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PROFIT MARGINS, FOREIGN TRADE AND THE BUSINESS CYCLE IN A SMALL OPEN ECONOMY

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Abstract

This paper is an attempt to present a theoretical model on determination of profitability in a small open economy, and to analyze it using panel data covering 115 large Taiwanese companies over the period 1986-96. The presented results suggest that firm-level profit margins are determined by international trade characteristics than the domestic market structure. In particular, exchange rate palys an important element of competition in a small open economy, however the role of exchange rate which was absent in previous studies. We also incoporate the variable of aggregate industrial production index changes as demand fluctuation and find that firm-level profit margins, are strongly procyclical.

JEL classification numbers: *L11*, *L22*, *O53*

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I. INTRODUCTION

A number of models have been proposed in theoretical and empirical literature to explain the determination and adjustment of profitability in relation to market concentration.[1] Some of the recent empirical analyses which diverge from the conventional Industrial Organization approach investigate how business cycles affect industrial profitability, such as Domowitz, Hubbard and Petersen [1986a, 1986b]. They used a panel of US industry data for 24 years and found a procyclical movement of the margins in highly concentrated industries. In addition, several studies used oligopoly supergame models to analyze changes in collusive behavior over the cycle and the cyclical factors might enter via the conjectural variations parameter. Most well-known of these are Green and Porter [1984] and Rotemberg and Saloner [1986].[2] Their conclusions differ: Green and Porter predicted that margins should exhibit procyclical behavior, whereas Rotemberg and Saloner predicted anti-cyclical margins.

It has been stressed that the international competition causes much influence on the market structure-performance relationship. For instance, Katics and Petersen [1994] examined the panel data of US manufacturing industries over the time period 1964-1986, and found the negative relationship between price-cost margins and import competition for industries which have high levels of domestic concentration. Martin [1993, pp.410-414] applied non-cooperative oligopoly model to investigation that there is a definite impact on pricing while exchange rate adjustment occurred either the condition of

[1] Much of the empirical work is surveyed in Geroski [1988] and Schmalensee [1989]. See also Martin [1993, pp.447-485] for a historical review on the Structure-Conduct-Performance relationships.

[2] See also the extensions and developments by Stenbacka [1990] and Kandori [1991]. For details of the description on 'trigger-strategy equilibrium' see Domowitz *et al.* [1987].

quantity-setting or price-setting.

However, these studies mostly focus on advanced countries, such as the US and the UK. It is doubtful if these studies can be applied to developing countries, particularly Asian newly industrializing countries, because these countries have export-oriented economies. It should be interesting to see whether international trade factors play an important role in the determination of profits over the business cycle in these countries. In fact, it has been proposed that it is important to include foreign trade in analyses of market power in open economies by Stålhammar [1991]. Moreover, in my understanding, little is known about the impact of exchange rate changes on profit margins in empirical work, and it should be emphasized further in small open economy.

The basic principle of this analysis is to study the extent and determinants of profit margins in the rather small but very open economy of Taiwan. We start this paper with a general theoretical model which is a improvement version of the well-known model of conjectural variation suggested by Cowling and Waterson [1976]. We contrive some meaningful determinants of profit margins in this model and then, using panel data covering 115 Taiwanese companies over the period 1986-1996, will examine the dynamic adjustment of profits. In estimation methodology, because of utilizing a panel data, we have a settlement of issues of endogenous on the model of profit margins determination.

To briefly main conclusions emerging from the empirical application of our model, the effect of collusion degree, i.e. domestic concentration, is generally very low in Taiwan, and further, each firm's market position, i.e. domestic market share and previous profitability, exerts a strong positive influence on

firm's market performance. Indeed, the evidence also suggests that the effects of international trade are more important than the conventional variables, in particular, the role of exchange rate is likely to play a competitive element for market structure.

This article is organized as follows: Section 2 describes a simple model to consider the effects of international trade on the determination of firm's profit margins in a small open economy. Section 3 provides some preliminary data analysis and a description on the estimation of Generalized Method of Moments (GMM). Section 4 presents the estimated models and the principal findings. Concluding remarks will be given in Section 5.

II. MODEL

The basic model

Let us consider firm i in a small open economy and the firm produces in domestic country and products are destined for two markets in period t: a domestic market and an export market. It is assumed that products are differentiated in the domestic market, whereas products are homogeneous and firm i acts as a price-taker in the export market. Firm i produces q_i^D in the domestic market and q_i^E in the export market to maximize profit Π_{it}:

$$(1) \qquad Max_{q_{it}^D, q_{it}^E} \Pi_{it} = p_{it}^D(Q_{it}^D + Q_t^I)q_{it}^D + p_{it}^E q_{it}^E - C_{it}(q_{it}^D + q_{it}^E),$$

where p_i^D is domestic price that depends on Q_i^D which may be called the effective output of variety i in the whole domestic market, and the import Q^I. p_i^E is export price which expressed in domestic currency. $Q_{it}^D + Q_t^I = q_{it}^D + \theta_i(Q_{-it}^D + Q_t^I)$, Q_{-i}^D is the combined output of all firms except firm i in the domestic market and $0 \leq \theta_i \leq 1$. If $\theta_i = 0$, products are completely

differentiated among firms; and if $\theta_i = 1$, they are homogeneous. And C_i is its total cost.

The first-order profit maximization condictions can be expressed as

$$(2) \qquad \frac{\partial \Pi_{it}}{\partial q_{it}^D} = p_{it}^{D\prime}(1 + \theta_{it}\lambda_{it}^D)q_{it}^D + p_{it}^D - C_{it}' = 0$$

$$(3) \qquad \frac{\partial \Pi_{it}}{\partial q_{it}^E} = e_t p_{it}^W - C_{it}' = 0$$

where λ_i^D $(=\partial(Q_{-i}^D + Q^I)/\partial q_i^D)$ is a conjectural variation term in the domestic market (indicating how much output changes firm i would expect from rivals and import on its altering output). p_i^W is equal to p_i^E/e, where p_i^W is world price and expressed in foreign currency and e is exchange rate. ep_i^W is given since the firm acts as a price-taker in the foreign market. And, to simplity the model, we have ignored the other cost such as transport expenses to assume marginal cost C' which is identical in both the domestic market and the export market. By substituting equation (2) (3) into (1) and rearranging, we obtain, [3]

$$(4) \qquad \left(\frac{\Pi}{S}\right)_{it} = \frac{MS_{it}^D(1 + \theta_{it}\lambda_{it}^D)}{\varepsilon_{p_{it}}^{(Q_{it}^D + Q_t^I)}}(1 - EX_{it})(1 - IM_{it}) + EX_{it}\left(\frac{e_t p_{it}^W - AC_{it}}{e_t p_{it}^W}\right) + (1 - EX_{it})\left(\frac{p_{it}^D - AC_{it}}{p_{it}^D}\right)\left(\frac{e_t p_t^W - AC_{it}}{p_{it}^D - AC_{it}}\right)$$

$(\Pi/S)_i$ is the profit margin which is the ratio of profit to sales in both markets; MS_i^D $(=q_i^D/Q_i^D)$ is the domestic market share; $EX_i(= p_i^E q_i^E/(p_i^E q_i^E + p_i^D q_i^D))$

[3] A number of empirical studies on the determinants of profitability have been based on the versions of a homogeneous product oligopoly model by Cowling and Waterson [1976]. In their model, the left hand side in (4) is written as the price-cost margin (PCM). However, PCM is equivalent to (Π/S) in long run equilibrium.

is firm i's export rate; $\varepsilon_{p_i}^{(Q_i^D+Q^I)}$ is the price elasticity of effective demand (including import) in the domestic market; IM_i $(=Q^I/Q_i^D+Q^I)$ is the import intensity of industry; and AC_i is the average cost.

In the right-hand side, the conjectural variation term λ_i^D is unobservable. Following Clarke and Davies [1982], we assume that $\lambda_i^D = \alpha_i(1-MS_i^D)/MS_i^D$; that is, the magnitude of the other rivial firms' output responses will be given by the ratio of their summed domestic market share, $1-MS_i^D$, to firm i's share, MS_i^D. α_i is a measure of firm's monopoly power. $\alpha_i = 1$ implies perfect collusion, while $\alpha_i = 0$ suggests a Cournot behavior. In general $0 \leq \alpha_i \leq 1$. Substituting this expression for λ_i^D in to equation (4), we have

$$(5) \qquad \left(\frac{\Pi}{S}\right)_{it} = \left[\frac{MS_{it}^D + \alpha_{it}\theta_{it}(1-MS_{it}^D)}{\varepsilon_{p_{it}}^{(Q_{it}^D+Q_t^I)}}\right](1-EX_{it})(1-IM_{it}) + \left[EX_{it}\left(\frac{1}{e_t p_{it}^W} - \frac{1}{p_{it}^D}\right) + \frac{1}{p_{it}^D}\right](e_t p_{it}^W - AC_{it}).$$

This is our fundamental equation and there are a number of interesting issues raised in the next subsection, and at the same time, we will discuss the expected sign of each independent variable and to briefly explain the implication economically.

The determination of profit margins

Firstly, let us focus on the international factors here. Looking at our fundamental equation (5) that predicts the export rate and import intensity are the important constituents on the determination of profitability, however, the variables were absent in the existing theoretic framework. There is a negative sign in the industry import intensity (IM) that means a firm is facing with

significant degree of import competition, the ability of producers to maintain prices above average cost is reduced, thus a high intensity of import will negatively affect the profit margin.

On the other hand, the relationship between the export rate (EX) and the profit is not unambiguous in equation (5), since the effect of the export rate depends on the relative prices (profit) between the domestic market and the export market. It has been often argued over the field of international economics that the export opportunity will restrain firm's monopoly power if there is not any trade restriction (e.g. tariff for protecting from froeign competition) in a small open country, That is, under the condition of $p_i^E (= ep_i^W) = p_i^D$, the domestic firm i acts as a price-taker in the export market, the effect of export on profit margin is negative as equation (5) showed. On the contray, if price discrimination occurs, it is not until $p_i^D > p_i^E$ that it is a possible of positive sign on the export effect. Our theoretical model is congruous with the implications which suggested by Krugman [1989].

Another important international trade factor, exchange rate (e), is here suggested to investigate the effects of pricing behavior on export market. There are a few words on the importance of including the variable e into standard profit margin regression: first, because of undering the condition that a firm acts as a price-taker in the export market, the exchange rate fluctuation in small open country will more signficantly affect the producer's export strategies than in large closed country. Do not take effect of exchange rate into consideration, it may not obtain robust results for the influences of export opportunity. Secondly, regarding the hypothesis of pricing-to-market, exchange rate fluctuations create different market conditions in the domestic market and

the export market. For example, in response to an appreciation of the domestic currency, the firms have reduced the domestic currency prices of products destined for export market in order to limit increase in the foreign currency prices of the products.[4] It is reasonable to think that the exchange rate is an essestial proposition on the contention of determination of profitability.

Let us turn now to focus on the effect of exchange rate. From equation (5) we can obtain $\partial(\Pi/S)/\partial e > 0$ and the fact that there is a positive relationship between e and profit margin suggested that an decrease in exchange rate made firms not profit. This finding, saying it differently, a decrease in export rate - an appreciation of domestic currency—will low the export price, and at the same time, it results in domestic price decrease because of the quantity which is destined for export will be supplied in the domestic market. This result has an interesting interpretation that an appreciation of domestic currency leads to a competition relationship among the firms and hence profit margins lower.

Next, we now describe the other conventional explanatory variables. Looking at the first term in the right hand of equation (5), we find that profit margins are increased by collusion degree α_i domestic market share and product differentiation θ_i. In order to transform this theoretical equation to an estimatable model we must measure the parameter α_i. According to Clarke and Davies [1982] and Kwoka and Revenscraft [1986], α_i was assumed to be a linear function of industrial concentration. Following a more general approach of Machin and Reenen [1993], we assume that α_i is a time-varying function of industrial concentration CR_{it}^D and previous profitability $(\Pi/S)_{it-1}$. Lagged

[4] In order to remain competitive, many exporting firms have followed pricing policies designed to keep export prices competitive despite changes in exchange rates. This is also called pass-through problem; see Froot and Klemperer [1989] and Knetter [1993].

profitability is included because current output conjectures may depend on previous performance, and is allowed for the type of partial adjustment to shocks in the persistence of profit literatures; see Mueller [1990] and Geroski and Jacquemin [1988] for example. To compare this variables with traditional structure-performance relationship model we know that the results on the efficient of firm's positions (CR^D, MS^D) agree approximately with industrial countries; however, it would be considered that the impact of CR^D in a small open economy is much lower than in an industrial country. And, because of engaging in advertising, a firm at least to some extent the degree to which its product is differentiated from the products of rivals. Again, advertising shifts a firm's demand curve and it results an increase in profit margins. We use advertising ratio (AD), measured as industry advertising costs divided by sales, to be the proxy of product differention.

Lastly we also include aggregate demand Z_t to take into account the effect of business cycle. Many papers use the unemployment rate as a cyclical variable, since per unit labor costs are inversely related to the unemployment rate. These papers found that profits are positively related to the unemployment rate. However, the negative relationship between unemployment rate and real GNP gap by Okun's law, there is an ambiguous explanation on the behavior of business cyclical. Here, we take the aggregative industrial production index changes (Z) to measure the effect of the macroeconomic environment. As regards effects of aggregate business cycle there are two branches of conclusion by repeated oligopoly supergame models. Rotemberg and Saloner [1986] assume that demand shifts are observable and firms know the new level of demand before selecting their level of the choice variable. Thus firms have greater excess

capacity to punish quantity expanding price-cutter in recessions and the optimal collusive price falls in booms because there are relatively greater rewards from reneging on implicit agreements. Consequently, Rotemberg-Saloner asserted that oligopoly price behavior over the business cycle.

By contrast, Green and Porter [1984] focuses on the problem that firms cannot perfectly observe the level of industry demand in each period and the output choices of their rivals. Therefore, they can not be sure whether their own falling profit margins are due to rivals' aggressive behavior or downward demand shocks. Because changing in cost are not considered by Green-Porter model, economy-wide inflation should not affect the collusive output level. Thus, collusion and profit margins are likely to display procyclical behavior. Because that there is not *a prior* influence of business cycle on profit margin, we inquire into the problem by empirical analysis after.

Based on the reasons explained anove, we linearise equation (5) to obtain an empirical model as

$$\left(\frac{\Pi}{S}\right)_{it} = f\left(MS_{it}^{D}, CR_{it}^{D}, AD_{it}, EX_{it}, IM_{it}, e_t, \left(\frac{\Pi}{S}\right)_{i,t-1}, Z_t, interaction\ terms\right).$$

Equation is shown above points distinctly, the introduction of a small open economy suggests that the firm's profit margins should be affected not only by firm's market position, product differentiation and aggregate demand fluctation as argued in previous models, but also by international factors, such as firm's export rate, import intensity of industry and the foreign exchange rate.

III. DATA AND ESTIMATION METHODS

Taiwan has a rather small but very open economy. During the past decade, foreign trade (goods and servises) in this country accounts for 89.5 percent of

GNP on average. In particular, in spite of a appreication of Taiwan currency (NT dollar) since 1987, the export ratio has recently expanded.[5] To estimate our model we use a balanced panel data of Taiwan's 115 large quoted manufacturing companies cover the period 1986-1996. The main data sources are 1986, 1991 *General Report of Industrial & Commerce Census* for industry data and annual *The Largest Corporations in Taiwan* for firm data. Industries are classified at the Standard Industry Classification (SIC) level and import data classified according to the Standard International Trade Classification (SITC) were reclassified to make them comparable to SIC industrial data.

The 115 firms are classified to 35 industries. The data source, the definition of variables and the method of construction are described in the Data Appendix. Summary data on the variables as reported in Table 1. The mean of MD^D has risen over the time period in our study. That is, it seems that the degree of competition in the domestic market falls, and this tendency is similar to CR^D. And, in spite of exchange rate changes there is not a obvious trend on EX or IM.

Before discussing the empirical results, a word is needed on estimation methodology. Since we consider the firm-specific fixed effects,[6] we adopt the usual first-differencing transformation for estimation. However, this induces a MA(1) error and we need to instrument the lagged dependent variable. We follow Arellano and Bond's [1991] GMM technique, which is a more efficient extension of the instrumental variables procedure. [7] This enable us to obtain

[5] For more detailed descriptions about export expansion strategies and trade performance in Taiwan see World Bank [1993].

[6] Unobserved heterogeneity between individuals may be a serious problem as Schmalensee [1989] argues. Comparing the pooled and fixed effects estimates in Domwitz *et al.*[1986a, b] for example.

[7] See Conyon and Machin [1991] technical appendix where the tests of instrument validity

consistent instrumental variable estimates in the occurence of serial correlation.

The selection of instruments for the endogenous right-hand side variables in our estimated model is an important keypoint. This distinguishes our work from the tradtional analyses on determination of profitability that first we verify all the firm-level explanatory variables whether they are endogenous by Hausman test.[8] and the explanatory variables can be viewed as endogenous in period t in our equations. We estimate our models from 1988 to 1996, by the Arellano-Bond procedure, we substitue the variables in 1988 for in 1986 as valid instruments, in 1989 we use variables from 1986 and 1987 and in 1990 we use variables from 1986 to 1988 as instruments and so on. We report heteroscedastic-robust one-step t-statistics and also present the Sargan tests of instrument validity to ensure that our instrument set is uncorrelated with the residuals from our estimated models.

IV. THE EMPIRICAL RESULT

The estimated equations are presented in Table 2. Columns (i) and (ii) report our basic specifications. In addition, column (iii) includes the lagged profit margin, column (iv) includes cyclical variable, and column (v) includes interaction terms. All models are estimated using the GMM techniques described above.

Column (i) indicates a stylized profit determination equation in the field of

and serial correlation has been descripted. For the descriptions of concept on GMM, see for example Greene [1993].

[8]The Hausman test is the statistical vehicle of exogeneity, providing a formal method of comparing the OLS and instrumental variable estimates. In our tests, the hypothesis that export rate is exogenous with respect to profit margins is rejected. Thus, instrument set (Π/S, MS) and their interaction terms are used here.

Industrial Organization but contains the variable of exchange rate. Contrary to the existing literatures on large industrial economy such as US or UK, the results revealed a weak relationship between concentration and profit margin in the small open country, Taiwan. The result on the insignificant effect of CR^D is similar to the study of another small open country—Sweden (Stålhammar [1991]). The facts suggest that collusive conduct among firms is diffcult for the open of free trade. It is true that the role of concentration which affects postively on profit margins in large closed countries but in our opinion the degree of implicit collusion is generally very low in small open countries. In column (ii), the effect of MS^D has been incoporated and the result that the coefficient of MS^D is positive and significant suggests that, MS^D affects profit margins more than CR^D. Furthermore, to compare (i) with (ii) we find that the postive effect on CR^D turns into negative while we take account of effect on MS^D. With this result, it could be confirmed that the firms in high domestic market share gain high profit margin due to their efficiency or firm position, but the very low degree of implicit collusion among firms estimated as far as using CR^D to be a index of market power. The proxy of product differention AD, unfortunately, which has influence on profit margin as our expectation but the coefficient is not significant.

Let us now describe the effects of international characters which are suggested in the theory section. Although import competition can not be firmly confirmed because the coefficient of IM are negative but not significant throughtout, it appears to a certain extent that profit margin is affected inversely by import penetration. The insignificant effect of import competition, it is just considered that the raw materials accounts for a great part in import ratio in the

Taiwanese manufacturing, and the import pattern of raw materials which are not in competition with domestically produced.

Essentially, the relationship between the export rate and profit margin is complex. There is a negative effect on EX, and this inverse relation to profit margin may be interpreted as: the extent of export rate acts as a deconcentration force because it enlarges the market size, and EX is inversely related to profit margin. In addition, export production in Taiwanese manufacturing firms are concentrated primarily on labor-intensive, miscellaneous manufactures and electronic apparatus. The firms' fixed costs and risk accosiated with exporting activities are not high because they act like 'international subcontracts' —the so-called OEM—in the world market, thus it is difficult to put a premium on export price. And, since 1987 the NT dollar has grown stronger against the dollar, firms deal with in the export market that is not profitable than in the domestic market.

e is employed to capture the impact of exchange rate fluctuation on profits in our paper. An decrease in e—an appreciation of NT dollar—is like a increase in the marginal cost for Taiwanese manufacturing firms to supply foreign market, and reduces the quantity supplied in home market thus result in a price increase. The coefficients of e are significantly positive in agreement to our predition. Furthermore, regarding the issue, Chou [1988] argues that there is a distiniction between export-oriented and domestic-oriented on determination of profit margins in Taiwan manufacturing; therefore we explore the influence of exchange rate on export opportunity by inserting interaction term $EX \times e$. In column (v), the significantly positive coefficient indicates that high export firms exhibit greater impact on exchange rate than low export rate

firms.

In columns (i) and (ii) there is however evidence of significant serial correlation $R1$ and $R2$. This manifestates the instrument validity test inappropriate and the coefficient estimates inconsistent, and column (iii) augments (ii) by lagged profit margins which can be justified for adjustment costs, habit persistence, delivery lags and so forth. The specifications including lagged profit margins are all free from first and second order serial correlation, this remedies the diagnostic problems of dynamic misspecification of columns (i) and (ii). The $(\Pi/S)_{it-1}$ is very significantly positive like much of the profit persistence literatures, the dominant influence is important. Furthermore, the effect of the interaction term $MS^D \times (\Pi/S)_{it-1}$ in column (iii) shows that profit persistence increases with a degree of market share.

Column (iv) incorporates aggregative demand effects and interaction term is introduced to capture the joint effect of market share and aggregate cyclical fluctuation. The coefficient on Z_t is positive and significant while the coefficient on $CR \times Z_t$ is negative but insignificant. These results indicate that profit margins vary procyclically over the business cycle but cyclical responses of profit margin independed on concentrated industries differ from those of all firms on average. Futhermore, in columns (iv) and (v), Z_t has a strongly positive significant coefficient which is very similar in both specifications. Hence, even after controlling for the whole range of determinants of profit margins and allow for the interactive terms as suggested by our empirical model, the procyclicality of margins remains.

V. CONCLUSION

The porpose of this analysis is to incorporate the contribution of recent theoretical works with an empirical research to advance our understanding on the determination of profitability. In this paper, we have presented a simple model to determine profit margins in a small open economy and estimated it using the firm-level panel data on 115 Taiwanese manufacturing firms. In order to avoid a biased estimate that as regards traditional studies have been plagued by arguments of explanatory variables as exogenous, it is careful to take into account the structural nature of the relevant model so that firm-level variables are treated as endogenous in the empirical work.

Most importantly, our findings suggest that firm-level profit margins are determined by international trade characteristic more than the domestic market structure. In particular, the exchange rate palys an important role in an small open economy, despite the fact that it has been neglected in previous studies. We also incoporated the variable of aggregative industrial production index changes as demand fluctuation and found that firm-level profit margins, are strongly procyclical. Thus we have not only confirmed the results agree with most of the earlier papers which predict procyclical profit margins, but also have taken a first step toward addressing the impact of exchange rate fluctuation in the concentration-margins relationship in small open economy. The firms in Asia countries have been faced with a intense attack since the Plaza Accord in 1985 and the Louvre Accord in 1987. It seems obvious that it is important to incoporate the variable of exchange rate and, in fact, we have obtained a meaningful outcome about the hypothese on the determinant of profit margins.

A number of caveats remain. First, in the absent of firm-level price data, we are unable to decompose our profit margins into prices and cost components which may be a potentially important distinction as pointed out by Bils [1987]. In particular, it is worth comparing the exchange rate fluctuation on pricing behavior between the domestic market and the export market as a foreseeable extension. Secondly, we focus our attention of determination of profitability on the relative large firms in this paper. In fact, a dichotomous market structure is observed in Taiwan by Chou [1988], that is, large firms are contained within the domestic-oriented sector while the export-oriented sector contains relative small firms. Because that the two sectors are quite distinct in terms of technology, firm size and market structure, we would like to go on to require a separate detail study to disentangle various effects of the two segments.

DATA APPENDIX

We select manufacturing firms which had continuous records between 1986 and 1996 from *The Largest Corporations in Taiwan.* The database records basic data of the top firms in sales and is published by China Credit Information Service Company annually. Owing to some gaps in the data, we have available balanced panel data on 115 companies. These firms are classified to 37 three-digit industries in the Committee on Industrial and Commerical Censuses of Taiwan which we used as the basis to match in various industry-level variables.

Note that since it is unable to get annual industrial variable, such as 'industrial sales', due to Census is reported 5-year intervals, we calculate the annual data on the variable by basic year (1991) data times the annual Indexes of Producer's Shipment over the period of this analysis. We also calculate the advesting expences by the same way. And, in order to avoid biases in the market share owing to firms operate in multiple industries, there is a weighted-average market share of firm that its products which been assigned to each industry. On the occasion that if the diversification is too complex to classify, the firms were dropped from this analysis.

TABLE AI

INDUSTRIAL CLASSIFICATION

Industry Description	*SIC Classification*
Canned Foods	2022
Frozen Foods	2023
Grain Mill Products	2026, 2091, 2032, 2033
Edible Oil & Feed Stuff	2031, 2070
Beverage & Dariy Products	2013, 2021
Tobacco & Liquor	2111, 2120
Miscellaneous Foods	2061, 2069, 2099, 2045, 2025
Cotton Textile	2201
Wool Textile	2202
Man-made Fibers	2705
Man-made Textile	2204
Garments & Accessories	2205, 2206, 2301, 2302, 2309
Printing dyeing & Finishing	2208
Pulp, Paper & Paper Products	2610
Petrochemicals & Chemical Products	2702, 2706, 2707
Plastic Materials & Products	3100 (not including Plastic Footwear)
Synthetic Rubber & Products	3000 (not including Rubber Footwear)
Footwear Products	2303, 2403, 3002, 3104
Medicine & Pesticides	2802, 2803, 2804
Chemical Materials	2701, 2709, 2807, 2809
Paints, Varnishes & Related Products	2801
Cosmetic & Cleaning Products	2805, 2806
Electrical & Electronic Machinery	3612, 3614, 3622, 3623, 3624
Motor & Heavy Electric Machines	3611, 3630
Wires & Cables	3613
Data Storage & Computer Equipments	3621
Machinery & Equipments	3500, 3800
Iron & Steel Refining	3311, 3312
Iron & Steel Products	3313, 3314, 3315, 3316, 3317
Other Metal Products	3320, 3400
Transport Equipment & Parts	3700
Cement & Products	3230
Wood, Bamboo & Rattan Products	2510, 2520
Leather & Far Products	2400 (not including Leather Shoes)
Leisure & Sporting Goods	3902, 3903

TABLE AII

VARIABLE DEFINITION AND SOURCE

Name	*Variable*	*Definition*	*Source**
profit margin	Π/S	firm's trading profits (net profits derived from normal trading activities before tax and interest payment) divided by sales.	A
domestic concentration	CR^D	the three-firm export-adjusted concentration ratio in terms of sales.	A, B
domestic market share	MS^D	firm's sales minus export divided by industrial sales in domestic (sales minus exports).	A, B
firm's export rate	EX	firm's export divided by sales.	A, B
import sale ratio	IM	industrial improt devided by domestic sales.	B, D
adversting ratio	AD	industrial adversting devided by industrial sales.	B
exchange rate	e	exchange rate for dollar.	C
industrial production index change	Z	aggretive industrial production index change rate.	C

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TABLE I

VARIABLE MEANS

	Π/S	MS^D	CR^D	EX	IM	AD	e	Z
1986	8.48	6.49	21.63	31.48	29.43	2.41	37.59	14.02
1987	11.64	6.90	22.99	31.34	31.30	3.06	29.24	10.61
1988	11.59	7.24	25.29	31.96	34.68	2.69	28.40	4.27
1989	10.27	7.44	26.32	30.61	35.38	3.77	25.39	3.77
1990	8.30	7.73	26.87	30.83	35.79	4.10	26.96	-0.23
1991	8.87	8.20	28.01	31.92	37.87	3.97	25.75	7.46
1992	7.4	8.54	27.55	31.04	38.18	2.32	24.03	4.48
1993	7.29	8.68	27.85	31.52	39.99	3.48	26.51	3.69
1994	9.75	9.89	30.21	27.24	41.19	4.61	26.26	6.71
1995	8.53	9.91	31.83	32.56	43.92	3.57	29.17	4.20
1996	6.54	10.33	34.02	33.13	42.30	4.41	29.89	0.06

Note: Definitions of variables and data sources are descriped in Data Appendix.

TABLE II

ESTIMATED RESULTS OF THE PROFIT MARGIN EQUATIONS

	(i)	(ii)	(iii)	(iv)	(v)
$(\Pi/S)_{it-1}$			0.309	0.315	0.315
			(5.837)	(6.306)	(6.275)
CR_t^D	0.338	-0.952	-0.516	-0.274	-0.263
	(10.64)	(1.885)	(1.189)	(0.597)	(0.492)
MS_{it}^D		0.452	0.226	0.098	0.086
		(3.039)	(2.323)	(1.435)	(1.324)
AD_{it}	0.336	0.374	0.229	0.319	0.290
	(0.612)	(0.501)	(0.427)	(0.542)	(0.577)
EX_{it}	-0.267	-0.284	-0.205	-0.094	-0.109
	(2.190)	(2.506)	(2.222)	(1.127)	(1.255)
IM_t	-0.218	-0.138	-0.195	-0.263	-0.207
	(1.845)	(1.926)	(0.606)	(1.212)	(1.033)
e_t	0.007	0.007	0.004	0.005	0.005
	(2.575)	(2.728)	(1.852)	(2.382)	(2.405)
Z_t				0.629	0.637
				(6.129)	(6.096)
$CR_t^D \times Z_t$					-0.010
					(0.454)
$MS_{it}^D \times (\Pi/S)_{it-1}$					0.046
					(2.953)
$EX_{it} \times e_t$					0.075
					(2.441)
Sargan	55.92	56.61	50.07	53.42	46.66
	[50]	[49]	[48]	[47]	[46]
R1	4.06	4.31	-1.74	-1.80	-1.36
R2	2.99	3.30	1.15	1.33	0.23

Note: 1. The dependent variable is $(\Pi/S)_t$.

2. Absolute t statistics in parentheses. These are heteroscedastic-robust one-step that described in Arellano and Bond [1991]. For all equations there are 115 firms during 1988-1996 total 920 observations.

3. Instrument set (Π/S, MS) used is lags of (t-2) in each period and their interaction terms.

4. Sargan is a test of the overidentifying restrictions provided by the instruments. This is distributed as a Chi-square statistic and the degrees of freedom are in brackets. Sargan is valid if this is not rejected.

5. *R1* and *R2* are one-step heteroscedastic robust test against first-order and second-order serial correlation, both are $N(0,1)$ statistics.