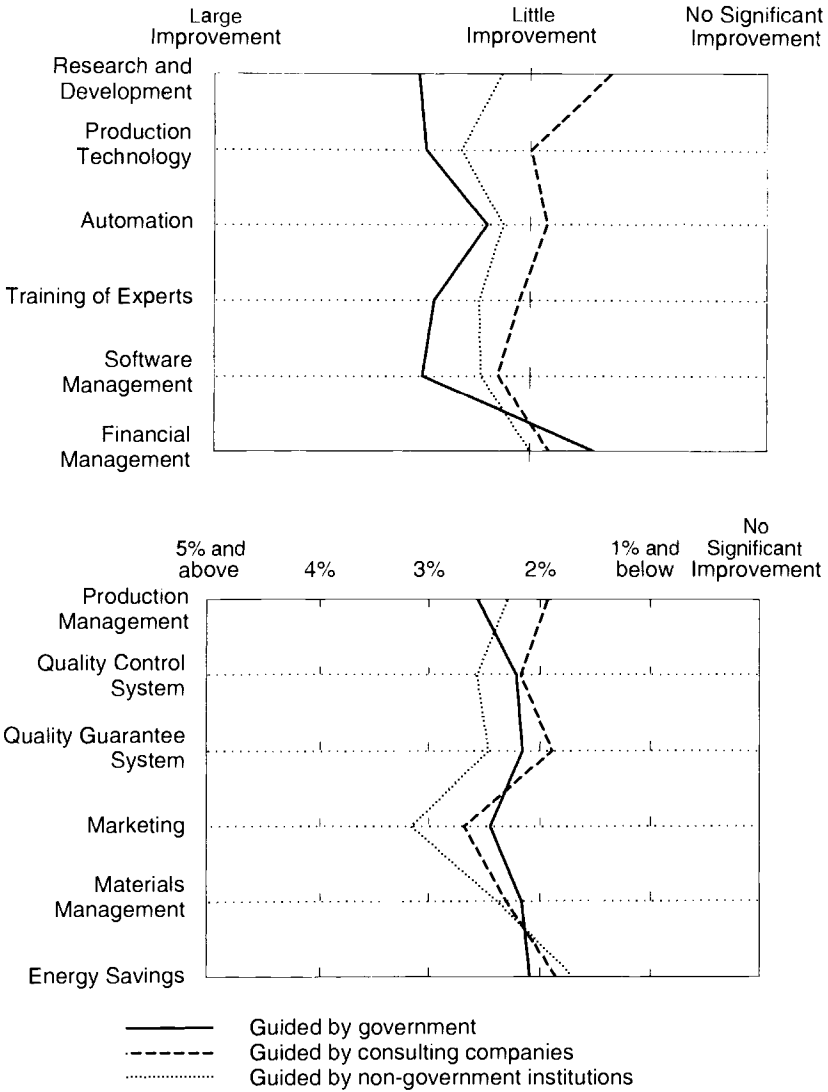


Fig. 14.4 Effects of different types of guidance items

tronics industries were also conducted using a similar approach, and similar results were obtained. The larger mechanical products firms tend to ask for more management and technology assistance, and they also display better production performance. Whether a firm obtains consultation through the government or through other institutions does not, however, seem to make any difference. Production performance increases in both cases.

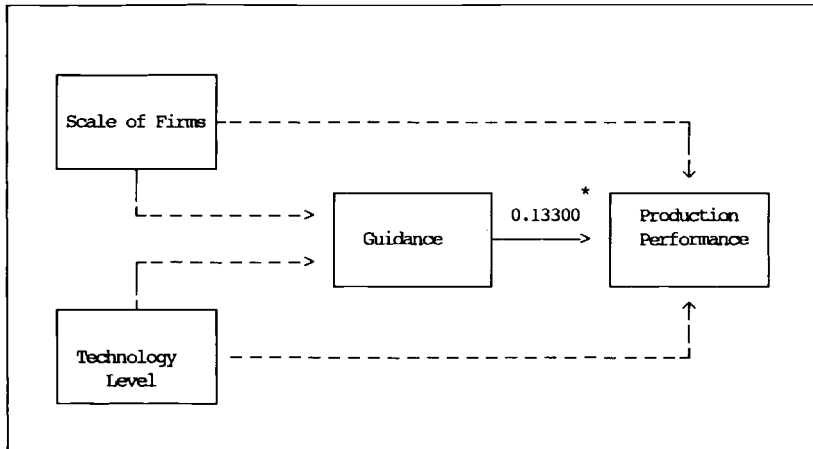


Fig. 14.5 Path analysis of the effects of guidance policy.

Note: The variables are defined as follows: X1 = scale of firms; X2 = technology level; X3 = dummy variable (X3 = 1 if obtained guidance, 0 otherwise); and X4 = production performance. Sample $N = 300$. * $\alpha = .05$. The regressions are the following:

- (1) $X3 = .80641 X1 + .70456 X2$, $R^2 = .04883$, $F = .70899$,
(.365) (.257)
- (2) $X4 = .07696 X1 - .01966 X2 + .13300 X3$, $R^2 = .01475$, $F = 2.43238$.
(.130) (-.332) (2.265)*

14.4 Conclusion

Preferential policies for strategic industries were introduced in 1982. Their effects were evaluated in this study through the aid of a questionnaire. The study found that most subsidized firms would have continued with their investment projects and would have still asked for assistance from other institutions even if they had not obtained preferential support from the government. The results of a path analysis show that the Taiwanese government's preferential policy of low-interest loans does not significantly reduce the interest burden, increase the fixed capital formation, or improve the operational performance of the firms. Those firms that took advantage of technological and management consultation showed better performance in comparison to the situation where no consultation was provided. However, the resulting improvement in performance was the same regardless of whether the consultation was provided by the government or by other institutions.

The answers to the three questions mentioned in section 14.1 above can be briefly summarized as follows:

1. Is the selection of strategic industries (which receive preferential treatment) necessary for stimulating economic growth?

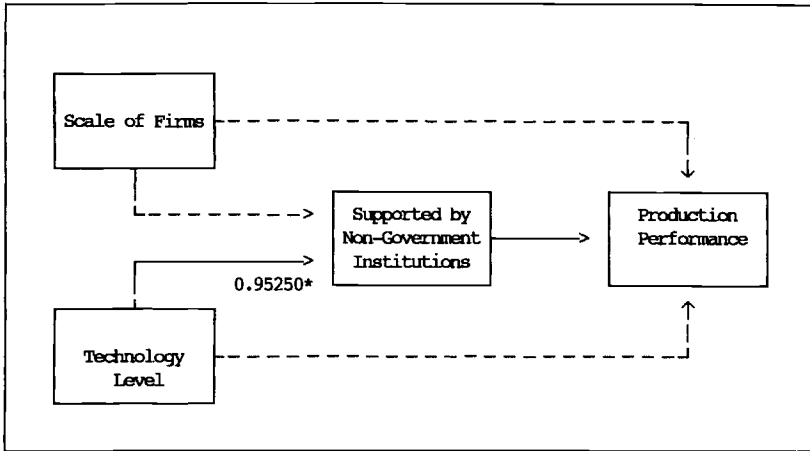


Fig. 14.6 Path analysis of the effects of guidance policy.

Note: The variables are defined as follows: X1 = scale of firms; X2 = technology level; X3 = dummy variable (X3 = 1 if obtained guidance, 0 otherwise); and X4 = production performance. Sample $N = 118$. * $\alpha = .05$. ** = .01. The regressions are the following:

- (1) $X3 = .48878 X1 + .95250 X2$, $R^2 = .24270$, $F = 6.97959$, **
(.835) (5.567)*
- (2) $X4 = .15198 X1 - .01901 X2 - .11508 X3$, $R^2 = .03565$, $F = 1.36770$.
(1.604) (-.197) (-1.203)

The unbalanced growth theory and the infant protection theory support the idea of key industries. The free economy theory and the balanced growth theory do not support this idea. Some scholars of the market failure theory agree that the government can intervene in the marketplace in the case of market failure.

2. Are the criteria used for selecting strategic products suitable for achieving the role of key industries?

Contradictions exist among different criteria, as is shown in Shea (1983) and Wu, Lee, and Yu (1988). Unless the government can clearly identify the social welfare objective and set definite weights for different criteria, arbitrarily selected criteria would not help economic development.

3. Are the process of and measures for executing policy effective in improving the investment position and performance of firms?

This paper provides empirical evidence that the preferential policy for strategic industries has not significantly improved the investment, financial situation, and operational performance of firms.

This study does have some limitations, however. Data on the surveyed firms before 1981 could not be obtained. The quantification of the qualitative vari-

ables used in the study may also be subject to criticism for its exactness. However, the method used in this study is a better approach than those used in other studies. As for the influence of the preferential policies studied, it could be the case that other policies (such as fiscal preferential policy) might have some effect on the decision-making processes of firms in Taiwan; however, these are not touched on here. Moreover, if the effects of preferential policies require more time to take effect, only future studies, given sufficient data, would be able to discover the actual effects.

References

- Dervis, K., and J. M. Page, Jr. 1984. Industrial policy in developing countries. *Journal of Comparative Economics* 8: 436–51.
- Hirschman, A. O. 1958. *The strategy of economic development*. New Haven, Conn.: Yale University Press.
- Judge, G. G., W. E. Griffiths, R. C. Hill, and T. C. Lee. 1980. *The theory and practice of econometrics*. New York: John Wiley & Sons.
- Kuo, Shirley W. Y. 1983. *The Taiwan economy in transition*. Boulder, Colo.: Westview.
- Laumas, P. S. 1975. Key sectors in some underdeveloped countries. *Kyklos* 28 (1): 62–79.
- . 1976. Key sectors in some underdeveloped countries: A reply. *Kyklos* 29 (4): 767–69.
- Li, Kwoh-ting, and Yu Tzong-shian, eds. 1982. *Experiences and lessons of economic development in Taiwan*. Taipei: Academia Sinica.
- Nurkse, R. 1953. *Problems of capital formation in underdeveloped countries*. New York: Oxford University Press.
- Pigou, A. C. 1918. *The economics of welfare*. London: Macmillan.
- Shea, Jia-Dong. 1983. Industry upgrading, capital accumulation, and finance strategy (in Chinese). *Monthly Review of Money and Finance* 12 (May): 2–9.
- Wu, H. L., S. F. Lee, and R. R. Yu. 1988. *The policy of industrial structure adjustment* (in Chinese). Taipei: Chung-Hua Institution for Economic Research.
- Yotopoulos, P. A., and J. B. Nugent. 1973. A balanced-growth version of the linkage hypothesis: A test. *Quarterly Journal Economics* 87 (2): 157–71.
- . 1976. *Economics of development: Empirical investigation*. New York: Harper & Row.

Comment Yoo Jung-ho

The first thing that one would like to know in evaluating an industrial policy is whether it is prompted by a case of market failure that justifies government intervention of some form. If the market can do better acting alone than it can

Yoo Jung-ho is a senior fellow at the Korea Development Institute.

with government intervention, there is no justification for government intervention. However, market failure is a theoretical concept, the existence of which is very difficult to prove or disprove, and the question of market failure may be irrelevant for an industrial policy that is already implemented.

Another tack that one may take in evaluating a government policy is to consider whether the benefit of the policy to the society is larger than or at least as large as its opportunity cost. Yang's paper appears to take this approach in evaluating the Taiwanese government's industrial policy in the 1980s. The major support measures of the policy were preferential loans with interest rates lower than market rates and technical and management assistance. The paper hypothesizes that the effects will take place through a number of "channels" and estimates the effectiveness of the policy supports at each channel. The empirical investigation is based on a survey of firms in the industries in which the recipients of the policy supports were located. The industries were mechanical products and information and electronics.

It should be pointed out that the paper evaluates Taiwanese industrial policy by the effects on the firms that received some support from the policy. For a balanced evaluation, one should weigh the effects on the recipients of the policy supports against the negative effects experienced by others. Since no government can create something out of nothing, if the government gives assistance to some, that assistance inevitably entails some costs that must be borne by someone else in the economy, not the government.

Admittedly, a correct estimation of these costs is almost always impossible. This does not mean, however, that one may ignore the problem. The paper could have made a greater contribution to the understanding of the effects of industrial policy had it provided some information on, for example, what the provision of preferential policy loans meant to the firms in the industries not favored by the policy in terms of higher cost of capital or increased difficulty in obtaining the loans or in terms of investment opportunities foregone as a consequence.

Most likely, the firms in the industries not favored by the policy were even less aware of the industrial policy than those in the favored industries. It is also likely that no more statistically significant replies can be expected from the firms in the nonfavored industries to the questionnaires than those the author obtained in her survey from the firms in the favored industries. Thus, an analysis of survey returns may not be an effective way of evaluating industrial policy. It may have been better to examine the performance of two groups, favored and not favored by the industrial policy, either at the firm level or at the industry level.

The paper, however, deserves praise for its efforts to identify the paths through which the effects of an industrial policy take place. This kind of inquiry will increase our understanding of the interaction between government policy and business responses and will enable us to make a more informed judgment as to the desirability of industrial policy.

Comment Tan Eu Chye

Ya-hwei Yang presents a very useful analysis of the effectiveness of the strategic industrial preferential policy of Taiwan. Such an evaluation of government policies is definitely needed to ensure their efficacy. The following are points raised by the author that I feel call for specific comment.

1. *Taiwan's experience can be used as a reference for other developing countries' industrial policy.*

To some extent this is true. But each country has its own economic, social, and political background. The Asian nations are a heterogeneous grouping. Hence, none of the newly industrialized countries (NICs) can be used as a model of economic development for Asian developing countries.

2. *The finance factor does not dominate the other factors in the investment decision-making process of the firms and their operational performance.*

Apart from the reasons given by the author, this may also be due to the magnitude of the assistance extended given the fact that the preferential loan rates are only 1.75–2.75 percent lower than the prime lending rate of commercial banks and the low limit of NT \$1 million that the government can subsidize on the consulting expenses of the firms as stated by the author. The finance factor may become a major factor if the magnitude of assistance is revised upward.

3. *The criteria adopted before industries can be designated as strategic may be in conflict with each other. For example, there is a conflict between a high degree of value added as one criterion and a high linkage effect as another.*

There may be no conflict between the two depending on the level at which value added is defined. If it is defined at the national level, which I am more ready to believe, then high value addedness of an industry is consistent with strong linkages in the economy, particularly backward linkages.

4. *The government does not follow the criteria when identifying strategic industries.*

The fact that the government arbitrarily chooses the industry to be granted such preferential treatment means that there is the attendant risk of making an inappropriate choice. It is a well-acknowledged fact that the public sector cannot respond more efficiently to market signals than the private sector. Rather than making an arbitrary choice, the government can always initiate a study of prospective industries, a study that approximates some social cost-benefit analysis. An environmental impact assessment (EIA) study of industries can also be launched.

5. *Government-assisted firms are satisfied in the area of technology, especially with regard to research and automation. And private consulting firms seem to give firms a greater degree of satisfaction.*

This is not an unexpected phenomenon as it is common knowledge that private-sector-run establishments are generally more efficient than public-sector-run establishments.

Generally, the move by the Taiwanese government to designate certain industries as strategic is a step in the right direction, disregarding its practical aspect, so long as these industries are not lavished with tariff protection at the same time. Otherwise, it merely constitutes a “double” protection for these industries, and the effective rate of protection (EPR) can be very high. Industries that are heavily protected usually remain infant forever.