

Paper

Long-run Profitability and Competitiveness of Multinational Enterprises: A Comparative Study of American and Japanese Automobile Companies

NAOKI TABETA* and RUIFANG WANG**

(Received 25 July 2001, revised 31 January 2002)

Abstract: This paper attempts to estimate the long-run profitability of companies in order to answer the following interesting questions: (1) why are Japanese automakers seeking for the long-run growth of the firm?; (2) how competitive both American and Japanese auto industries are?; (3) what happens to the long-run profits if Japanese automakers tend to seek market share or the growth of the firm?; more specifically, what is the relationship between the long-run profitability and the growth of the firm? Are large firms earning higher long-run profits? To answer these questions, Mueller's (1986, 1990) estimation techniques are used in period 1962 to 1995. Data are obtained from "Global 500," *Fortune*. For Japanese automakers, Toyota, Nissan, Honda and Mazda have been chosen, and for the American automakers, General Motors (GM), Ford, and Chrysler are selected. Our empirical findings are useful for entrepreneurs in order to set up a strategic agenda of US-Japan auto industries.

1. INTRODUCTION

It is very difficult to pick up a business article these days without mentioning the issue about US-Japan bilateral trade. The rapid expansion of market share of manufactured goods, such as automobiles and semiconductors, has given rise to disputes with its trading partners, especially, with US [See Table 1].

Although many tend to attribute Japan's huge amount of trade surplus against US to Japanese protectionism, unfair trade practices, or other non-tariff barriers, such as the *keiretsu* distribution system,¹ Tabeta and Wang (1996b) seeks a different explanation. They have developed a simple Cournot duopoly model with a management decision parameter in order to demonstrate that if one of the firms acts relatively as a "revenue-maximizer," while the other as a profit-maximizer, then the former gains in terms of market share and short-run profits even on a "level playing field" [i.e., the "relative" revenue-maximizer dominant hypothesis]. In this paper, we will further analyze the characteristics of American and Japanese auto markets, since it is very important for entrepreneurs to recognize the market structure in order to set up a strategic agenda. Above all, our main interest is to estimate the long-run profitability of companies in order to answer the following questions: (1) why are

* Department of Economics, Faculty of Political Science and Economics, Kokushikan University, Tokyo, Japan.

** Division of Applied Economics, Nanyang Business School, Nanyang Technological University, Singapore.

¹ With regard to the *keiretsu* system in the Japanese automobile industry, see Tabeta and Rahman (1999).

Table 1 Market Shares of Auto Firms (1963–1995)

Period/Firm	Overall Periods 1963–1995	1963–1972	1973–1982	1983–1995
GM	0.4016 (0.0738)	0.4808 (0.0451)	0.4104 (0.0131)	0.3338 (0.0511)
Ford	0.2619 (0.0264)	0.2883 (0.0150)	0.2694 (0.0168)	0.2369 (0.0111)
Chrysler	0.1080 (0.0291)	0.1380 (0.0116)	0.1060 (0.0333)	0.0865 (0.0083)
Toyota	0.0951 (0.0524)	0.0362 (0.0161)	0.0840 (0.0136)	0.1490 (0.0291)
Nissan	0.0700 (0.0300)	0.0337 (0.0152)	0.0753 (0.0203)	0.0940 (0.0130)
Honda	0.0373 (0.0242)	0.0115 (0.0041)	0.0302 (0.129)	0.0625 (0.0120)
Mazda	0.0261 (0.0123)	0.0116 (0.0026)	0.0247 (0.0062)	0.0383 (0.0059)

Source: “Global 500 (200)”, Fortune (Various issues).

Note: Standard Deviations are shown in ().

Japanese automakers seeking for the long-run growth of the firm. (2) how competitive both American and Japanese auto industries are?; (3) what happens to the long-run profits if Japanese automakers tend to seek market share or the long-run growth of the firm. More specifically, what is the relationship between the long-run profitability and the growth of the firm (i.e., the growth of the market share)? Are American automakers earning higher long-run profits at the cost of growth of the firm? Measurements of long-run profitability yield valuable information of answering these questions.

There are two alternative views regarding the long-run profitability. One of these states that the profit rates of all firms in an industry will tend towards a single competitive profit rate if a market is competitive (i.e., entry barriers are low). The alternative view is that a number of barriers, such as the degree of vertical integration, production technology, product differentiation, capital requirements, prevent such a convergence. In fact, one may argue that each American automaker’s long-run profitability will be expected to converge to its industry long-run profitability, since the US market is relatively open, and entry barriers are lower than the Japanese counterpart. On the other hand, one may expect that Japanese automaker’s profitability will not converge to its industry long-run profit rate if the Japanese market is relatively closed and protected due to unfair trade practice, and non-tariff barriers, such as the *keiretsu* distribution system. Thus, our central hypothesis of this paper is whether the firm’s long run profitability converges to a single industry long-run profit rate after a severe trade competition between US and Japan.

If the long-run profitability differs across firms, then one may further ask what factors (e.g., firm size, stability of sales, and growth rate of the firm) affect the long-run profitability. Which companies have competitive advantage?

2. MODEL AND DATA

Estimates of Firm i 's Long-Run Profit Rate

Measurements of long-run profitability yield valuable information on the tendencies in the competitive process, or implications of movement in the current profitability. To estimate the long-run profit rates for firm i , we follow Mueller's methodology (1986, 1990). Assume that firm i 's return on capital in year t , $\pi_i(t)$, is composed three parts: (1) a competitive return, c , common to all firms within an industry; (2) a permanent rent, r_i , specific to firm i , which could be a premium for risk, and (3) a short-run component reflecting influences of short-run conditions, $s_i(t)$, with zero expected value. Thus, firm i 's return on capital in year t is described as:

$$\pi_i(t) = c + r_i + s_i(t) : (1)$$

Let $s_i(t)$ be defined as:

$$s_i(t) = b_i s_i(t-1) + u_i(t) : (2),$$

where $0 < b < 1$ and the error term, $u_i(t)$, are distributed $N(0, \sigma^2)$.

From (1), $s_i(t) = \pi_i(t) - c - r_i$, substituting it into (2) to eliminate $s_i(t)$, we obtain:

$$\begin{aligned} \pi_i(t) &= (1 - b_i)(c + r_i) + b_i \pi_i(t-1) + u_i(t) \\ &= a_i + b_i \pi_i(t-1) + u_i(t) : (3), \end{aligned}$$

where $a_i \equiv (1 - b_i)(c + r_i)$.²

Setting $\pi_i(t) = \pi_i(t-1) \equiv \pi_{ip}$ in (3) if $0 < b < 1$, the long-run profit rates, π_{ip} is then estimated as:

$$\pi_{ip} = a_i / (1 - b_i) [= c + r_i] : (4).$$

Evidently, if all firms earn the competitive rate of return, then $\pi_{ip} = c$ and $r_i = 0$ for all i 's. In this case, entry and intraindustry mobility from one strategic group to another drive profit rates down to the long-run competitive profit level.³

Another important indicator of competitiveness of the market is the magnitude of "the speed of adjustment to the firm i 's long-run profit level," $(1 - b_i)$. More specifically, the smaller $(1 - b_i)$ is, the slower short-run rents erode, and the more a firm's profits continue a slowly moving toward the permanent profit level, π_{ip} . Alternately, if the convergence speed is fast, then competition among existing firms within the industry must be strong to bring these firms' profit rates quickly back to their industry long-run competitive profit level. This indicates that the market is dynamically changing and competitive.

² Regression results of (3) are shown in Table 3.

³ An alternative model of measuring persistence of profits over time is shown in Appendix B.

Data

Data are taken from “Global 500,” *Fortune* in the period of 1963–95. As Uekusa and Caves (1976), and Odagiri (1994: 180) have argued, we use “return on capital,” or “net income over total assets” as a proxy of profit rates. Note that in our sample, the choice of profit over total assets (i.e., after tax rates) and profit over sales (i.e., before tax rates) makes little difference because they are highly correlated; that is, the correlation coefficients between the two parameters are 0.9736 for Japan and 0.9957 for the US, respectively. They are statistically significant at 5% level of significance.

For Japanese automakers, we have selected Toyota, Nissan, Honda and Mazda. We excluded Mitsubishi Motors from the data set, since until 1989, it was part of Mitsubishi Heavy Industries, and we could not identify the financial data of the auto division for the period before 1989. For US automakers, the Big Three, General Motors, Ford, Chrysler have been chosen.

Note that *EView*, version 4.0 is used to estimate equation (3). Data and estimation procedure are shown in Appendix A.

3. RESULTS AND DISCUSSION

We have found that from 1963 to 95, the average growth of American automakers is 9.73%, whereas that of Japanese automakers is 17.47% [See Table 2]. The average profit

Table 2 Growth Rate of Sales (1963–1995)

Period/Firm	Overall Periods 1963–1995	1963–1972	1973–1982	1983–1995
GM	.0849 (.1349)	.0903 (.1894)	.0789 (.1420)	.0855 (.0802)
Ford	.0958 (.1174)	.1028 (.1299)	.0696 (.1295)	.1104 (.1034)
Chrysler	.1130 (.1779)	.1600 (.1490)	.0191 (.1889)	.1490 (.1744)
American Industry	.0896 (.0118)	.0983 (.1256)	.0664 (.1312)	.1009 (.0892)
Toyota	.1855 (.1085)	.2487 (.0855)	.1467 (.1225)	.1666 (.0986)
Nissan	.1719 (.1181)	.2659 (.1229)	.1571 (.0994)	.1110 (.0832)
Honda	.1889 (.1036)	.2187 (.0946)	.2189 (.1076)	.1429 (.0972)
Mazda	.1526 (.1539)	.1781 (.1351)	.1706 (.1751)	.1192 (.1563)
Japan Industry	.1753 (.0875)	.2378 (.0682)	.1614 (.0956)	.1380 (.0717)

Source: “Global 500 (200)”, *Fortune* (Various issues).

Note: Standard Deviations are shown in ().

rates over the same period are 0.0448 for US, and 0.0365 for Japan. Thus, Japanese companies appear to be much more interested in growing fast and gaining market share than at generating profits. As a company comparison, Honda (i.e., 18.89%) and Toyota (i.e., 18.55%) are growth-oriented firms among them. Note that by substituting these estimated values of a_i 's and b_i 's [see Table 3] into $\pi_{ip} = a_i/(1 - b_i)$, we could obtain long-run profit rates [see Table 4].

As Tabeta and Wang (1996a) points out, there are several reasons to explain why Japanese firms are in general seeking for the long-run growth of the firm. First of all, in Japan, expansion in firm size is a necessary condition to maintain the lifetime employment system and internal promotion. In order to provide more jobs and promotion opportunities

Table 3 Estimation Results of Equation (3) in the period 1963–95

	GM	Ford	Chrysler	Toyota	Nissan	Honda	Mazda
A	.01559 (1.3870)	.01521 (1.7123)	.008673 (0.7053)	.01716 (1.9571)	.00183 (.5595)	.01201 (2.0226)	.00594 (1.5118)
b	.72903 (6.1376)	.61699 (4.4320)	.64259 (4.6722)	.69199 (4.8791)	.84658 (9.2780)	.67252 (5.8000)	.65355 (5.1682)
DW	2.0711	1.6553	1.6519	2.0214	1.7749	1.8297	2.0638
Adj. R^2	.53400	.36813	.39428	.41612	.72669	.50495	.44551

Note: π_i is profit over total asset.

Table 4 Estimation Results of Initial Profit, Long-run Profit and Adjustment Speed to the Long-run Profit Level (1963–1995)

Firms	Sales (\$ million)	Market Share	Initial Profit ($\pi_{63} + \pi_{64}$)/2	Long-run Profit $a_i/(1 - b_i)$	Adjustment Speed (1 - b_i)
GM	68896.07 (45869.60)	.4016 (.0738)	.1509	.0575	.2710
Ford	48560.30 (37435.92)	.2619 (.0264)	.0802	.0397	.3830
Chrysler	18484.18 (13926.47)	.1080 (.0291)	.0822	.0243	.3574
American Industry	na.	na.	.1044 (.0403)	.0405 (.0166)	.3371 (.0181)
Toyota	26879.64 (31630.93)	.0951 (.0524)	.0667	.0557	.3080
Nissan	17771.70 (18633.30)	.0700 (.0300)	.0613	.0119	.1534
Honda	11081.43 (13445.82)	.0373 (.0242)	.0938	.0367	.3275
Mazda	6873.64 (7369.49)	.0261 (.0123)	.0521	.0171	.3465
Japanese Industry	na.	na.	.0691 (.0177)	.0304 (.0200)	.2839 (.0884)

Note: Profit means profit over total assets.

SD's are shown in ().

for employees, firm size must be continuously expanded. Most of the firms are managed and controlled by managers who do not possess corporate-stocks and have been promoted from within. As a result, the managers' top priority is to maintain harmony in the firm. This can be achieved only through providing more jobs and promotion opportunities, and hence a continuous expansion in firm size. Secondly, under the seniority system where both the wages and the position of an employee are dependent on the years of service, hiring more graduates from colleges or high-schools is more crucial to reducing costs, as it eventually leads to a build-up of advantages in respect of labor costs by keeping the average age of the employees young. Obviously, this process must be accompanied by a faster growth of the firm. Lastly, there is some possibility that MITI's administrative guidance and controls, "*gyosei shido*" lead Japanese firms to act like revenue-maximizers. As Schumpeter (1942: 88) has mentioned in his book, "a car with brakes of course is driven faster than one without." In this sense, administrative guidance and controls ironically create "excess competition." Nakamura (1978, 1981) claimed that administrative guidance and controls play a role as a "shelter from the storm." Japanese firms in their competition for market share tend to invest more than their own capital permitted, thereby bringing about rapid growth of the industry as a whole. This is because they normally expect that when at some point, there arose excess production and firm profitability declined sharply, "administrative guidance" would come to the rescue.

Let us further analyze the relationship between the long-run profitability and the growth of the market share in order to explain why Japanese automakers seek for the long-run growth of the firm [see Appendix C]. As is seen in Figure 1, in Japan, there is a positive correlation between the firm's long-run profitability and its growth rate of sales. In Japan, the firm's long-run profitability will be higher as the growth rate of the firm size increases. On the other hand, in US, there is a negative correlation between them. This indicates that Japanese automakers enjoy a merit of "economies of scale," while American automakers may be tak-

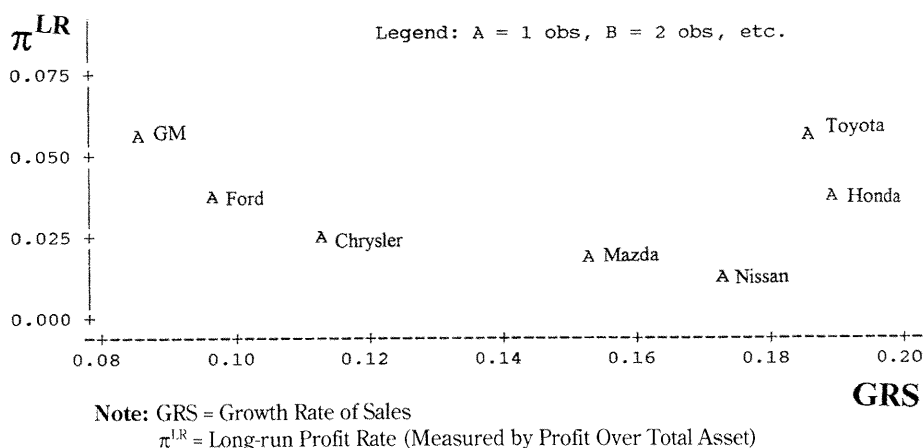


Fig. 1 The Long-run Profit Rate and Growth Rate of Sales (GRS)

ing on the position of “diseconomies of scale.” As an alternative explanation, since learning may be a function of cumulative output in the case of Japanese auto industry. By using the revenue-maximizing strategy-producing more output than its rival firms, average costs might be declined in the long run. Therefore, those who can manage to gain their market share will earn higher long-run profits in Japan. This will provide the answer why Japanese automakers companies go after an increase in share of market.⁴

Are large firm more profitable than small firms? There is a positive correlation between the firm size (i.e., measured by sales) and the firm’s long-run profitability in Japanese and American market, respectively [See Figure 2].

Furthermore, if we use market share as the firm size, there is also positive correlation between the long-run profitability and its market share in both countries [See Figure 3].

The correlation coefficient is 0.99758 for the US market, and 0.53600 for the Japanese market, although they are not statistically significant at 10% level of significance. Thus, we find that there is a tendency that large firms (e.g., GM for US, and Toyota for Japan) are more profitable than small firm (e.g., Chrysler for US, and Mazda for Japan).

Some may argue that a firm with a higher initial profit earns a higher long-run profit. The initial profit rate is the average of the profit rates of the first two years, 1963 and 1964. The correlation between the long-run profitability and its initial profit rate is positive in the US (i.e., the coefficient is 0.87434), while there is a negative correlation between the two parameters in Japan (i.e., the coefficient is -0.77935), although they are not statistically significant at 5% level of significance. There is a tendency for US automakers with an initially high profit rate to earn higher long-run profitability. On the other hand, Japanese automak-

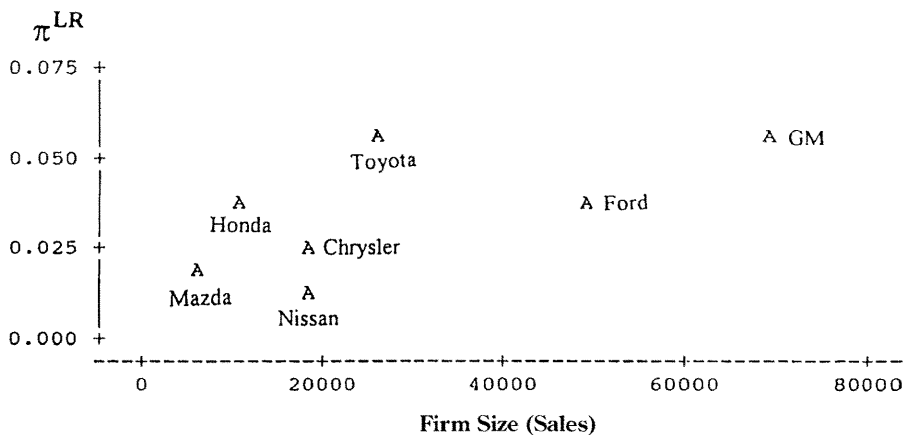


Fig. 2 The Long-run Profitability and Firm Size

⁴ Our empirical results support the view of Abegglen and Stalk (1985), “the strong bias toward growth of the successful *kaisha*”, and Prestowitz (1989: 311), “The Japanese are not averse to making money; all things being equal, they’d like to make more. But if the choice is between growth and profit, it will be growth every time.”

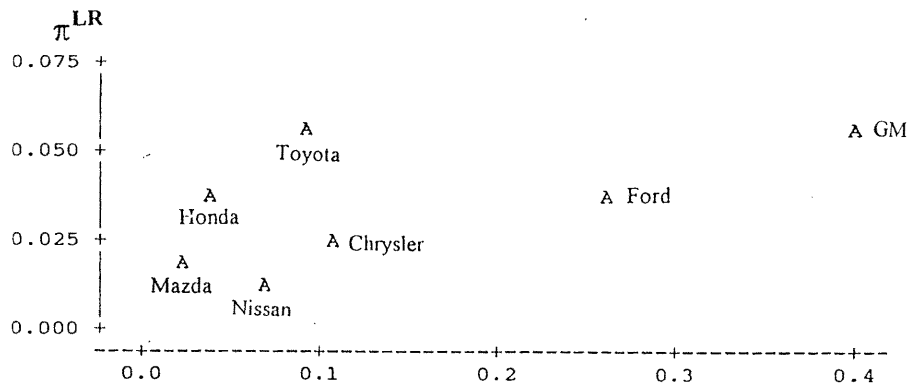


Fig. 3 The Long-run Profitability and Market Share

ers with a low initial profitability earn higher long-run profits. This can be simply explained by differences of the life cycle of auto industries in two countries. Namely, in 1963–64, Japanese auto industry was just reborn due to destruction of industries during W. W. II,⁵ and it was experiencing the “developing/constructing stage,” while the US auto industry was in “growing/maturing stage.” The American automakers already earned higher profits in 1963–64, and the profitability is gradually declining as the US auto industry has reached to the matured stage.

What happens to the long-run profit rates? Blinder (1992: 26) stated that “American managers striving to maximize stock-market value will induced to maximize *long-run profits*. Managers of large Japanese enterprises are willing to sacrifice some of their firms’ potential profits for the sake of *greater size*.” If this is true, then one may expect that Japanese firms’ long-run profit rates are lower than that of US firms. Estimated long-run profit rates (i.e., measured by net income over total assets) seem to support Blinder’s claim that American automakers earn higher profits in the long run. American automakers are 0.0405, while that of Japanese automakers are 0.0304 [see Table 4]. This is an interesting fact-finding, since it is often claimed or believed that American firms maximize short-run profits, while Japanese firms maximize long-run profits. Holding other things constant, since a permanent rent, r_i , which could be a premium for risk is lower for Japanese automakers, we obtain the long-run profitability in (4).

Why do profit differences across automakers occur? One reason for existence of profit differences is that barriers to entry and barriers of intraindustry mobility may exist in both American and Japanese markets. However, the average adjustment speed to respective American firm’s long-run profitability is faster than that of Japanese. This implies that the US market is more dynamically changing and competitive (or less barriers), compared to the Japanese counterpart. This is an interesting fact-finding. Contrary to our belief that

⁵ In Japan, a wave of “motorization” just started around this initial period, and Honda, Mazda, and Mitsubishi, in fact, began to produce passenger cars.

Japanese market is more dynamically changing and competitive since “eleven” Japanese automakers are competing with each other in the domestic market, our results indicate that Japanese protectionism, unfair trade practices, or other non-tariff barriers, such as the *keiretsu* distribution system may affect “slow-down” of the industry average adjustment speed in Japanese market. That is, Japanese automakers can sustain their short-run rents for some time period due to existence of such barriers.

As a firm level comparison, it is obvious that some firms seem to be able to earn profit rates that exceed the industry average. Which automakers have competitive advantages in the long run? When a firm outperforms its industry, it achieves a “competitive advantage.” GM attains competitive advantage in the US market, earning higher profits than the industry average but it sacrifices the growth rate of the firm. In fact, GM set up the target-return pricing strategy, fixing the mark-up rate at 15 to 20% till the end of the 1970s (Kuwahara, 1995: 103). Since Asian markets, especially, Chinese and ASEAN markets are growing; GM should pay more attention to gaining market share as Tabeta and Wang point out (1996). As for Japanese automakers, Toyota, and Honda have some benefit of adopting the revenue-maximizing strategy in order to possess competitive advantage, while Nissan and Mazda need to pursue a radical restructuring in order to earn higher long-run profits. In fact, Nissan and Mazda suffers from over-investment during the bubble economy period, and they must integrate car lines, shut down some plants and decrease the operation ratio of some production lines.

4. CONCLUSION

As an industry comparison, the Japanese auto industry is more growth oriented but it earns lower long-run profits, compared with American counterpart. Although both US and Japanese markets are not perfectly competitive, the US market seem to be dynamically changing and relatively competitive, since the average adjustment speed to the long-run profit level is faster than that of the Japanese market. This implies that Japanese automakers can sustain their short-run profits for some time due to existence of entry barriers.

We find that there is a positive correlation between the firm size (i.e., measured by sales and by market share) and the firm’s long-run profitability in Japanese and American market, respectively. In addition, in Japan, the firm’s long-run profitability will be larger as the growth rate of the firm size increases. This explains why Japanese automakers go after gaining market share. On the other hand, in US, there is a negative correlation between them. This indicates that Japanese automakers enjoy a merit of “economies of scale,” while American automakers may be taking on the position of “diseconomies of scale.” Another explanation is that Japanese automakers with the revenue-maximizing strategy (i.e., producing more than profit-maximizing level of output) may reduce their unit costs of production if learning is a function of accumulated production.

As a firm level comparison, the long-run profit rates differ significantly across automak-

ers. Some automakers, GM in the US market, and Toyota and Honda in the Japanese market possess competitive advantage, and they earn higher long-run profits than respective industry average profit rate. To attain competitive advantage, GM seems to sacrifice growth of market share. Thus, GM should pay more attention to gaining market share, since Asian markets, especially; Chinese and ASEAN markets are growing. On the other hand, Toyota, and Honda have some benefit of adopting the revenue-maximizing strategy in order to possess competitive advantage, while Nissan and Mazda need to pursue a radical restructuring in order to earn higher long-run profits. In 1996 Ford, in fact, increased Mazda's equity share for 25% to 33.4% to strengthen Mazda's financial position. Similarly, Nissan signed an agreement with Renault, SA concerning a comprehensive global alliance to strengthening Nissan's financial position.

In short, measurements of long-run profitability provide valuable information on the tendencies in the competitive process, or implications of movement in the current profitability of American and Japanese automakers. These empirical findings are useful to set up a strategic agenda of US-Japan auto industries.

APPENDIX A: Data and Estimation Procedure

EView, version 4.0 is a user friendly software package, which provides sophisticated data analyses, regressions, and forecasting (see the website: <http://www.eviews.com>). Procedures conducted in this paper are as follows: (1) input data from "Global 500," *Fortune* in the period of 1963–95; (2) define variables; (3) execute simple regression models with time lags shown in equation (3).

Definition of Variables : First two characters, PA stands for *profit over total asset* for each firm; namely, $PA = (\text{net income})/(\text{total asset})$. Thus, as for American automakers, PACL, PAFD, and PAGM respectively mean profit over total asset for Chrysler, Ford, and General Motors. As for Japanese automakers, PAHD, PAMZ, PANS and PATY respectively mean profit over total asset for Honda, Mazda and Toyota. These data are printed out in Table 5.

Execute a Simple Regression Model with Time Lags: To execute a regression model with a time lag shown in equation (3), the following steps are done: (1) Choose the sample period; in this appendix, the sample period is 1973 to 1995 (i.e., after the first oil shock period); (2) Type $PAGM = PAGM(-1)$ in an *Equation Specification* window, which estimates the following regression model: $\pi_{GM}(t) = a + b\pi_{GM}(t-1) + u(t)$. As an example, General Motors is selected, and empirical result is shown in Table 6.

APPENDIX B: Estimates of the Persistence of the Super-normal Profit over Time

Followed by Geroski (1990), we may further argue whether the persistence of the super-normal profits over time exist for certain automakers. According to orthodox microeconomic textbooks, free entry and exit from a market ensures a normal economic profit. Positive excess profits cause entry, or negative excess profits cause exit from the industry. Thus, free entry and exit eventually drive all profit rates to a common normal level.

Table 5 Data: Profit Over Total Asset of Each Automaker's

obs	PACL	PAFD	PAGM	PAHD	PAJP	PAJPAVE
1961	NA	NA	NA	NA	NA	NA
1962	0.042908	0.088748	0.142498	0.101035	0.067202	0.073061
1963	0.076094	0.082134	0.147596	0.113664	0.072352	0.078259
1964	0.088318	0.078281	0.154287	0.073844	0.054800	0.058675
1965	0.079537	0.092545	0.168916	0.041869	0.040645	0.042118
1966	0.060091	0.076761	0.138817	0.036165	0.041110	0.040933
1967	0.051997	0.010556	0.122579	0.008041	0.041986	0.036149
1968	0.066097	0.069986	0.123624	0.018641	0.039241	0.036013
1969	0.018935	0.059407	0.115451	0.027279	0.041472	0.038727
1970	-0.001579	0.052069	0.042965	0.040002	0.046018	0.050979
1971	0.016800	0.062485	0.106129	0.035093	0.032539	0.031786
1972	0.040113	0.074781	0.118369	0.035061	0.041263	0.037946
1973	0.041835	0.069978	0.118146	0.038391	0.041456	0.039549
1974	-0.007738	0.023078	0.046414	0.034534	0.019323	0.020743
1975	-0.041407	0.023017	0.057889	0.013029	0.029927	0.023833
1976	0.059740	0.062347	0.118769	0.031956	0.047036	0.039261
1977	0.021283	0.086938	0.125214	0.040531	0.047859	0.040683
1978	-0.029307	0.071891	0.114647	0.038605	0.043391	0.037016
1979	-0.164931	0.049705	0.089801	0.019213	0.041735	0.035968
1980	-0.258349	-0.063386	-0.022064	0.034681	0.053597	0.047066
1981	-0.075853	-0.046049	0.008540	0.090677	0.058588	0.059425
1982	0.027160	-0.029952	0.023262	0.059158	0.051780	0.051978
1983	0.103510	0.078238	0.081634	0.052034	0.048320	0.045914
1984	0.262615	0.105758	0.086624	0.065850	0.053032	0.052698
1985	0.129724	0.079592	0.062648	0.089068	0.062861	0.060598
1986	0.097047	0.086603	0.040569	0.069357	0.041801	0.038820
1987	0.064649	0.102884	0.040619	0.046691	0.030466	0.026609
1988	0.021624	0.037231	0.029598	0.056981	0.037329	0.033858
1989	0.007034	0.023941	0.024374	0.044083	0.038920	0.032992
1990	0.001466	0.004969	-0.011019	0.031734	0.038275	0.031663
1991	-0.018456	-0.012945	-0.024158	0.025698	0.029432	0.024597
1992	0.017785	-0.040904	-0.123018	0.011636	0.009369	0.007265
1993	-0.058202	0.012711	0.013105	0.007698	0.002137	-0.004357
1994	0.074951	0.024198	0.024676	0.017846	-0.001216	-0.003874
1995	0.037670	0.017013	0.031687	0.022321	0.011944	0.010811

Letting the net excess profits at time t is defined as: $\Delta EP(t) \equiv EP(t) - EP(t-1)$, we obtain the net excess profit:

$$\Delta EP(t) = \theta_0 + \theta_1 E(t) + \theta_2 EP(t-1) + \mu(t) : (A1),$$

where $EP(t)$ is excess profits at time t , $E(t)$ is the rate of potential entry into the industry at

Table 5 Data: Profit Over Total Asset of Each Automaker's (continued)

obs	PAMZ	PANS	PATY	PAUS	PAUSAVE
1961	NA	NA	NA	NA	NA
1962	0.058255	0.073571	0.059381	0.116713	0.091384
1963	0.050670	0.077988	0.070713	0.118893	0.101941
1964	0.053468	0.044683	0.062706	0.121957	0.106962
1965	0.050051	0.032358	0.044194	0.132473	0.113666
1966	0.039432	0.034599	0.053536	0.107771	0.091890
1967	0.034053	0.039222	0.063280	0.076173	0.061711
1968	0.029433	0.034493	0.061485	0.096826	0.086569
1969	0.024526	0.035155	0.067945	0.081730	0.064598
1970	0.075098	0.030303	0.058512	0.038661	0.031152
1971	0.015019	0.028523	0.048507	0.079306	0.061805
1972	0.013981	0.038168	0.064576	0.091895	0.077754
1973	0.014807	0.029844	0.075153	0.090454	0.076653
1974	0.007460	0.015342	0.025636	0.029607	0.020585
1975	-0.002932	0.025747	0.059489	0.031389	0.013166
1976	0.001478	0.052168	0.071442	0.091123	0.080285
1977	0.001998	0.046684	0.073518	0.096588	0.077812
1978	0.004771	0.044220	0.060469	0.081974	0.052410
1979	0.014414	0.033081	0.077163	0.047521	-0.008475
1980	0.025351	0.049675	0.078558	-0.061270	-0.114600
1981	0.028165	0.041901	0.076957	-0.017614	-0.037787
1982	0.039260	0.037328	0.072165	0.006827	0.006823
1983	0.032387	0.030977	0.068260	0.082513	0.087794
1984	0.043153	0.020940	0.080847	0.110536	0.151666
1985	0.036131	0.022910	0.094282	0.075430	0.090655
1986	0.013371	0.007844	0.064708	0.061075	0.074739
1987	0.003689	0.004834	0.051223	0.062142	0.069384
1988	0.007978	0.013767	0.056706	0.031568	0.029484
1989	0.010004	0.024912	0.052969	0.021892	0.018450
1990	0.018627	0.022202	0.054089	-0.002647	-0.001528
1991	0.017040	0.007424	0.048224	-0.018679	-0.018520
1992	0.000739	-0.007125	0.023809	-0.073166	-0.048712
1993	-0.030589	-0.011256	0.016720	0.005671	-0.010795
1994	-0.025240	-0.020185	0.012083	0.029779	0.041275
1995	0.009267	-0.013822	0.025116	0.025369	0.028790

time t , $\theta(t)$ is independently and identically distributed $N(0, \sigma_\mu^2)$. The permanent advantage enjoyed by firm i (relative to a perfectly competitive firm), θ_0 , persists in the long run. θ_2 , is a feedback control parameter to ensure that steady state values of $EP(t)$ remain finite. Otherwise, when $\theta_2=0$, the net excess profits becomes: $\Delta EP(t) = \theta_0 + \theta_1 E(t) + \mu(t)$. When $E(t)=0$, $\Delta EP(t) = \theta_0 + \mu(t)$. In this case, it will possible that the excess profits become infinite as $t \rightarrow \infty$.

Table 6 Estimation Results in Equation (3): GM's case (1973–95)

LS Dependent Variable is PAGM				
Date: 01/29/02 Time: 14:36				
Sample: 1973 1995				
Included observations: 23				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.014700	0.012228	1.202149	0.2427
PAGM(− 1)	0.593371	0.165839	3.577999	0.0018
R-squared	0.378736	Mean dependent var		0.041650
Adjusted R-squared	0.349152	S.D. dependent var		0.057263
S.E. of regression	0.046197	Akaike info criterion		− 6.066728
Sum squared resid	0.044818	Schwarz criterion		− 5.967989
Log likelihood	39.13179	F-Statistic		12.80208
Durbin-Watson stat	1.959180	Prob(F-Statistic)		0.001774

Whereas, if $\theta_2 \neq 0$, a long-run equilibrium value of $EP(t)$ equals to $-(\theta_0/\theta_1)$.

The consequences of high positive or negative excess profits cause entry or exit of firms, and alter incumbent's pricing behaviors. Entry at time t can be described as:

$$E(t) = \gamma[EP(t) - EP^*] + \eta(t) : (A2).$$

where $\eta(t)$ is independently and identically distributed $N(0, \sigma_\eta^2)$. EP^* is the equilibrium value of $EP(t)$. This value is obtained when all entry is zero, and hence, $EP^* = -(\theta_0/\theta_1)$. We expect the parameter, γ , is positive. Namely, if there are excess profits, then entry will occur. Substituting (A2) into (A1), we obtain:

$$\begin{aligned} EP_i(t) &= (\theta_0 - \gamma\phi_1 EP^*) + (1 + \theta_1\gamma + \theta_2)EP(t-1) + \theta_1\eta(t) + \mu(t) \\ &\equiv \alpha_i + \beta_i EP(t-1) + v(t) : (A3), \end{aligned}$$

where $v(t)$ is independently and identically distributed $N(0, \theta_1\sigma_\eta^2 + \sigma_\mu^2)$.

Note that in this estimation, $EP_i(t)$ is defined as the firm i 's deviation of the profits from the industry average profit rate. We use the average profit rate of the auto industry, $\pi_1(t)$, as a proxy for normal returns to capital, which is $\pi_i(t) \equiv \sum_i \pi_i(t)/n$ for $i = 1, 2, \dots, n$. Thus, for $i = 1, 2, \dots, n$, we use $EP_i(t) \equiv \pi_i(t) - \pi_1(t) = \pi_i(t) - \sum_i [\pi_i(t)/n]$ in (A3).

Our main interest in this appendix is to test whether there are some excess profits over time for firm i . More specifically, $\alpha_i = 0$ means that there are “no excess profits in the long run,” and firm i will earn competitive level of profits; namely, $\pi_i(t) = \pi_c$. Therefore, we expect that $\alpha_i > 0$. In addition, the firm i maintains the competitive advantage in the long-run if $\beta_i > 0$.

Table 7 shows estimation results of equation (A3).

All automakers possess non-negative coefficient, α_i . This means that there are some excess profits (if $\alpha_i > 0$), or loss (if $\alpha_i < 0$) for firm i . Above all, GM, Toyota, and Honda shows

Table 7 Estimation Results of Equation (A3) in the period 1963–95

	GM	Ford	Chrysler	Toyota	Nissan	Honda	Mazda
α_i	.00576 (.9707)	-.00093 (-.2530)	-.00719 (-.9139)	.01193 (3.7454)	-.00348 (-1.8032)	.00183 (.7880)	-.00928 (-2.6177)
β_i	.68931 (5.3401)	.48924 (3.1114)	.59327 (4.0976)	.46396 (3.4940)	.70616 (5.4028)	.58045 (4.1568)	.42968 (2.5805)
DW	2.4239	1.8179	2.0936	2.3930	1.9601	1.9726	1.9078
Adj. R ²	.46234	.21340	.33041	.25940	.46835	.33719	.15026

positive coefficients of α_i , and β_i . This suggests that these automakers possess competitive advantage, and they earn higher long-run profits than respective industry average profit rate. On the other hand, Ford, Chrysler, Nissan and Mazda shows “competitive disadvantage” in the respective market.

APPENDIX C: Relationship Between Growth Rate of Sales and Long-run Profit Rate

US Auto Industry	$\pi^{LR} = 0.1536 - 1.1557(\text{GRS})$ (7.836) (-5.810) Note adjusted R ² = 0.9425, t-value are in ()
Japanese Auto Industry	$\pi^{LR} = -0.1216 + 0.8698(\text{GRS})$ (-1.160) (1.454) Note adjusted R ² = 0.2709, t-value are in ()
Overall (US and Japan)	$\pi^{LR} = 0.3061 - 4.1872(\text{GRS}) + 14.8352(\text{GRS})^2$ (0.3783) (-3.310) (3.2450) Note adjusted R ² = 0.6097, t-value are in ()

REFERENCES

- Abegglen, James C., and George Stalk, Jr. 1985. *Kaisha, The Japanese Corporation*, New York: Basic Books, Inc., Publishers.
- Blinder, Alan S. 1992. International Perspective: Trading with Japan: Why the US Loses Even on a Level Playing Field. *Business Economics*, 27: 25–29.
- Fortune, various years. Global 500 (or 200). *Fortune*. New York: Time Inc.
- Kawahara, Akira. 1995. *Kyosoryoku no Honsitu: Nichibei Jidosha Sangyo no 50 Nen* (Nature of Competitiveness: Japan-the US Automobile Industries for the past 50 years), In Japanese. Tokyo: Diamond Sha.
- Mueller, Dennis C. 1986. *Profits in the Long Run*. London: Cambridge University Press.
- Mueller, Dennis C., ed. 1990. *The Dynamics of Company Profits: An International Comparison*. London: Cambridge University Press.
- Nakamura, Takafusa. 1978. *Nihon Keizai Sono Seicho to Kozo* (Japanese Economy: Its Growth and Structure), In Japanese. Tokyo: University of Tokyo Press.
- Nakamura, Takafusa. 1981. *The Postwar Japanese Economy, its Development and Structure*. Tokyo: University of Tokyo Press.
- Odagiri, Hiroyuki. 1994. “Profitability and Competitiveness.” in *Business Enterprise in Japan*, Imai, K. & Komiya,

- R. eds. Massachusetts: MIT Press.
- Prestowitz, Clyde V., Jr. 1989. *Trading Places*. New York: Basic Books.
- Schumpeter, Joseph A. 1942. *Capitalism, Socialism and Democracy*. London: Allen & Unwin.
- Tabeta, Naoki, and Rahman, Sahidur. 1999. "Risk Sharing Mechanism in Japan's Auto Industry," *Asia Pacific Journal of Management*, 16, 311–330.
- Tabeta, Naoki, and Wang Ruifang. 1996a. "Relative Revenue-maximizing Strategy Under Duopolistic Competition: The Case of US-Japan Bilateral Auto-trade," *Proceedings-7th ENDEC World Conference on Entrepreneurship*, 696–705. Singapore: Nanyang Technological University.
- Tabeta, Naoki, and Wang Ruifang. 1996b. "Revenue- vs. Profit-maximizing Strategy: The Case of US-Japan Bilateral Auto-trade," *Asian Economies*, 25 (1), 38–61.
- Uekusa, Masu, and Richard E. Caves. 1976. *Industrial Organization in Japan*. Washington DC: The Brookings Institution.