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by

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*The Interaction of Market Structures and External Exposure Effects on Profit Margins: An Empirical Analysis of Taiwan**

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Abstract

Noting the fact that the exchange rate also affects unit input costs in an open economy such as Taiwan's where a large portion of inputs are imported, and thereby influences the prices of goods sold in domestic and foreign markets, we model the dependence of both the industry's revenue and costs on the exchange rate in order to examine the relationship between the exchange rate and profit margins.

Using the data of 19 two-digit manufacturing industries over the period of 1981-1994, we find that Taiwanese manufacturing industries indicate a higher degree of net export exposure. Since the 1987 appreciation of the Taiwanese currency, industries take advantage of the appreciation of the NT dollar, enjoying a reduction in the price of imported inputs into production. The market structures, such as market concentration and industrial products are destined for domestic or export, matter in price transmissions.

Keywords: external exposure, profit margins, market structure, exchange rate.

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I. INTRODUCTION

The increased sensitivity of industries to movements in the exchange rate is largely attributable to the growing reliance of this sector on international trade. However, despite the substantial movements in exchange rates over the past decades, the implication of these movements for real economic activity remain an open question. Exchange rate can cause large shifts in relative unit input costs and influence the prices of goods sold in domestic and foreign markets. If producers are not perfectly hedged against exchange rate movements, their short- and long-run profitability could depend on exchange rates.

There has been an interest in questions about the relation between exchange rates and prices or profits since the large fluctuations of the US dollar in the mid-eights. For example, Clarida (1997), using nationally aggregated data for the 1975-93 period indicates that a permanent 1% real appreciation of the dollar reduces real US manufacturing profits by roughly 1% over the long run. By another view of relating exchange rate to the firms' discriminatory pricing behavior with market power, termed pricing-to-market,[1] Marston (1990) finds that the yen influences the relative markup measured by the ratio of the export price index to the price index for Japanese goods sold in Japan.[2]

The purpose of this paper is to examine the relationship between the exchange rate and profit margins, taking into account both the effect of industry's revenue and costs. A small open economy—Taiwanese manufacturing industry is the subject of empirical work. With greater international division of

[1] It means that if exporters have some market power and markets are segmented, an exchange rate change may induce price discrimination across destination markets.

[2] For an extensive empirical literature on the relationship between exchange rate changes and price adjustments of traded goods see Menon (1995) and Goldberg and Knetter (1997).

production, Taiwanese producers export a greater share of their products and now make more extensive use of foreign parts and material in the production of their goods than in the past. If the Taiwanese dollar (NT dollar) appreciates against the US dollar, for example, Taiwanese producers selling to US markets will find that their dollar revenues translate into less NT dollar than in the past. With this decrease in their 'local-currency profit' the Taiwanese producers are unable to keep the competitive price they charge in US markets. By contrast, however, when the NT dollar rises, the cost of imported inputs falls. The resulting industries' profits can at least partly offset the revenue losses associated with the NT dollar appreciation given the advantage of imported cost side. Therefore, exchange rate changes, by affecting revenues of export, also affect costs of imported materials.

In order to capture both the revenue and the cost sides of an industry's exposure to exchange rate movements which is the first objective of this paper, we follow Goldberg and Crockett (1998) to construct measures of industry utilization of imported inputs into production starting from the input-output tables for each of these industries. This measure is computed as the share of an industry's total revenue that is derived from exports less the share of its total spending that is attributable to imported inputs. The net exposure of each of the 19 two-digit Taiwanese manufacturing industries are traced for the period between 1981 and 1994. We show that most Taiwanese manufacturing industries have considerably shifted their external exposure over the last decade. External exposure has changed more through increased reliance on imported inputs into production than through increased reliance on export.

The second objective is to examine the importance of the export exposure,

import exposure, and external exposure channels for the transmission of exchange rate activity into expected profits. This approach complements other studies of the real effects of industry exposure to exchange rates which tend to highlight the importance of export exposure and competition from imports without explicitly addressing reliance on imported inputs into production.

The paper is organized as follows. Section 2 presents a model which takes both the industry's revenue and costs on the exchange rate into account in order to illustrate the effects of exchange rate changes on expected profitability. Section 3 explains the index of exposure used to measure industry exposure to exchange rates through exports and imported inputs into production. Section 4 presents the empirical results on the relationhip between exchange rate fluctuations, external exposure, and profit margins. The summary and conclude are presented in section 5.

II. MODEL

Suppose a firm at the beginning of each period observes exchange rate and makes its choice of output in the domestic and foreign market. The per-period profits for a representative firm in industry i can be represented as:

$$\Pi_i = p_i^D\left(\hat{Q}_i^D\right)\cdot\hat{q}_i^D + ep_i^F\left(\hat{Q}_i^F\right)\cdot\hat{q}_i^F - c_i\left(w^D, ew^I, \hat{y}_i\right) \tag{1}$$

where a '$\wedge$' over a variable denotes the optimal values obtained from the corresponding maximization problem. $p_i^D(Q_i^D)$ and $p_i^F(Q_i^F)$ are the domestic and foreign inverse demand curves facing the firm that depend on the respective quantities supplied by the firm to each market. $c_i(w^D, ew^I, y_i)$ is the cost function for the total of producing the aggregated volume y_i, where $y_i = q_i^D + q_i^F$.

w^D and w^I, representing domestic and imported input costs in domestic production. e is the exchange rate, defined in terms of domestic currency per unit of foreign currency. We assume that the exchange rate is a log-normally distributed variable. Moreover, the individual firm does not have any recognizable ability to influence the exchange rate and movement in exchange rate volatility.

Suppose the firm applies a constant-returns-to-scale Cobb-Douglas production technology, with production sourced at home using both domestic and imported inputs, k^D and k^I:

$$y_i = \left(k^I\right)^{\alpha_i} \left(k^D\right)^{1-\alpha_i}, \tag{2}$$

with the unit cost function given by

$$c_i\left(w^D, ew^I, \hat{y}_i\right) = A_i \left(w^D\right)^{1-\alpha_i} \left(ew^I\right)^{\alpha_i} y_i, \tag{3}$$

where $A_i = (1-\alpha_i)^{\alpha_i - 1}{\alpha_i}^{-\alpha_i}$, and α_i is the share of imported inputs in total costs. Labor inputs are assumed to be domestically supplied and therefore subsumed within $1-\alpha_i$. As specified, the only source of uncertainty is due to movements in the exchange rate, e, and the exchange rate affects expected profitability through both channels of export market revenues and imported input costs.[3] Thus,

$$E\left(\Pi_i\right) = p_i^D\left(Q_i^D\right) \cdot q_i^D + E(e) p_i^F\left(Q_i^F\right) \cdot q_i^F - E(e^{\alpha_i}) \left(w^D\right)^{1-\alpha_i} \left(w^I\right)^{\alpha_i} \left(q_i^D + q_i^F\right). \tag{4}$$

As previously noted, exchange rate is distributed log-normally (μ_e, σ_e^2) with

[3]Certainly, it is considered that exchange rate affects profits through the channel of home market revenue due to the possibility of import competition for domestically produced goods. However, we have no means of dividing the effect further from the whole revenues here.

mean, $\exp(\mu_e + \sigma_e^2/2)$. Hence, the value of the expected profits is

$$\begin{aligned} E(\Pi_i) &= p_i^D\left(Q_i^D\right)\cdot q_i^D + \exp\left(\mu_e + \frac{1}{2}\sigma_e^2\right) p_i^F\left(Q_i^F\right)\cdot q_i^F \\ &- \exp\left(\alpha_i\mu_e + \frac{1}{2}\alpha_i^2\sigma_e^2\right)\left(w^D\right)^{1-\alpha_i}\left(w^F\right)^{\alpha_i}\left(q_i^D + q_i^F\right). \end{aligned} \tag{5}$$

Differentiating with respect to μ_e and normalized by levels of total expected revenues TR_i in the industry, we obtain the direct effect on expected profits by changing the mean of the exchange rate process,

$$\frac{\partial E(\Pi_i)}{\mu_e} = TR_i\left(\chi_i - \phi_i\alpha_i\right), \tag{6}$$

where χ_i is the share of export revenues in total revenues and ϕ_i is a weight term of α_i defined as the ratio of expected costs to expected revenues. By partial differential equation, (6) can be written as:

$$logE(\Pi_i) = \frac{1}{L_i}\left(\chi_i - \phi_i\alpha_i\right)\mu_e, \tag{7}$$

where L_i is the Lerner index, denoting the industry price over cost markup ratio. L_i approaching 1 depicts a highly monopolistic market, whereas L_i approaching zero reflects a perfectly competitive industry.

From (7), the response of expected profits to the mean of the exchange rate depends on: (i) the degree of industry monopoly power, (ii) the export share of total sales in industry i; and (iii) the share of imported inputs in total cost. As expected, the export share of total revenues has a positive sign: a home currency devaluation improves the external competitive position of home industry to the extent that this industry supplies foreign markets. On the other hand, for a given export share, a devaluation of the home currency hurts more those industries with a higher share of imported inputs.

Moreover, this damage is greatest in competitive industries (i.e., with a high $\phi_i = 1$). The overall effect of exchange rate on profit margin depends on the relative export and import exposure of each industry to exchange rates. Therefore in the next section we detail the exposure to exchange rates observed in 19 two-digit SIC Taiwanese manufacturing industries between 1981 and 1994.

III. THE INDEX OF EFFECTIVE EXPOSURE

This section introduces the, *Index of Effective Exposure (IEE)*, which is developed to account for both the import and export dependence of sectors of an economy. The index considers both the share of output ascribed to exports and the share of imported intermediates in total production costs. This measure is computed as the share of an industry's total revenues that is derived from exports less the share of its total spending that is attributable to imported inputs. This index is intended as an indicator of the exposure of a sector to exchange rate, both through reliance on imported inputs into production and through sales to external markets.

For construction of the index we aggregate from the original six-digit input/output manufacturing classification (from the Input-Output Tables) to the two-digit SIC classification. In its most general form, these data are combined with data on import and export shares, by sector, according to the formula:

$$\begin{aligned} IEE_{it} &= EX_{it} - \phi_{it} \frac{\sum_{j=1}^{n-1} m_t^j p_t^j q_{it}^j}{\sum_{j=1}^{n-1} p_t^j q_{it}^j + p_t^n q_{it}^n} \\ &= EX_{it} - \phi_{it} \alpha_{it} \, (= EX_{it} - IIM_{it}) \,, \end{aligned}$$

where

$i =$ index representing the output sector,

$j =$ index representing the production input sector. Out of the n possible input types, the first $n-1$ types correspond to manufacturing and service inputs; the nth input into production is labor, assumed to be supplied domestically.

$EX_{it} =$ share of exports in total sales of commodity i in period t.

$\phi_{it} =$ share of total cost in total sales of commodity i in period t.

$m_t^j =$ share of imports in supply of commodity j in period t.

$p_t^j q_{it}^j =$ the value of resources from industry j that was used in production of commodity i in period t, defined for $j = 1, ..., n-1$.

$p_t^n q_{it}^n =$ annual wage of industry i in period t.[4]

If there are no imported inputs into production, the sectoral level of exposure is identical to the traditionally used export to production ratio. IEE_i equals zero either when there is zero export and zero import dependence in this industry, or the dependencies precisely offset each other. When IEE_i takes on positive values, it can be stated that production of commodity i has net export exposure; when IEE_i takes on negative values, it can be stated that production of commodity i has net import exposure.

Table 1 illustrates the scale of these data by showing the import share, export share, and imported input share by sector for the sample years 1984 and 1994. As regards the export rate, textile mill industries and apparel products, chemical and allied products, ordinary machinery, and instruments

[4]See Appendix A for sources of the variables used in this paper.

have been proliferating at a remarkable rate during the period 1984-1994, while a substantial reduction in wood and allied furniture, rubber products, and non-metallic mineral products has been observed. On the other hand, with regard to the imported input share, all the industries have increased except for beverage. Furthermore, we have noted the import share, which is often interpreted as a measure of foreign competition in a sector. The variable is included in the table to point out that direct import shares often differ quite remarkably from shares of imported input into production.

The import and export reliance of these industries are examined together via the IEE_i measures, which are showed in Table 2. Because it takes the effect of market power into account on the exchange rate movements for profit margins by equation (6), we therefore separate all samples into the high and the low concentration sectors according to the average domestic concentration of the period between 1986 and 1991.[5] We find that the industries in the low concentration sector have a significantly higher reliance on export shares (net export) as compared with the industries in the high concentration sector. This finding seems to agree with Chou (1988) that there is a dichotomous market structure in the Taiwanese manufacturing industry. That is, export oriented industries contain relative small firms with a low concentration while the domestic oriented industries are characterized by a high degree of concentration.

Of the 19 Taiwanese industries, in Table 2, 14 are net export exposure. The average IEE of individual industry is compared to the analysis of the other industried countries, see Appendix B, by Campa and Goldberg (1997), indicating that the degrees of net export exposure in Taiwanese manufacturing

[5]The domestic concentration is defined as the top 3 firms' export-minus concentration ratio in terms of sales.

industries is markedly higher than those in US, Canadian, UK, and Japanese industries. Appendix B also shows that the annual average IEE of the four countries slightly rise during the observed period. As compared with Table 2, in a different result with the four countries, Taiwan's industries show the annual average IEE has fallen obviously since 1986. The result implies that Taiwanese industries increase the share of imported inputs into production owing to an advantage of the appreciation of the NT dollar.

Furthermore, the net import and net export exposure during the observation period is summarized in Table 3. We find that the average IEE of net importers is relatively low and the average IEE of net exporters is very high. It means that Taiwan's economy is characterized by export-leading as a whole. On the other hand, the numbers of net importers and net exporters have been very stable during the period. This finding implies that the effect of exchange rate movements on the changes in number of the two groups is not clear. That is,

However, there is a decline tendency in IEE since 1986 both in the net importers and exporters. This finding suggests that the import exposure is more prevalent among industries when an intense changes in the value of the NT dollar since 1987. Namely, most of Taiwanese manufacturing industries, even those with a gradual high net export, are exposed to the international economy predominantly through their use of export markets for their sales rather than through their use of imported inputs into production between 1986-1994.

IV. EMPIRICAL IMPLEMENTATION AND RESULTS

Following equation (7), we use the panel data of Taiwanese manufacturing industries to test the relationship between profit margins and external exposure by the following equation:

$$\pi_{it} = \beta_0 + \beta_1 e_{t-1} + \beta_2(\gamma_{it} e_{t-1}) + \beta_3 \Delta y_{it} + u_{it} \tag{8}$$

where $\pi_{it} = ln(\Pi_{it})$ represents profit margins in manufacturing sector i in year t with industries corresponding to those shown in Table 2, e is the real effective exchange rates,[6] γ_{it} is the index of industrial external exposure, and the growth rate of production in the industry, Δy_{it}, is introduced to control for differences in growth rates across industries.

In estimated equation (8), lagged exchange rates are permitted to influence profit margins with constant elasticities (through β_1) or can vary over time with industry external exposure, γ_i which alternatively represents the export share of the industry (EX_i), the imported input share of the industry (IIM_i) and IEE_i of the industry. The interacted relationship between lagged exchange rates and industrial exposure is captured by the β_2 parameter.

In the measure of EX_i, NT dollar appreciation is expected to reduce industry profit margins in relation to export exposure, so that the coefficient β_2 is expected to be positive. In the measure of IIM_i, an appreciation of the domestic currency reduces the cost of imported inputs of production and should be associated with negatively signed β_2. Finally, under the condition of the

[6]The exchange rate of the NT dollar measured in terms of a trade-weighted index of the currencies of the main trading partners, which includes the US, Japan, and Hong Kong. All exchange rates are represented by the amount of the NT dollar per unit of foreign currencies. As the result, a decrease in the value of exchange rate donotes appreciation of the NT dollar.

measure of IEE_i which combined imported input and export dependency, β_2 is expected to be positive.

We measure annual industry profit margins following the methodology:

$$profit\ margins = value\ of\ sales + \Delta inventories - payroll - cost\ of\ materials,$$

the data used to construct this measure are drawn from the *General Report of Industrial and Commerce Census of Taiwan*, and from the *Report on Industrial and Commercial Surveys*, published by the Directorate-general of Budget, Accounting & Statistics, and the Department of Statistics, Ministry of Economic Affairs, respectively.

Because a large appreciation of the NT dollar is observed since the mid-1980s, our estimated models use a panel data with the number of observations being 4 years (1986, 1989, 1991, and 1994) in 19 industries. The Hausman Test used here to test the null hypothesis that the effects of individual industries are uncorrelated with independent variables is not rejected. We therefore use the variance components (random-effects) model by maximum-likelihood estimation to analysis. The estimator is asymptotically efficient. The results are shown in Table 4. Beside the results of examining the implications of exchange rates movement for profit margins in the full sample of industries, and, as appropriate, the net exposures constructed using Lerner index (industry elasticity) as in equation (6), the aforementioned distinction among the groups of different types of industry elasticity, e.g. high-concentration and low-concentration or domestic-oriented and export-oriented, is presented in Table 5.

According to the estimate of β_1 of the first row of Table 4, the effect of exchange rate on profit margins is negative significantly. That is, NT dollar

appreciations are strongly significantly correlated with increased profit margins in the pooled sample of Taiwan two-digit industry over the estimation period. Furthermore, from the interacted regressions reported in the remaining rows, we know that Taiwan currency appreciations increase profit margins and depreciations decrease profit margins as IEE_i or EX_i rises; however, the result that Taiwan currency appreciations increase profit margins as the industry's dependence on imported input into production (IIM_i) rises is not significant.

Against expected, IEE_i and EX_i have a negative effect on profit margins with appreciating Taiwanese currency. Since according to equation (6), the role of Lerner index has been taken into account to modify the measure of IEE_i. It means that the degree of market cpmpetition affects IEE. So, we divide the sample according to a different degree of competition by the domestic- and export-oriented sectors and the high- and low-concentration sectors. The results of a distinction of the external exposure how correlated with market structure between these sectors are presented in Table 5.

As shown in the β_1 column of Table 5, there is a significantly negative in the profit margins response to exchange rate movement both the sectors of high-concentration and low-concentration industries. It means that in spite of the degree of market competition, profit margins is positively responsive to NT dollar appreciation. However, the coefficients of β_2 in IEE show a different effect in the profit margins across these sector: in industries with high-concentration is -0.002 significantly while in industries with low-concentration is -0.001 insignificantly. This result suggests that high-concentration industries have much stronger positive effects of external exposure on profit margins when

an appreciation of Taiwan currency occurs.

Next, the coefficients of β_1 across the different sectors of domestic-oriented and export-oriented industries both show a negative effect on profit margins. It means that in spite of the difference between the destination markets, profit margins is positively responsive to NT dollar appreciation. β_2 in IIM has a significantly negative effect on profit margins in the domestic-oriented industries. The finding is agreed with our exception and shows that Taiwan currency appreciations increase profit margins and depreciations reduce profit margins as the industry's dependence on imported inputs into production rises. However, it is observed only in the domestic-oriented sector. Furthermore, there is a striking result that β_2 column of Table 5 in IEE across the sectors of domestic-oriented and export-oriented industries, shows the same sign and value with the result which obtained from high-concentration and low-concentration industries. That is, domestic-oriented industries have much stronger positive effects of external exposure on profit margins than export-oriented industries when an appreciation of Taiwan currency occurs.

With respect to exports, in general, as the NT dollar appreciates the US dollar price of exports rise with the exchange rate. As a consequence, causing a significant decline in the price competitiveness of Taiwan's exports in international markets. The result of a further test on the profit margins and exchange rate to different export markets for 5 industries of Taiwan is reported in Table 6.[7] The table clearly shows that the profit margins of export to US decrease

[7]As far as the exports is concerned, the export to China for Taiwan exporters has been decreasing as well as the export to US since 1990s. Thus in this paper we select to compare the two foreign markets. The 5 industries contain that textile and apparel, rubber and plastic products, chemical, ordinary machinery and equipments, and electrical and electronic machinery.

significantly while the profit margins of export to China increase significantly when the NT dollar appreciates against the US dollar. The reason is that as compared with exporting to US, the price of the goods-destined for China is relatively insensitive to exchange rate changes than the goods-destined for US. This result agrees with the finding of Fukuda and Ji (1995) who indicate that the export prices of yen-denominated goods are low in exporting to US but are high in exporting to the East Asian countries. Our empirical evidence indicates some important findings. First, the degrees of net export exposure in Taiwanese manufacturing industries is markedly higher than those in US, Canadian, UK, and Japanese industries. However, with the appreciation of the NT dollar since 1987, most of the Taiwanese manufacturing industries are exposed to the world market through their use of export markets for their sales rather than through their use of imported inputs into production.

Second, market characteristics, such as the high-concentration industries or the domestic-oriented industries, might pass more of the exchange rate movements through into their pricing behavior. By contrast, the low-concentration industries or the export-oriented industries absorb more of the exchange rate effects in profit margins. The distinct interaction effects of external exposure and exchange rate on profit margins between the different market structures are found in Taiwan. This result is consistent with the opinion by Dornbusch (1987), in which he shows that more oligopolistic industries exhibit greater pass-through responses to exchange rate movements.[8] Indeed, the results of the high-concentration industries has a similar to the results of the domestic-

[8]The actual response of profit margins and prices to exchange rates depends on the market power of the industry and on the relative share of foreign firms among the competition in domestic and foreign markets. See, for example, Tsui (2000) for details.

oriented industries that support our observation which mentioned above: the domestic-oriented industries are characterized by a high degree of concentration while the export-oriented industries contains relative small firms with a low concentration.

Third, Taiwanese manufacturing industries benefit both from revenues side of export and cost side of imported input in spite of the appreciation of the NT dollar. Hence, the actual finding of the industries benefit from the side of export regarding of the NT dollar rises, is satisfactory to consider that the sustained appreciation of the NT dollar have pressed Taiwan's export market from US to China and the exporters benefit from export due to a pricing-to-market behavior.[9]

V. CONCLUSION

Modeling of the effect of exchange rate on price or profits has often focused on the variability of the export (import) price to explain partial adjustments of export (import) price following exchange rate changes. This paper presents a model of both the industry's revenue and costs on the exchange rate in order to examine the relationship between the exchange rate and profit margins, showing that profit margins can result from the cost side of imported inputs as well as from the revenue side of export (import) activities.

Following Goldberg and Crockett (1998), we construct a measure of external exposure to capture the exposure channels for the transmission of exchange rate activity into profits. Using the data of Input-Output Table for 19 two-digit Taiwanese manufacturing industries, this paper finds that the industries

[9]It is a phenomenon that price differentials across similar products are destined for different markets when exchange rate changes in common currency. See Knetter (1993).

have shifted their external exposure over the period of 1981-1994. Moreover, external exposure has changed more through increased reliance on imported inputs into production than through increased reliance on export.

The empirical results in this paper have a number of practical implications. First, Taiwan's industries take advantage of the appreciation of the NT dollar, enjoying the price of imported inputs into production. Second, the results provide further evidence that market structure matters in international price transmissions. The results confirm the findings by Dornbusch (1987) and Knetter (1993) that differences in industry are important in understanding differences in pass-through behavior. Finally, the results of the distinction between goods destined for the US and for China agree with the phenomenon of exchange rate induced price discrimination in the two export markets. That is, it suggests that Taiwan's exporters act pricing-to-market behavior in the world market.

APPENDIX A: SOURCES OF DATA

Π : Industrial profit margins.

ϕ : Total cost to total sales ratio.

Δy : The growth rate of production.

General Report of Industrial and Commerce Census, Directorate-General of Budget, Accounting and Statistics, Executive Yuan. *Report on Industrial Surveys*, Department of Statistics, Ministry of Economic Affairs.

EX : Exports to total production ratio.

IM : Import to total sales ratio.

EX^k : Ratio of goods in exporting to US or to China.

Monthly Statistics of Exports and Import, Department of Statistics, Ministry of Finance. *Industrial Production Statistics Monthly*, Department of Statistics, Ministry of Economic Affairs.

α : Imported input cost to total cost ratio.

Input-Output Tables in Taiwan Area, and *Yearbook of Earnings and Productivity Statistics*, Directorate-General of Budget, Accounting and Statistics, Executive Yuan.

e : Real effective exchange rate.

Financial Statistics Monthly, Economic Research Department, the Central Bank of China.

Monthly Statistics of Exports and Import. Department of Statistics, Ministry of Finance.

APPENDIX B

Index of Effective External of US, Canadian, UK, and Japanese Manufacturing Industries in selected years

	US		Canada		UK		Japan	
Industry	1985	1995	1984	1993	1984	1993	1984	1993
Food and beverage	0	1.7	2.3	12	4.1	4.8	-6	-3.7
Tobacco	6.5	12.8	1.1	30.2	14.9	-2	-	1
Textile	-1.8	0.3	-4.8	5.2	-4.2	6.7	4.9	-5.4
Apparel	-0.5	4.2	-12	-2.8	-	-	-	-
Lumber and wood	1.8	3.3	46.4	70.4	-18.2	-10.2	-4.5	-5.4
Furniture and fixtures	-3.7	-0.2	9.4	35	-12.2	-6.2	-	-
Pulp and paper	0.8	2.7	48	52.1	-12.2	-8	0.2	0.3
Printing	-1.8	-1.1	-1	-2.6	-5.7	-5.3	-0.7	-0.5
Chemicals	7.2	9.5	-5.3	22.1	16.1	22.6	5	5.4
Petroleum	-3.7	-1.4	0.1	15	12.1	14.2	-51.8	-23
Rubber	0	3.9	5.5	17.8	4.6	9.9	11.3	10
Leather	-9.6	-6.1	-6.1	1	1	-1.8	-	-
Stone and glass	-0.2	0.9	6.8	13.3	-3.2	-2	-4.8	-2.3
Primary metal	-5.5	0.6	16.8	41.8	1.4	9	6.1	4.3
Fabricated metal	-3.1	-0.8	3.8	3.2	-2.9	-7.5	5.5	1.6
Industrial machinery	12.9	14.8	42.6	84.2	19.6	19.8	16.4	19
Electronic and electric	3.4	12.6	10.9	8	0.4	12.4	21.2	22
Transportation	2.3	2.1	41.1	44.7	9.6	8.6	30.4	22.2
Instruments	10.1	15	-	-	86.6	78.1	29.9	28.2
Other manufacturing	-0.4	3.6	-	-	88.2	89.2	4.4	7.5
Average	0.66	3.92	11.42	25.03	10.53	12.23	4.22	4.78

Source: Campa and Goldberg (1997).

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Table 1

Export share, import share, and imported input share of

Taiwanese manufacturing industries in selected years

Industry	1984			1994		
	Export share (EX)	Import share (IM)	Imported input share (IIM)	Export share (EX)	Import share (IM)	Imported input share (IIM)
Food and kindred products	22.09	12.65	9.68	26.67	19.09	12.27
Beverage manufacturing	2.26	14.05	5.57	1.53	10.41	2.28
Tobacco manufacturing	0.40	7.64	6.41	0.92	16.85	9.21
Textile mill and apparel products	47.01	4.99	3.44	64.30	16.28	10.66
Leather and leather products	57.15	7.62	4.13	56.61	11.88	8.07
Wood, bamboo and allied furniture	56.29	9.26	5.62	38.48	18.59	11.70
Pulp, paper and printing	5.51	13.93	11.68	11.68	22.08	17.18
Petroleum and coal products	3.54	34.61	21.35	7.50	50.97	26.67
Chemicals and allied products	12.13	28.37	14.72	24.39	32.99	19.05
Rubber products	50.94	3.97	6.18	46.11	14.41	15.35
Plastic products	39.48	1.16	6.76	32.98	3.54	12.87
Non-metallic mineral products	29.25	5.81	8.73	11.56	11.72	12.08
Basic metal	16.72	31.65	23.99	13.55	31.64	27.86
Fabricated metal products	32.29	4.59	10.04	34.46	7.65	29.14
Ordinary machinery and equipments	40.14	43.27	16.94	67.79	44.64	19.78
Electrical and electronic machinery	61.67	22.85	16.92	63.25	27.66	21.74
Transportation equipment	25.73	12.04	8.84	26.63	26.10	18.16
Precision Instruments	54.10	52.10	23.06	67.08	59.11	28.44
Miscellaneous manufacturing	64.57	5.04	3.84	69.88	25.22	8.70

Table 2

Index of Effective External for the Taiwanese manufacturing industries

Industry	1981	1984	1986	1989	1991	1994	Average
High concentration							
Food and kindred products	14.772	12.409	20.462	15.252	17.603	14.398	15.816
Beverage manufacturing	1.131	-3.311	-2.479	-1.006	-0.093	-0.748	-1.084
Tobacco manufacturing	-2.850	-6.005	-2.411	-5.979	-2.230	-8.290	-4.628
Pulp, paper and printing	-1.381	-6.172	-3,200	-4.979	-3.741	-5.500	-4.162
Petroleum and coal products	-11.551	-17.802	-10.596	-15.919	-15.097	-19.170	-15.022
Rubber products	34.438	44.762	68.228	38.058	40.687	30.766	42.823
Plastic products	29.337	32.718	33.235	18.212	12.128	20.118	24.291
Non-metallic mineral products	10.400	20.527	22.253	11.285	6.794	-0.523	11.789
Basic metal	-14.554	-7.271	-10.282	-11.856	-13.070	-14.305	-11.890
Transportation equipment	12.180	16.889	26.266	5.337	10.110	8.471	13.042
Low concentration							
Textile mill and apparel products	62.557	43.566	58.485	55.823	61.133	53.642	55.969
Leather and leather products	46.043	53.025	69.928	51.758	56.556	48.541	54.308
Wood, bamboo and allied furniture	57.781	50.677	54.837	41.780	37.508	26.774	44.893
Chemicals and allied products	4.560	-2.590	4.225	-3.135	2.007	5.337	1.734
Fabricated metal products	27.338	22.255	34.164	26.320	22.989	5.320	23.064
Ordinary machinery and equipments	30.202	23.200	36.916	47.897	22.139	48.015	34.728
Electrical and electronic machinery	40.993	44.747	45.116	36.586	37.791	41.511	41.124
Precision Instruments	66.389	61.047	69.299	64.515	67.529	58.635	64.569
Miscellaneous manufacturing	78.446	80.731	79.798	76.726	78.589	61.188	75.913
Average	25.591	24.389	31.223	23.509	23.155	19.694	

Table 3

Evolution of net importer and exporter positions (based on IEE)

	Net importers		Net exporters	
	Number	Average IEE	Number	Average IEE
1981	4	-7.584	15	34.483
1984	6	-7.192	13	38.966
1986	5	-5.793	14	44.443
1989	6	-7.146	13	37.685
1991	5	-6.846	14	33.870
1994	6	-8.089	13	32.517

Table 4

Empirical results of industry profit margins on exposure index

$$\pi_{it} = \beta_0 + \beta_1 e_{t-1} + \beta_2(\gamma_{it} e_{t-1}) + \beta_3 \Delta y_{it} + u_{it}$$

(1986-1994, selected years)

γ	β_0	β_1	β_2	β_3	$logL$
	10.578**	-0.149**		0.031	-286.87
	(1.984)	(0.059)		(0.022)	
IEE	6.530**		-0.001**	0.020	-285.68
	(0.484)		(0.0003)	(0.022)	
IIM	5.425**		-0.002*	0.026	-289.72
	(0.667)		(0.001)	(0.023)	
EX	6.875**		-0.001**	0.023	-285.83
	(0.569)		(0.0004)	(0.022)	

Note:

1. All equations estimated by Maximum Likelihood method of panel estimation with industry-wise random effects.

2. The sample size is 76. Standard errors in parentheses and * and ** represent statistical significance at 10% and 5%, respectively.

Table 5

Empirical results of industry profit margins on exposure index for market of different demand elasticity

$$\pi_{it} = \beta_0 + \beta_1 e_{t-1} + \beta_2(\gamma_{it} e_{t-1}) + \beta_3 \Delta y_{it} + u_{it}$$

(1986-1994, selected years)

γ	β_0	β_1	β_2	β_3	$logL$
High-concentration industries, N=40					
	10.998**	-0.152**		0.021	-167.14
	(30142)	(0.061)		(0.049)	
IEE	6.576**		-0.002**	0.023	-164.26
	(0.827)		(0.0003)	(0.047)	
IIM	4.964**		-0.002*	0.032	-168.06
	(1.242)		(0.001)	(0.049)	
EX	7.877**		-0.003**	0.020	-164.34
	(1.030)		(0.001)	(0.047)	
Low-concentration industries, N=36					
	9.258**	-0.116*		0.024	-100.93
	(1.763)	(0.051)		(0.014)	
IEE	7.337**		-0.001	0.016	-94.72
	(0.520)		(0.008)	(0.013)	
IIM	5.075**		0.001	0.029*	-102.84
	(0.555)		(0.001)	(0.014)	
EX	8.034**		-0.001*	0.016	-94.54
	(0.654)		(0.0006)	(0.012)	
Domestic-oriented industries, N=44					
	8.222*	-0.085**		0.097*	-164.82
	(4.055)	(0.030)		(0.053)	
IEE	5.543**		-0.002*	0.102*	-164.12
	(0.875)		(0.0007)	(0.050)	
IIM	5.645**		-0.002**	0.113	-165.02
	(1.246)		(0.0002)	(0.055)	
EX	6.324**		-0.002*	0.112**	-163.61
	(1.049)		(0.001)	(0.050)	
Export-oriented industries, N=32					
	10.275**	-0.153		-0.002	-68.81
	(1.019)	(0.115)		(-0.008)	
IEE	6.385**		-0.001	-0.005	-71.41
	(0.492)		(0.007)	(0.008)	
IIM	5.081**		-0.001*	-0.006	-75.07
	(0.447)		(0.001)	(0.009)	
EX	6.400**		-0.001	-0.004	-72.42
	(0.574)		(0.008)	(0.008)	

Note:

1. All equations estimated by Maximum Likelihood method of panel estimation with industry-wise random effects.

2. Standard errors in parentheses. * and ** represent statistical significance at 10% and 5%, respectively.

Table 6

Results of industry profit margins on different market

$\pi_t = \beta_0 + \beta_1 EX_t^k + \beta_2(e_{t-1} EX_t^k) + u_t$ (1986-1994, annual years)

k	β_0	β_1	β_2	$\log L$
US	7.307**	-0.259**	0.999	-231.49
	(0.608)	(0.069)	(0.016)	
China	8.153**	0.149**	-0.062**	-241.37
	(1.188)	(0.099)	(0.009)	

Note:

1. The export industry includes textile mill and apparel products, leather and leather products, wood, bamboo and allied furniture, rubber products, ordinary machinery and equipments, electrical and electronic machinery, precision Instruments, and miscellaneous manufacturing. 2. All equations estimated by Maximum Likelihood method of panel estimation with industry-wise random effects.

3. The sample size is 72. Standard errors in parentheses and * and ** represent statistical significance at 10% and 5%, respectively.