

Chen, Jo-hui

Article

An analysis of industrial characteristics and incentives on foreign investment: The case of rapid economic growth in Taiwan

The Journal of Entrepreneurial Finance and Business Ventures

Provided in Cooperation with:

The Academy of Entrepreneurial Finance (AEF), Los Angeles, CA, USA

Suggested Citation: Chen, Jo-hui (2005) : An analysis of industrial characteristics and incentives on foreign investment: The case of rapid economic growth in Taiwan, The Journal of Entrepreneurial Finance and Business Ventures, ISSN 1551-9570, The Academy of Entrepreneurial Finance (AEF), Montrose, CA, Vol. 10, Iss. 3, pp. 89-107

This Version is available at:

<https://hdl.handle.net/10419/55947>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

An Analysis of Industrial Characteristics and Incentives on Foreign Investment: The Case of Rapid Economic Growth in Taiwan

Jo-Hui Chen^{*±}
Chung Yuan Christian University

This study measured the impacts of the industrial characteristics and the fiscal incentives that influenced foreign direct investment. We used the fixed effect model with a 2SLS simultaneous equation for the period of rapid economic growth from 1980 to 1996 across nine industries in Taiwan. We found that the wage and market size are positively correlated with foreign national investors, while exports are negatively correlated with overseas Chinese investors. The results also indicated that the tax holiday and the statute for the promotion of upgrading industries affect foreign national investors positively, but that R&D tax credits are ineffective. The relatively high effective tax rates may not deter investments by foreign national investors, thus providing more profitability to a region of economic growth, such as Taiwan. In addition, the profitability of overseas Chinese investors is supported by asset efficiency.

Introduction

Many countries continuously use economic policy and fiscal incentive instruments to stimulate foreign investment. To promote technological development and to increase employment, host countries normally offer foreign investors tax incentives such as a tax holiday, a reduction in corporation income tax rates, or allowances for accelerated depreciation in order to reduce capital costs. [Easson (1992)] The expectation is that the benefits from these efforts outweigh the costs—tax revenues and infrastructure expenditures. Policymakers in developing countries, however, have seen little empirical evidence showing how well these

* Jo-Hui Chen is an Associate Professor and chairman in the Department of Finance at Chung Yuan Christian University (CYCU), Taiwan, R.O.C. He earned a Ph.D. in Economics from Northern Illinois University (NIU), U.S.A. Dr. Chen was then bestowed Award for Outstanding Economics Research Scholar at NIU. He also received three Grants of Outstanding Economics Researcher from National Science Council of Taiwan, R.O.C. His disciplinary background is in the field of Public Finance, International Monetary, and Regional Economics. Currently, his areas of research interest are International Investment, Merger and Acquisition, and International Public Finance.

± The author appreciates the grant received from the Nation Science Council of Taiwan R.O.C. (NSC 89-2415-H-033-004)

various incentives actually work in stimulating foreign capital inflows and how the benefits compare with the losses in tax revenue.

Some recent empirical studies on taxation and economic growth, based upon the theory of supply-side economics, have generated important policy implications. To examine the influence of various tax policies on the foreign investment's decisions, Hartman (1984) found that a decline in U.S. tax tends to increase FDI accomplished by reinvestment of earnings and explicit transfers of funds in the U.S. Koechlin (1992) showed that market size, labor cost, and effective tax rate are the important factors for attracting FDI. Using a simultaneous equation model, Tsai (1994) examined the jointly determined effects of FDI and economic growth in Taiwan. He confirmed the market size hypothesis, suggesting that large market size can attract foreign direct investment due to the efficient utilization of resources and the advantages of economies of scale. He also found that a deterioration of the trade balance has led the Taiwan government to adopt more liberal policies to facilitate FDI inflow. In addition, a cheap labor cost hypothesis was an important factor for international investment decisions.

To determine how FDI are affected by the microeconomic determinants, Chen (1992) found that both large and small firms in Taiwan with successful export experience prior to FDI tend to have more foreign ventures. Zhang (1999) examined the causal-order between the role of FDI-led in economic growth and the effect of economic growth-driven on inward FDI flows for the ten East Asian economies. These results indicated that economic growth through technological upgrading and knowledge spillovers in host countries has a positive and statistically significant effect on FDI. In addition, higher FDI tended to increase economic growth in the long run for five economies (i.e., China, Hong Kong, Indonesia, Japan, and Taiwan) and in the short run for Singapore's economy.

Several empirical studies have provided some statistical supports for the role that fiscal policies and incentives play in FDI. To measure how a variety of foreign tax laws influenced the repatriation practices of U.S. multinational corporations, Mutti (1983) collected 4,446 tax return data from U.S. owned foreign manufacturing subsidiaries in eleven countries (i.e., Mexico, Italy, Germany, Canada, France, Britain, Brazil, Switzerland, Denmark, Taiwan, and Singapore). The statistically significant non-parametric test suggested that financial practices could be influenced by tax incentives such as investment tax credits. Moreover, Chen (1998) used the fixed effect model with a partial adjustment mechanism. The author concluded that national variation in property taxes, sales taxes, GDP, and wages, plays a statistically significant role in attracting FDI. Interestingly, new technology credit may attract more FDI, which improves the technological capability of Southeast Asian countries. Export credit seems to help Latin American countries to boost export-oriented capacity. To analyze the linkage effects of FDI in Taiwan, Schive and Majumdar (1990) made a distinction between Overseas Chinese and Non-Chinese foreign investors located both inside and outside Export Processing Zones (EPZs). Again, the results show that greater FDI leads to more economic growth and higher exports. The similar research of Chen (2000) applied a computable general equilibrium (CGE) model to examine the impact of the EPZs on Taiwan's economy.

Considering the externality effects, these findings suggested that the creation of EPZs have been successful in attracting FDI to enhance the production and national income in Taiwan. However, Steinnes (1984) and Coughlin, Terza, and Arromdee (1990) found conversely that taxes, measured in the various ways, have negative effects on the location of FDI. States providing tax incentives, financial assistance, and employment assistance did not receive a larger amount of foreign direct investment in the U.S. Likewise, Feltenstein and

Anwar (1993) constructed a dynamic general equilibrium model to analyze the use of investment tax credits and capital tax changes in Pakistan. The authors concluded that the changes in the corporate tax rates are likely to be greater than the increased investment tax credits in order to provide the cost effectiveness to attract foreign direct investment. In an empirical research of international investment location decisions in 1980s, for example, Wheeler and Mody (1992) concluded that U.S multinationals are likely to prefer good quality infrastructure in the early phases of development.

Literature reviews have examined FDI from the perspectives of macroeconomic factors and fiscal incentives. However, the numerous empirical studies of the effects of national characteristics and incentives yield very inconclusive results. Most of their contributions are limited because they failed to integrate related variables into a comprehensive explanatory model of industrial sectors.

The purpose of this study is to examine how the industrial characteristics and fiscal incentive policies influence the behavior of overseas Chinese (i.e., people of Chinese descent living outside of China and Taiwan) and foreign national investors of inward FDI on Taiwan.¹ We conduct an empirical analysis to hypothesize the impacts of specific variables on the interaction between FDI and profitability in Taiwan at industrial level. Unlike the imposition of inheritance tax on the amount of overseas Chinese investment, foreign national investors, who are not be subject to the Land law, are more likely to bring in foreign technology and R&D activities to produce new products. (Schive and Majumdar, 1990) A special feature of this analysis is that it includes several industries in Taiwan, some of which are eligible for incentive programs such as investment credit, R&D tax credit, science-based industrial park, and the Statute for Promotion of Upgrading Industries.

Considering its industry-specific nature, this study developed the pooled cross-section and time-series data for the fixed effect model with a 2SLS simultaneous equation framework being used to obtain an appropriate inference from the results of the least squares. It is appropriate to select Taiwan for analysis because it is an export-oriented, newly industrialized country that has continual income growth. Also, tax reform has been one of the central issues in Taiwan's economic development since the early 1980's. In view of foreign direct investment in Taiwan in the period of 1952-1996, Table I illustrates the comparative foreign investment flows over the past decades for overall FDI, overseas Chinese investment, and foreign national investment. Comparing the periods 1988-1991 to 1992-1996, overall FDI has increased in Electronics and Electric Appliances, Banking and Insurance, Transportation, and Services, but it has decreased in Plastic and Rubber Product, Chemicals, Non-metals and Metal Product, Basic Metals and Metal Product, as well as Machinery Equipment and Instruments. Because the Taiwan government has encouraged more technology-intensive industries, it provided incentive programs for attracting foreign investors. From 1992 to 1996, Electronics and Electric Appliances became the most important industry in Taiwan because the number of foreign national investment was 2,475, the highest of all industries. This was followed by Chemicals, with 832; and Services, with 736. Moreover, overseas Chinese investors have

¹ The Investment Commission of Taiwan, R.O.C. enacted the Statute for Investment by Overseas Chinese and the Statute for Investment by Foreign Nationals to classify two foreign investment sources, overseas Chinese investment and foreign national investment. To ensure the development and stability of Taiwan's economy, the Investment Commission will set the national policy of economic liberalization, and also examine the execution of industrial capital inflows by overseas Chinese investment and foreign national investment. (The Investment Commission's Organizational Statute, 2000)

been devoted to Services, Banking and Insurance, which were ranked first and second respectively, from 1992 to 1996.

I. Data and Empirical Model

The data employed in this paper was collected from the publications of Statistics on Overseas Chinese & Foreign Investment and Corporate Taxes and a Worldwide Summary. Table II explains the variables' names and the sources of data that influenced FDI and PROFIT. We used the pooled data of the rapid economic growth from 1980 to 1996 and a cross section of nine major industries, consisting of Chemicals, Basic Metals and Metal Products, Machinery Equipment, Electronic and Electric Appliances, Transport Equipment, Precision Instruments, Transportation, Banking and Insurance, and Services. The pooled time series and cross-sectional database consists of 153 observations (i.e., 9 industries over 17 years).²

To obtain the effect of industrial characteristics and fiscal incentives, following Chen (1998), we examine the variables that are hypothesized to influence overall FDI. In this framework, it is useful to supplement the information on FDI by conducting similar analyses of the industrial sectors for foreign national investment and overseas Chinese investment. We expect that the impact of industrial characteristics and fiscal incentives will vary according to the specific investment category.

II. Estimates of the FDI Equation

First noted that foreign direct investment (FDI) is affected by financial conditions. Increasing profitability, as measured by after-tax return for operating income, may cause foreign affiliations to reinvest or send in more capital in order to expand their production. Nigel and Melanie (1997) presented empirical evidence indicating that increased profitability in FDI does indeed generate an expansion in production. Therefore, the firm's profitability should be positively correlated with FDI.

Moreover, the sign on average monthly payrolls, WAGE, will depend on the efficiency wage theory being associated with the impact of wage costs as a major management cost.³ The efficiency wage theory indicates that an increased wage due to increased labor experience will affect labor productivity. This will directly promote the industrial productivity, and leads to higher wages. However, studies by Tsai (1994) and Chen (1998) used the cheap labor cost hypothesis and found that a decrease in wages encourages FDI inflows into host countries. Thus, the coefficient of WAGE is inconclusive.

Capital density, CAP, has been used in the literature as a proxy variable for measuring the capital intensity of the production process, and indicates the degree of technology in the form of capital goods in that industry. Love and Francisco (1999) found that inward FDI of Mexican affiliates in U.S. multinationals was positively related to a higher degree of capital intensity embodied in the production processes. Therefore, we expected this variable to have a positive sign.

In order to estimate the effect of the market size (SIZE) on FDI, we include the sales of foreign firms in Taiwan. Sharmistha and Wheeler (1989) and Liu, Song, Wei, and Romilly (1997) found that the higher the value of SIZE, the greater the market demand in attracting

² This paper is based on the unbalance of the pooled time series-cross-sectional data, which may reduce the observations because of accounting for incomplete data. (Greene, 1997)

³ See Jansen, Delorme, and Ekelund (1994).

foreign investors. In addition, Scaperlanda and Mauer (1969), Tsai (1994), and Love and Francisco (1999) asserted that an expansion in market size and a higher level of sales to exploit economies of scale tended to increase FDI. We would therefore expect that market size would be positively correlated with FDI inflows.

The value of the exports, EXPORT, is a leading index in the evaluation of international competitiveness and a positive signal of a healthy economy with respect to other export-oriented host countries. Therefore, the export level can affect the host country's level of FDI by increasing foreign capital inflows, and it is easy to see the positive relationship between EXP and FDI. However, Tsai (1994), Mainardi (1992), and Chen (1998) found that trade deficits can force governments to adopt more favorable policies to encourage inflows of FDI. Hence, the EXP sign remains indeterminate.

All of the less-developed and industrializing countries have established investment promotion programs, and tax incentives are a part of these programs. In addition to a variety of incentives for promoting both domestic and foreign investment, some special concessions are offered to foreign investors. The Taiwanese government offers certain tax incentives to "Foreign Productive Enterprises". Based on the data from "Corporate Taxes- a Worldwide Summary", Table III shows the comparison between fiscal incentive programs for overall foreign investors, as applied to general industry in Taiwan from 1979 to 1996. Four fiscal incentive dummy variables have been included to capture the effect of incentive policies at the industrial level. These include R&D tax credit (R&D), tax holiday (HOL), science-based industrial park (PARK), and the statute for promotion of upgrading industries (UP).

Swenson (1992) found that tax credits have a positive impact on research and experimentation expenditure in U.S. By influencing the location decisions of foreign investors, they may encourage the transfer of advanced technology from abroad to develop technological capability. Therefore, host countries clearly see the need to intervene via the tax code in order to stimulate R&D activities. The Taiwan government also provides a four-year tax holiday from the business income tax to attract multinationals. However, Lim (1983) found that tax holidays resulted in a totally unexpected negative sign, suggesting that a lack of natural resources and general economic growth can offset the benefits of fiscal incentives to lure FDI. Moreover, the existence of the science-based industrial park in Taiwan emphasizes a deregulation in multinational economic activity within the park. The program amounts to a test of how much FDI will be attracted to these areas as a result of the tax relief available through this expansion project. In addition, the industrial park provides investment credit for new machinery and equipment purchased, allowing foreign firms to reduce taxes paid by a certain percentage of investment expenditure, which immediately benefits the investing company. To achieve industrial development, policymakers have enacted a statute for the promotion of upgrading industries in order to attract FDI inflows into Taiwan. This statute provides multinationals with benefits for several years, including tax credits, an accelerated depreciation related to the equipment or technology used for automation, energy efficiency, R&D, and pollution control. Thus, we hypothesize that the R&D tax credit, tax holiday, the science-based industrial park, and the statute for the promotion of upgrading industries were all have positive effects on the level of FDI inflow.

III. Estimates of the Profitability Equation

Empirical supports revealing the importance of foreign direct investment and its profitability have been presented by Santiago (1987) and by Tung and Cho (2000). In order to

attract foreign investors, and thus obtain modern technology for a continuous economic growth, a host country may provide a well-structured facility and better profits making opportunities for foreign investors. Thus, foreign direct investment (FDI) is hypothesized to have a positive effect on the profitability. This equation shows that an increase in the net differential of rates of return to capital, which is associated with operating efficiency, may alleviate an increase in foreign capital inflow if the income tax on foreign capital is increased. We measure the financial ratios for profitability by the after-tax rate of return for operating income. According to the corporate income tax rate in Taiwan, different tax rates exist for different industries. The income tax rate, including surcharges, may not exceed 20% of annual taxable income for capital- and technology-intensive enterprises. Other enterprises, which are not subject to this tax rate, will have the regular corporate income tax rate from 25% to 35% during the sample period. (Corporate Taxes-a Worldwide Summary, 1996) Note that the effective tax rate in Taiwan is measured by taxes paid, divided by earnings and profits before tax, for that individual industry.⁴ The effective tax rate theory utilizes corporate income tax, capital gains tax and dividend tax as the criteria for multinationals to determine their investment decisions.⁵ The pioneering study of Hartman (1984) and Young (1988) used the log-linear models, in which the marginal investment decisions of firms that are reinvesting earnings or transferring new funds from abroad could be affected indirectly by taxes through the after-tax rate of return. In the recent regional business location literature, Gubert and Mutti (1991) revealed the strong negatively impact of the effective tax rate on the after-tax profitability of U.S. multinational corporations that had shifted taxable income to low-tax locations. As a hypothesis, we expected that a higher effective tax rate (TAX) implied a lower profitability in terms of after-tax rate of return.

Aside from the effective tax rate, operating efficiency with a variety of key determinants such as ownership advantage, managerial efficiency, and asset efficiency may directly influence the after-tax rate of return. The ownership advantage (OWN) as a proxy variable represented the foreign investment as the percentage of real stock capital. The higher the share of ownership, the greater the firm-specific advantage is expected in terms of management know-how, production technology, and marketing skills. These will all lead to higher profitability. Li and Guisinger (1991) found that having the ownership advantage in foreign firms allows them to compete more effectively with U.S firms in certain sectors within the U.S. Thus, we expected the coefficient of OWN to have a positive sign.

To capture an important aspect of managerial efficiency (MAN), the appropriateness of operational technology is measured as the operating revenue per worker in the industry. We hypothesize that the more effective the managerial technology, the more likelihood that profitability will take place. The empirical research, for example, Chou (1988) also concluded that operational technology is likely to have a positive influence on profitability. Moreover, it is reasonable to assume that a higher return on assets corresponded to asset efficiency (ASSET) may generate revenues from their fixed assets, thus increasing profitability. Hence, the coefficients on MAN and ASSET are expected to be positive.

By using a cross-section of FDI for nine industries over the period ranging from 1980 to 1996 in Taiwan, we are able to increase the number of observations in the analysis. Although

⁴ See. Koechlin (1992) and Newman and Turnbull (1991).

⁵ Hall and Jorgenson (1967) originally developed the effective tax rate theory based on the neoclassical theory of capital accumulation and the notion of user cost of capital.

analyzing pooled data offers significant advantages, giving cross-section variability as well as variability over time, one must be careful to control for unobserved individuals and/or time characteristics. Otherwise, it can result in specification bias and/or inefficient estimates can occur. [Kennedy (1994), Greene (1997)] We specify the following 2SLS equations of the two-way fixed effects model with the industry (i) and time (t) dummy variables. In the simultaneous equation model, both foreign direct investment (FDI) and profitability ($PROFIT$) are endogenous variables that are jointly determined and affected by the simultaneous interaction of other predetermined variables as follows:

$$FDI_{it} = \alpha_{1i} + \gamma_{1t} + \beta_1 \cdot PROFIT_{it} + \beta_2 \cdot WAGE_{it} + \beta_3 \cdot CAP_{it} + \beta_4 \cdot SIZE_{it} \\ + \beta_5 \cdot EXPORT_{it} + \beta_6 \cdot R \& D_{it} + \beta_7 \cdot HOL_{it} + \beta_8 \cdot PARK_{it} + \beta_9 \cdot UP_{it} + \varepsilon_{it} . \quad (1)$$

$$PROFIT_{it} = \alpha_{2i} + \gamma_{2t} + \delta_1 \cdot FDI_{it} + \delta_2 \cdot TAX_{it} + \delta_3 \cdot OWN_{it} + \delta_4 \cdot MAN_{it} + \delta_5 \cdot ASSET_{it} + \psi_{it} . \quad (2)$$

where α and γ are different fixed intercepts representing the industry and time dummy components for two-way fixed effect model, and ε and ψ are a random error components. The unobserved industrial specific characteristics such as location and the diffusion of industrial technology can be included by introducing a shift parameter α for each industry. In addition, other unspecified features of nationwide time-specific economic factors such as the business cycle, population, and government economic policies can be expressed by introducing a shift parameter γ . [Helms (1985)] Here, we imposed the restriction $\sum_i \alpha_i = \sum_t \gamma_t = 0$ to avoid the problem of multicollinearity. [Greene (1997)] Note that the estimation equation is measured in natural logarithms. To obtain the more efficient estimators, we apply a Lagrange Multiplier test (LM), as described by Hausman (1983), for testing over-identifying restrictions under the null hypothesis of exact identification. The LM test statistic is defined as TR^2 , where T is the total number of observations for the panel data. The LM test statistic is asymptotically distributed as chi-squared with $(K_j - M_j)$ degrees of freedom, where K_j is the number of excluded exogenous variables in the j th equation and M_j is the number of endogenous variables included in j th equation. [Greene (1997)]

IV. Results and Interpretation

Table IV tabulates the specifications for overall FDI, foreign national investors and overseas Chinese investors. We specified six columns for models I-VI of 2SLS models regarding to the FDI in equation (1) and the profitability in equation (2), respectively. Across these models, we reported the goodness of fit measure of the adj- R^2 ranged from 0.07 to 0.85. Note that the high adj- R^2 value (that is, 0.85) in model (I) may be caused by the 2SLS models

with a very large number of exogenous variables.⁶ [Madalla (2001)] The LM test for the over-identifying restrictions versus exact identification yields a significant value ranging from 5.67 to 68.85 for the models (I)~(VI). Thus, we reject the null hypothesis of exact identification. This test results suggest that all the equations are over-identified. So we may estimate them by 2SLS.

We discussed the major determinants of FDI and profitability for overall FDI from their home countries in specifications I and II. These determinants, however, are expected to statistically differ between foreign national investment and overseas Chinese investment. It is advisable to further supplement the information on FDI and profitability by conducting similar analyses in order to provide better specific measures for policymakers. The results are summarized in specifications III~VI of Table IV.

Our results reveal that, consistent with the hypothesis, the coefficients for the profitability have positive effects on both foreign national investors and overseas Chinese investors in specifications III and V, even though the estimates are not generally statistically significant. In addition, we obtain a statistically significant and negative effect in specification I to capture the impact of the profitability for overall FDI inflows. And this finding asserts that higher profitability does not lure foreign investors to continuously reinvest or remit more capital to produce a niche for marketable products in Taiwan. One reason for this may be that the market demand is already saturated.

Comparing across all specifications, we found that the coefficients of the market size (SIZE) and the wage rate (WAGE) have a positive and statistically significant effect on overall FDI and foreign national investors in specifications I and III. These positive coefficients support the view that a higher amount of sales implies a larger market size for exploitation of economies of scale and a greater potential demand for attracting overall FDI, especially for foreign national investors. Also as expected, the wage rate (WAGE) is positive and statistically significant at the 0.05 levels for the foreign direct investment regression. These results reaffirmed the efficiency wage theory, that foreign national investors are willing to pay higher wages to compensate the skilled workers in order to improve industrial productivity and reduce hiring and retraining costs.

The negative and significant coefficients of the capital intensive (CAP) factor provide strong evidence that overall FDI and foreign national investors in Taiwan are not driven by benefits derived from technological knowledge contained in capital goods in specifications I and III. One possible explanation is that multinationals may reluctant to transfer funds into the capital intensity of foreign-owned manufacturing investment in a politically uncertain region, such as Taiwan. Besides, foreign investment in Taiwan can be viewed as especially productive and profitable due to a comparative advantage in non-capital intensity of new production facilities.

In addition, the coefficients of exports show the expected signs in specifications I and III. However, they are statistically insignificant. This result seems to indicate that FDI inflows have been encouraged by trade surpluses. However, the negative coefficient for exports suggests that government can enhance trade policies to increase FDI inflows from overseas Chinese investment in order to reduce trade deficits in specification V. Consistent with the findings of Tsai (1994), Mainardi (1992), and Chen (1998), the test results imply that

⁶ Madalla (2001) concluded that whenever the R^2 from the 2SLS estimator is negative or very low and the R^2 from the OLS estimation is high, one should worry about the problems of the identification in particular equation.

the lower the exports in Taiwan, the greater will be inward FDI in Taiwan from overseas Chinese investors.

We find strong support for the effect of fiscal incentives, including tax holidays (HOL), and the statute for the promotion of upgrading industries (UP) for overall FDI and foreign national investors in specifications I, and III. As anticipated, the tax holiday (HOL) and the statute for promotion of upgrading industries (UP) coefficients are positive and statistically significant. These results may partially indicate that foreign producers tend to be drawn to industries with tax exemptions during a certain holiday period, and also to favorable investment credits in order to meet the requirement for industrial upgrading. By doing so, multinationals can minimize the cost of operating affiliates in Taiwan. We also find a negative and statistically significant coefficient for the statute for promotion of upgrading industries (UP) for overseas Chinese investors in specification V. This implies that a growing number of overseas Chinese investors may invest in potential competitors in Southeast Asia and Mainland China to benefit from more tax incentives.

Somewhat surprisingly, the coefficient of R&D tax credit was negative and significant in specification III. This result seems to imply that R&D tax credits are ineffective in attracting foreign national investors. One explanation is that if policy makers offer R&D tax credits for some particular industries, other countries can easily and rapidly replicate a similar package of incentives to obtain foreign technologies. Therefore, the net result may be ineffective and largely offset by the competing countries' equally generous tax concessions. Further, we found that the Science-based Industrial Park (PARK) coefficients are positively correlated with FDI for foreign national investors in specification III. This finding suggests that providing investment credit and tax reductions for eligible firms located in the science-based industrial park can attract foreign national investors. However, the Science-based Industrial Park (PARK) coefficients are found to have a negative effect on FDI for overseas Chinese investors in specification V. These findings state that overseas Chinese investors may not be lured by incentives in the science-based industrial park because the high number of large users in the small park area has recently caused power problems. [Pao (2001)] Foreign national investors may benefit from Taiwan's core strengths of cost-effective manufacturing and the flexibility to rapidly switch to new products. These may outweigh the costs of a power limitation.

Among the other explanatory variables in the profitability equation, the FDI coefficients for both overall FDI inflows and overseas Chinese investors in specifications II and VI have the expected sign but are not statistically significant. This result seems to indicate that accessing technology transfer via foreign direct investment is not an important factor in influencing the profitability of industrial sectors in Taiwan. Nevertheless, FDI inflows from foreign national investors have a negative and statistically significant effect on the profitability. This indicates that foreign producers tend to provide modern technology, which required a well-established industrial base, the advanced equipment, the costly R&D expenditures, and the skilled workforces in the initial stage. By doing so, an increase in operational cost enabled foreign investors to utilize more leverage in their capital structure that may have led to a lower profitability and a higher leverage risk.

The effective tax rate (TAX) displays sizeable significant effect for foreign national investors in specification IV. It is statistically significant and positively correlated with the profitability for foreign national investors. This finding did not support our expectation that foreign investors are attracted to the relatively low effective tax rates in some host countries.

Another interesting observation is that ownership advantage (OWN) has a strong positive effect on the profitability of foreign national investors in specification IV. The positive coefficients tend to support the hypothesis that the share of foreign ownership is positively related to the profitability for the host country to assess management know-how, production technology, and advanced marketing skills. Note, however, that we found that the coefficient of ownership advantage (OWN) in the industries is negative and statistically significant for FDI inflows in specification II. This suggests that an increase in the share of foreign investment leads to a decline in profitability. This result supports the hypothesis by Prahalad and Bettis (1986), which puts forward the dominant logic theory where the process of decision making by multinationals becomes institutionalized. It appears that multinationals with strong dominant logic characteristics tend to use past experiences to make foreign investment decisions regardless of other relevant information.

Managerial efficiency (MAN) has a positive and statistically significant effect on the profitability for overall FDI in specification II. This suggests that the more effective the managerial technology, the greater the likelihood that profitability will occur. Further, we also found that managerial efficiency had negligible effects on both foreign national and overseas Chinese investors. These findings suggested that the effects of managerial efficiency were insignificant.

We also found strong support for the asset efficiency effect on overseas Chinese investment in specification VI. The analysis suggests that as the return on assets increases, overseas Chinese investment was reasonably efficient in generating revenues from their fixed assets and experiencing higher profitability. However, asset efficiency (ASSET) has only a mixed and negligible effect on overall FDI and foreign national investors.

V. Conclusion

Stimulation of foreign capital inflows is a long-established and important objective of economic policy. Host countries are active in using the industrial characteristics and fiscal incentive instruments to stimulate foreign investment, but little information is available for policymakers on how effective these measures are in accomplishing their objectives. This study developed the pooled data for the fixed effect model with a 2SLS simultaneous equation framework for the period of rapid economic growth in Taiwan. This approach emphasizes the impact of economic factors and fiscal incentives on the interaction between foreign direct investment and profitability in Taiwan at the industrial level.

We also did a comparative analysis between the findings for overall FDI, foreign national investors, and overseas Chinese investors, and several key observations can be highlighted. First, the evidence fails to support the hypothesis that higher profitability attracted foreign investors to further reinvest or remit more funds in Taiwan, perhaps because of the saturated market demand. In addition, foreign investors, who provide technology transfer, are not an important factor in influencing the profitability of industrial sectors in Taiwan due to a higher operational costs and leverage risk. In general, we found that the estimated parameters of economic factors and fiscal incentives will affect different investment categories in the different ways. To utilize the economies of scale and to reaffirm the efficiency wage theory, the findings indicated that wage and market size are positively correlated with FDI for both overall FDI and foreign nationals investors, but not for overseas Chinese investors. To reduce trade deficits, our results suggest that policymakers should adopt more favorable trade policies in order to facilitate FDI inflows from overseas Chinese investors. The benefits of

being capital intensive provided strong evidence that technological knowledge embodied in capital goods did not have an effect on inward FDI in Taiwan, probably due to a comparative advantage in non-capital intensity industries and a reluctance to transfer funds in a politically uncertain region. We found some statistical evidence that the tax holiday and the statute for the promotion of upgrading industries are both positively associated with FDI inflows for both foreign national investors and overall FDI. However, R&D tax credits are ineffective and may largely be offset by tax concessions and a similar package of incentives provided by other competing countries for foreign national investors.

Finally, we found that the most profitable FDI inflows are in the host country where foreign national investors have higher effective tax rates. This implied that foreign national investors were not extensively influenced by the relatively high effective tax rates in an economic growth region such as Taiwan. In addition, the present analysis supported the hypotheses that higher asset efficiency increased the profitability for overseas Chinese investors. While operational technology was found to be a positive determinant of profitability, we found evidence that foreign ownership has a negative impact on profitability for overall FDI. This is consistent with the dominant logic theory of Prahalad and Bettis (1986). As expected, the share of foreign ownership is positively related to the profitability for host country to assess management know-how, production technology, and advanced marketing skills for foreign national investors.

With industrial variations in foreign capital, knowledge of the determinants of foreign direct investment and the effectiveness of incentives is necessary for an accurate assessment. Policy makers will be able to redesign proper economic incentives to enhance their attractiveness to international investors and also obtain their stated objective cost effectively. Hence, before executing any economic policy, it is wise for government to evaluate its potential impact on foreign direct investment in the industrial sectors.

For future research, we may consider the development of FDI inward in Taiwan and China after obtaining their accession to the WTO beginning at year 2002. To consolidate market access commitments to WTO members and to reform trading systems complied with WTO rules, the Chinese government also provides packages of tax incentives to attract 40-50 billions US dollars foreign direct investment in the past several years. Further research should present in-depth analysis to see if the China factor has any impact on Taiwan's foreign direct investment.

REFERENCES

- Chen, J. R., 2000, *Foreign Direct Investment*, Macmillan Press Co., London, UK, 138-162.
- Chen, J. H., 1998, The Effects of International Competition of Fiscal Incentives on Foreign Direct Investment, *Economia Internazionale*, LI(4), 497-516.
- Chen, T., 1992, Determinants of Taiwan's Direct Foreign Investment, The Case of a Newly Industrializing Country, *Journal of Development Economy*, 39(2), 397-407.
- Cletus, C. C, Joseph V. T., and Vachira A., 1990, State Government Effects on the Location of Foreign Direct Investment, *Regional Science Perspectives*, 20(1), 194-207.
- Corporate Taxes-a Worldwide Summary, Price Waterhouse Co., New York, U.S.A, 1983-1996.
- Davidson, W.H., 1980, The Location of Foreign Direct Investment Activity: Countries Characteristics and Experience Effects, *Journal of International Business and Studies*, 11, 9-22.
- Easson, A. J., 1992, Tax Incentives for Foreign Direct Investment in Developing Countries, *Australian Tax Forum*, 9, 387-439.
- Feltenstein, A., Anwar, S., 1993, General Equilibrium Effect of Taxation on Investment in a Developing Country: The Case of Pakistan, *Public Finance*, 48(3), 255-386.
- Greene, W. H., 1997, *Econometric Analysis*, 3rd ed., Prentice-Hall, Inc., Upper Saddle River, New Jersey, U.S.A.
- Grubert, H., Mutti, J., 1991, Taxes, Tariffs and Transfer Pricing in Multinational Corporate Decision Making, *Review of Economics and Statistics*, 73, 285-293.
- Hall, R. E., Jorgenson, D. W., 1967, Tax Policy and Investment Behavior, *American Economic Review*, 57, 391-414.
- Hartman, D. G., 1984, Tax Policy and Foreign Direct Investment in the United States, *National Tax Journal*, 37, 475-488.
- Hausman, J., 1983, Specification and Estimation of Simultaneous Equations Models, in Z. Griliches and M. Intriligator, eds., *Handbook of Econometrics*. Amsterdam: North-Holland.
- Helms, J. L., 1985, The Effect of State and Local Taxes on Economic Growth: a Time Series-cross Section, *The Review of Economics and Statistics*, 67, 574-84.
- Jansen, D. W., Delorme C. D., Ekelund R. B. Jr., 1994, *Intermediate Macroeconomics*, West Publishing Company, New York, U.S.A.
- Kennedy, P., 1994, *Guide to Econometrics*, The MIT Press, Cambridge, Massachusetts, U.S.A.

- Koechlin, T., 1992, The Determinants of the Location of USA Direct Foreign Investment, *International Review of Applied Economics*, 6(2), 203-216.
- Li, J., Guisinger, S., 1991, How Well Do Foreign Firms Compete in the United States? *Business Horizons*, 34, 49-53.
- Lim, D., 1983, Fiscal Incentives and Direct Foreign Investment in Less Developed Countries, *The Journal of Development Studies*, 19, 207-212.
- Lin, Y., Szenberg, M., Webster, T. J., 2001, Determinants of Foreign Direct Investment: Taiwan, 1965-1993, *Journal of Applied Business Research*, 17(2), 51-63.
- Liu, X., Song H., Wei, Y., Romilly, P., 1997, Country Characteristics and Foreign Direct Investment in China: a Panel Data Analysis, *Weltwirtschaftliches Archiv*, 133(2), 313-329.
- Love, J. H., Francisco, L., 1999, The Ownership Advantage in Latin American FDI: a Sectoral Study of US Direct Investment in Mexico, *The Journal of Development Studies*, 35(5), 76-95.
- Madalla, G. S., 2001, *Introduction to Econometrics*, 3rd ed., Wiley publishing co., New York, New York, U.S.A.
- Mainardi, S., 1992, Foreign Direct Investment in Latin America and South East Asia: Relevance of Macroeconomic and Policy-Related Factors, *Giornale degli Economisti e Annali di Economia*, 51, 259-279.
- Mutti, J., 1983, Tax Incentives and the Repatriation Decisions of U.S. Multinational Corporations, *National Tax Journal*, 34(2), 241-248.
- Newman, R. J. Turnbull, G. K., 1991, The Inter-industry Distribution of Effective Tax Rates for a State Corporate Income Tax, *Review of Regional Studies*, 21, 65-78.
- Nigel, P., Melanic, L., 1997, Regional Economic Integration and Foreign Direct Investment: The Case of German Investment in Europe, *National Institute Economic Review*, 160, 87-99.
- Pao, M., 2001, Behind the Darkness, *Far Eastern Economic Review*, 164(7), 30-31.
- Prahalad, C., Bettis, R., 1986, The Dominant Logic: a New Linkage between Diversity and Performance, *Strategic Management Journal*, 7, 485-501.
- Scaperlanda, A., Mauer, L., 1969, The Determinants of U.S. Direct Investment in the E.E.C, *American Economic Review*, 59(4), 558-568.
- Schive, C., Majumdar, B. A., 1990, Direct Foreign Investment and Linkage Effects: the Experience of Taiwan, *Canadian Journal of Development Studies*, XI (2), 325-342.
- Sharmistha, B., Wheeler, J. O., 1989, A Spatial and Temporal Model of Foreign Direct Investment in the United States, *Economic Geography*, 65(2), p113-129.

- Steinnes, D. N., 1984, Business Climate, Tax Incentives, and Regional Economic Development, *Growth and Change*, 15, 38-47.
- Tsai, P., 1994, Determinants of Foreign Direct Investment and Its Impact on Economic Growth, *Journal of Economic Development*, 19(1), 137-163.
- Wheeler, D., Mody, A., 1992, International Investment Location Decisions, the Case of U.S. Firm, *Journal of International Economics*, 33, 57-76.
- Zhang, K., 1999, Foreign Direct Investment and Economic Growth: Evidence from Ten East Asian Economies, *Economia Internazionale*, 52(4), 517-35.

Table I
Comparative of Foreign National Investment, Overseas Chinese Investment, and Overall FDI by Industries

Unit: US\$ million.

Industry	Investment	1952-1987	1988-1991	1992-1996
Plastic & rubber product	Foreign	189	173	134
	Oversea	39	19	0
	FDI	228	191	134
Chemicals	Foreign	1026	1314	832
	Oversea	58	19	10
	FDI	1084	1333	842
Non-metals & metal product	Foreign	130	128	90
	Oversea	289	4	0
	FDI	419	132	90
Basic metals & metal product	Foreign	478	504	224
	Oversea	38	60	19
	FDI	516	564	243
Machinery equipment & instrument	Foreign	656	527	268
	Oversea	34	17	10
	FDI	690	544	278
Electronic & electric appliances	Foreign	2081	1501	2475
	Oversea	49	65	66
	FDI	2130	1566	2541
Banking & insurance	Foreign	228	406	568
	Oversea	100	255	454
	FDI	328	661	1022
Transportation	Foreign	92	139	315
	Oversea	57	59	42
	FDI	149	198	357
Services	Foreign	596	696	736
	Oversea	356	97	170
	FDI	952	793	906

Note: Foreign = Foreign national investment. Overseas = Overseas Chinese investment.
 FDI = Overall foreign direct investment.

% = The percentage of foreign investment (or overseas Chinese investment) to FDI.

Source: Statistics on Overseas Chinese & Foreign Investment, 1980-1996.

Table II
Variable Definition, Notation, and Sources of Data

Variable	Notation	Definition
Foreign Direct Investment	<i>FDI</i>	Foreign direct investment for overall FDI, foreign national investment and overseas Chinese investment adopted by (1). Unit: US\$ million.
Profitability	<i>PROFIT</i>	Profitability is measured by after-tax rate of return for operating income. The data for foreign nationals and overseas Chinese investors are from (1). Unit: %.
Average Monthly Payrolls	<i>WAGE</i>	Average monthly wages for foreign nationals and overseas Chinese investors at the industrial sectors in Taiwan Area adopted by (1). Unit: US\$ thousand
Capital Intensive	<i>CAP</i>	Capital intensive for foreign nationals and overseas Chinese investors, which is proxied by capital density. Data is from (1). Unit: US\$ thousand.
Market Size	<i>SIZE</i>	Market size is a proxy variable standing for the sales of foreign nationals and overseas Chinese firms in Taiwan. Data is from (1). Unit: US\$ million.
Export	<i>EXPORT</i>	Export for foreign nationals and overseas Chinese investors from (1). Unit: US\$ million.
R&D Tax Credit	<i>R&D</i>	A dummy variable equals to 1 if R&D tax credit is available and 0 otherwise. Data is adopted by (2).
Tax Holiday	<i>HOL</i>	A dummy variable equals to 1 if tax holiday is available and 0 otherwise. Data is adopted by (2).
Science-based Industrial Park	<i>PARK</i>	A dummy variable equals to 1 if Science-based Industrial Park is available and 0 otherwise. Data is adopted by (2).
The Statute for Promotion of Upgrading Industries	<i>UP</i>	A dummy variable equals to 1 if the Statute is available and 0 otherwise. Data is adopted by (2).
Effective Tax Rate	<i>TAX</i>	Taxes paid by individual industry to host government divided by earnings and profits before taxes of each industry for foreign nationals and overseas Chinese firms. Tax data is from (1). Unit: %.
Ownership Advantage	<i>OWN</i>	The ownership advantage was a proxy variable representing the foreign investment as a percentage of real stock capital for foreign nationals and overseas Chinese investors. Data is from (1). Unit: %.
Managerial Efficiency	<i>MAN</i>	Managerial efficiency is a proxy variable representing operating revenue per worker in industries for foreign nationals and overseas Chinese investors. Data is from (1). Unit: US\$ thousand.
Asset Efficiency	<i>ASSET</i>	Asset efficiency as a proxy variable refers to return on asset for foreign nationals and overseas Chinese investors. Data is from (1). Unit: %.

The major sources of data in this paper are: (1) Statistics on Overseas Chinese & Foreign Investment, 1980-1996.
(2) Price Waterhouse Co, Corporate Taxes, a Worldwide Summary, 1980-1996.

Table III
Comparison of Fiscal Incentives for General Industries in Taiwan

Periods	Programs	Features
1986~1992	R&D tax credit	The expenditure incurred R&D may treat 20% of the amount. If enterprises had no R&D expenditure, the tax credit will be allowed on expenditure in excess of 0.5%.
1979 ~1990	Tax Holiday	A new productive enterprise approved under the Statute for encouragement of investment is exempt from income tax for five consecutive years. An expansion of a productive enterprise approved is also eligible for a four-year tax holiday on the profits derived from such expansion.
1983~1991	The Science-based Industrial Park	With the investment in the expansion project, eligible firms located in the Science-based Industrial Park are entitled to investment credit. The company qualified for a four-year income tax holiday can choose to deduct 15% of the cost newly added machinery and equipment from income tax.
1991~1996	The Statute for Promotion of Upgrading Industries	A company limited by shares can claim as a tax credit 5%~20% of the amount invested in the following: (1) Automated production equipment or technology, (2) Pollution control equipment or technology, (3) R&D, professional personnel training and creation of an international brand image, and (4) Energy saving and utilization of industrial-waste-water equipment or technology.

Source: Corporate Taxes- a Worldwide Summary, Price Waterhouse, 1979~1996.

Table IV

Fixed Effect Model with 2SLS Results for Foreign and Oversea Chinese Investors

Variables	Notation	Overall FDI		Foreign National Investors		Overseas Chinese Investors	
		I	II	III	IV	V	VI
		FDI	PROFIT	FDI	PROFIT	FDI	PROFIT
Profitability	PROFIT	-0.01 (-2.52)**		0.002 (0.19)		0.001 (0.42)	
Average Monthly Payrolls	WAGE	0.96 (3.86)**		0.75 (3.70)**		-0.11 (-1.05)	
Capital Intensive	CAP	-0.63 (-5.48)**		-0.41 (-3.60)**		0.01 (0.86)	
Market Size	SIZE	0.31 (3.83)**		0.44 (3.36)**		0.02 (0.34)	
Export	EXPORT	0.01 (0.34)		0.17 (1.59)		-0.001 (-0.04)	
R&D Tax Credit	R&D	-0.11 (-0.54)		-0.55 (-2.11)**		0.44 (1.29)	
Tax Holiday	HOL	1.21 (2.14)**		1.12 (2.31)**		-0.73 (-1.24)	
Science-based Park	PARK	-0.11 (-0.63)		0.10 (0.44)		-0.08 (-0.27)	
The Statute for Promotion of Upgrading Industries	UP	1.03 (1.95)*		1.11 (2.87)**		-0.90 (-1.80)*	
Foreign Direct Investment	FDI		27.47 (1.47)		-13.67 (-7.63)**		23.33 (0.42)
Effective Tax Rate	TAX		-7.69 (-0.71)		6.52 (7.57)**		0.35 (0.08)
Ownership Advantage	OWN		-0.91 (-1.92)*		0.12 (2.55)**		-0.41 (-0.85)
Managerial Efficiency	MAN		23.60 (1.78)*		-1.69 (-1.27)		-2.12 (-0.32)
Asset Efficiency	ASSET		0.002 (0.09)		-0.001 (-0.06)		5.57 (3.01)**
Adj- R ²		0.85	0.07	0.82	0.68	0.66	0.15
LM Test		68.85**	5.67*	73.8**	61.2**	53.46**	12.15**

Note: T-statistics in parentheses.

* Statistically significant at 90 percent level of confidence.

** Statistically significant at 95 percent level of confidence.

