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GLOBALIZING ACTIVITIES AND THE RATE OF SURVIVAL: PANEL DATA ANALYSIS ON JAPANESE FIRMS

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ABSTRACT

This paper conducts a Cox-type survival analysis of Japanese corporate firms using census-coverage data collected by METI. A study of exiting firms confirmed several characteristics of Japanese firms in the 1990s. First, excessive internalization in the corporate structure and activities is harmful to corporate survival. Having too many establishments and affiliates weakens corporate performance. Efficient concentration on core competences increases the probability of survival. Second, global commitment helps Japanese firms be more competitive and more likely to survive. However, the channels of a firm's global commitment must be carefully selected. Small firms can benefit from exporting activities, though having foreign affiliates or conducting foreign outsourcing might aggravate their performance. Large firms, on the other hand, can conduct foreign direct investment and foreign outsourcing to possibly enhance the probability of their survival. Third, while corporate performance affects the choice of exits for affiliate firms, it does not affect the survival/exit of independent firms; suggesting the possible malfunctioning of the market mechanisms in the exits of independent firms. Fourth, we do not find any statistically significant evidence that firms with foreign shareholders are more likely to exit; there is little evidence of foot-loose behavior among foreign companies.

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1. Introduction

For the Japanese economy, the 1990s have been called a lost decade. Following a series of intensive debates among economists, we now share the view that issues are not simply cyclical, determined by the business cycle, but are related to the existence of serious structural problems that have driven the long-term recession. The financial sector and macroeconomic management have obviously had severe problems. Japanese companies, once were praised as the core of the "Japanese economic system," also seem to suffer from structural impediments that prevented them from adjusting to the new economic environment that arrived in the 1990s.

Recent academic and other literature has reached a consensus that three generalizations can be made about Japanese corporate firms in the 1990s. First, in the late 1980s, Japanese firms excessively expanded their boundaries and internalized.[1] To take advantage of the economies of scope and risk pooling, many firms entered new fields and diversified their products. In the course of diversification, they founded a number of establishments and affiliates in both domestic and foreign locations to facilitate new enterprises. Furthermore, firms were active in developing tight intra-firm-group networks and long-term inter-firm relationships. The wide scope of internalized activities within a firm as well as extended intra-firm-group/inter-firm relationships was regarded as an essential component of long-term efficiency in the context of the so-called Japanese economic system.

However, once the Japanese economy slumped, as well as having to face foreign competition in the 1990s, a drastic reversal began. The excessive expansion of corporate activities and inter-firm relationships suddenly became a source of inefficiency; Japanese firms were forced to reduce the scope of their activities, to reorganize their establishments and affiliates, and to critically review their old inter-firm relationships. The old type of corporate structure and inter-firm relationships seemed

[1] In this paper, the word "internalization" represents a fairly wide concept. It does not simply mean the ratio of internalized value added out of total sales values. More fundamentally, it consists of various "activities" internalized within the boundary of a firm. It is not easy to capture the actual contents of internalized activities, but we can indirectly observe the degree of internalization through corporate structure such as the

to work against corporate performance during this period.

Second, excessive adaptation to the period of rapid economic growth resulted in a rigid industrial structure and low turnover ratios of firms. Cross-shareholding, the subcontracting system, and other types of long-term inter-firm relationships made the cost of firms' exits extraordinary high. Cooperative labor relations as well as various government regulations also became an obstacle to efficient turnovers. A very limited number of mergers and acquisitions (M&As) were apparent; with very few firms experiencing hostile takeovers.[2] Scarcity of turnovers obviously delayed necessary adjustments to the industrial structure and helped prolong the poor economic situation.

Third, even in such a stagnant situation, the global commitment of firms worked as a crucial element for enhancing efficiency.[3] Good firms tended to develop external activities. At the same time, in the opposite direction of causality, various types of global commitment such as exporting activities, foreign direct investment, and foreign outsourcing seemed to improve corporate performance by accelerating the efficient reformulation of corporate structure and inter-firm relationships.

These generalizations have not been fully proved by formal economic analysis. In particular, in the absence of census-coverage statistics providing longer-term stable data, no serious empirical study of the survival and exit of firms has hitherto been done for the Japanese economy.[4] However, with the presentation of METI's firm-level survey, taken in a series of fixed times, we can now conduct formal

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number of establishments and affiliates in addition to using outsourcing contracts.

[2] Shimizu (2001, p. 88) reports that listed companies on the Tokyo Stock Exchange that have conducted mergers account for only 71 out of all listed companies during the period 1949-1998 (1273 in his sample). The Fair Trade Commission (FTC), Government of Japan (2002, p. 220) has shown that the number of mergers reported to FTC was only 151, 170, and 127 in 1999 F/Y, 2000 F/Y, and 2001 F/Y, respectively.

[3] The concept of "global commitment" is taken from Lewis and Richardson (2001), who include various channels of firms' engagement with external links such as exports, imports, inward and outward investment, technology transfer, and so on. Lewis and Richardson present various kinds of empirical evidence and also provide a literature survey. They claim "globally engaged Americans seem economically healthier – more productive, more stable, and materially better off – than other Americans (p. 13)."

[4] Honjo (2000) conducted survival analysis for the manufacturing firms located in Tokyo with using the data bank of Tokyo Shoko Research (TSR). Shimizu (2001) analyzed the corporate survival in terms of the listing at Tokyo Stock Exchange. However, their data sets are much smaller than census-coverage statistics.

survival/exit analyses.

Because M&As are rare in Japan, we can primarily interpret the exit of a firm as an indication of its poor performance. If this is the case, we want to confirm whether over-internalization of the corporate structure makes a firm prone to exit, and whether global commitment helps a firm survive. In addition, if the cost of exiting matters in the turnover of firms in Japan, we may find differences between the cases of affiliates of other firms and those of independent firms when we investigate the relationship between corporate performance and the probability of survival/exit. This paper focuses on the characteristics specific to Japanese firms in terms of corporate structure, inter-firm relationships, and globalizing activities; and examines how these factors affect the survival of firms. The empirical study is based on a survival analysis using Cox's proportional hazard model with panel data for Japanese firms for the period between 1994 F/Y and 1999 F/Y.

Cox's proportional hazard model was originally developed in the field of biology and medical science to analyze the survival in living animals, and was first applied in economics for survival analysis of corporate firms and establishments in the mid 1990s. The first application of Cox's model was the survival analysis of U.S. firms and establishments. The seminal works were by Audretsch (1995) and Audretsch and Mahmood (1994, 1995), followed by Agarwal (1998), Klepper and Simons (2000), Agarwal and Audretsch (2001) and others. Similar studies were conducted in Europe. Mata and Portugal (1994) and Mata, Portugal and Guimaraes (1995) on Portuguese firms were in the first cohort, and a number of studies were subsequently conducted using the data of countries such as Germany (Harhoff, Stahl and Woywode, 1998), Italy (Audretsch, Santerelli and Vivarelli, 1999), and Norway (Tveteras and Eide, 2000). These studies primarily found that the size and technological level of a firm seemed to positively affect its survival. However, the relationship of corporate structure (including establishments and affiliates) with survival/exit has not yet fully been explored. Further, few studies have analyzed the connection between the global commitment of firms and their survival.[5] In this regard,

[5] Li (1995) and McCloughan and Stone (1998) analyze the exit of foreign affiliates from the viewpoint of host country. However, their studies do not directly examine the

our study has a unique focus.

The plan of the paper is as follows: the next section explains the statistical data used, section 3 presents our analytical methodology, section 4 summarizes our hypotheses, and section 5 reports our analytical results. The last section offers a conclusion.

2. Data

Our data set is constructed from the firm-level micro data of *Kigyo Katsudo Kihon Chosa (Basic Survey of Business Structure and Activity).* This survey was first conducted in 1992 F/Y, then in 1995 F/Y, and annually thereafter. The prime purpose of the survey is to capture the overall structure of Japanese corporate firms in terms of their diversification, internationalization, inter-firm linkages, and strategies on R&D and information technology. Financial information, however, is minimal. The survey covers all firms that have more than 50 workers, have a capital of more than 30 million yen, and an establishment that is engaged in mining, manufacturing, the wholesale/retail trade, or the restaurant business. Domestic and foreign affiliates are defined as the ones held by Japanese domestic firms for more-than-50% shares. We constructed a longitudinal data set by connecting annual firm-level data from 1994 F/Y to 1999 F/Y.

The *Basic Survey* has several attractive features. First, it provides firm-level data. Most of the world's firm-related statistics are given on an establishment basis, rather than on a firm basis, and thus most of the related empirical studies in the United States, Canada, and other countries have used establishment-level longitudinal data. In the case of Japan, too, establishment-level microdata are available in the form of the *Kogyo Tokei Hyo (Census of Manufactures).* Establishment-level data are useful for analyzing production activities but are not entirely appropriate for examining corporate activities as a whole. A corporate firm is an individual economic entity that makes economic decisions. When we wish to investigate the structure, performance, and strategies of corporate firms, firm-level data have clear advantages.

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global commitment of firms.

The second strength of the *Basic Survey* is its frequency. Censuses tend to be conducted only once in several years because of the huge amount of cost and labor required in processing the statistics.[6] However, in order to precisely identify the nature of entry and exit of corporate firms, data are needed at more frequent intervals. The *Basic Survey* collects annual data, which provide far richer information on the survival of firms.

Third, relatively high ratios of effective questionnaire returns are also the strength of the *Basic Survey.* Statistics conducted by the Government of Japan are legally classified into two categories: designated statistics (shitei tokei) and approved statistics (shonin tokei). The *Basic Survey* belongs to the first type, firms in the survey being required to complete and return the questionnaires under the Statistics Law.[7] The actual ratios of effective questionnaire returns are not disclosed but are probably between 90% and 95%. More importantly, the firm list itself is widely recognized as being precise. Hence, we can be confident that the distortion due to a low effective return rate is relatively small.

Even with a data set of such quality, great care is needed in defining the exit of firms. In particular, because the turnover ratios of Japanese firms are known to be very low, data handling could be a fairly delicate matter. A weak point of the *Basic Survey* in the context of survival analysis is that it does not include a reconfirmation process to check whether a firm genuinely exits from the market or not. Therefore, to identify whether a firm exits from the market or not must depend solely on the information on whether or not the company concerned shows up in the data set.

In general, there are various reasons why a firm can be omitted from the data set. Omissions can occur, for example, when a firm happens not to return the questionnaire, or when a firm geographically relocates headquarters, or when a firm switches the industry it belongs to, or when mergers and acquisitions (M&As) occur. The permanent firm numbering system in the *Basic Survey* deals with most of industry

[6] For example, the seminal paper of the literature, Dunne, Roberts and Samuelson (1989), uses the U.S. manufacturing censuses that are conducted once in five years.
[7] Collection of "Approved" statistics is not backed by strong legal enforcement so that effective return ratios tend to be low.

switching and geographical relocation.[8] However, for example, when a firm changes the nature of its activities and loses establishments covered by the survey, the firm drops out of the data set. Furthermore, some firms may leave the sample set because of shrinkage in size; the *Basic Survey* has a cut-off line in size as mentioned above.

To keep erroneous interpretation to a minimum, this paper treats firms dropping from the survey in two sequent years as those that get out of the market. Because data from 1994 F/Y to 1999 F/Y are available, so that we can identify whether the firms survive or not, our data set consists of corporate firms that were in business in 1994 F/Y, 1995 F/Y, 1996 F/Y, and/or 1997 F/Y. In addition, and considering the possibility of relatively small firms dropping from the data set due to shrinkage in their size, we conduct regressions with the sample set of firms employing 100 or more workers, a matter that is discussed in detail in the Appendix.

3. Methodology: the proportional hazard model

This section presents the proportional hazard model that we utilize in our survival analysis of corporate firms.

The analysis of survival and exit of corporate firms requires careful consideration of methodology. If we collect data only for firms exiting from the market and conduct OLS regressions, serious sampling bias occurs. Although it is possible to treat survival and exit as discrete choices and conduct logit or probit analysis, we cannot take into account changes over time with respect to each firm. To overcome these problems, we would have to observe all firms from entry to exit, which is virtually impossible in most studies. The sample period typically ends before most of the firms get out of the market. This is a serious censored data problem that we must confront.

The issue is how to utilize the information on firms that survive. One way is to conduct event history analysis using a model such as the proportional hazard model. Event history analysis examines what happens over a time span before some event

[8] Kimura and Kiyota (2003) find that a substantial number of firms covered by *the Basic Survey* switch industries over time. This suggests that the survey follows industry

occurs; in our case, "some event" is the exit of a firm. It specifies the survival function that describes the probability of a firm's survival until a certain time has elapsed. By using a hazard function, the probability of a firm's exit at a certain time period is expressed.

The survival function is specified as follows:

$$S(t) = \Pr(T \geq t) \ , \qquad (1)$$

where T is the duration of survival of a firm and t is a certain time point. The function presents the probability of a firm's survival at time t as a function of t. The hazard function describes the probability of the risk of some event occurring. When we denote the probability density function of event occurrence as $f(t)$, the hazard function can be written as

$$h(t) = \frac{f(t)}{S(t)} \ . \qquad (2)$$

The hazard function is in general specified as follows:

$$h(t) = \lim_{\Delta t \to 0} \frac{\Pr(t \leq T \leq t + \Delta t \mid T \geq t)}{\Delta t} \ , \qquad (3)$$

where T is the duration of a firm and t denotes time. This function presents the probability that the event (exit) occurs in a fraction of time Δt, conditional on no occurrence of the event until time t (i.e. the firm survives until time t). However, it is empirically difficult to specify the functional form of the hazard function in our case due to problems such as that of specifying probability distribution.[9]

The extended version of the proportional hazard model (Cox (1972, 1975)) analyzes the relationship between the probability of event occurrence and various covariates, based on the concept of hazard function. It imposes the condition of "hazard proportionality" and makes the analysis of covariates possible without specifying a hazard function itself. "Hazard proportionality" is the assumption that the proportion of two kinds of hazard is constant over time. The model treats each sample's hazard rate $h_i(t)$ as a function of a number of covariates. It conceptually

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switching pretty well.

[9] In the case of durable time analysis of machines, for example, we can specify the survival function or hazard function because we a priori know the distribution of durable time as the Weibull distribution. However this is not the case when we

defines the baseline hazard ($h_0(t)$) that is not influenced by any covariate and treats the proportion of $h_i(t)$ and $h_0(t)$ as constant based on the hazard proportionality assumption. Hence, the proportion is interpreted as a function of covariates.

If we denote the vector of covariates (explanatory variables) as x_i, we can write

$$h_i(t)/h_0(t) = \exp(\beta x_i) \quad (4)$$

$$h_i(t) = h_0(t)\exp(\beta x_i) \ . \quad (5)$$

This is the proportional hazard model. By taking logarithm, we obtain

$$\log h_i(t) = \log h_0(t) + \beta x_i \ . \quad (6)$$

In this model, we investigate the factors that explain the height of hazard rates. Thus, a negative coefficient means that the explanatory variable is associated with higher survival probability, while a positive coefficient suggests that the explanatory variable accelerate the exit of firms.

Even though the baseline hazard, $h_0(t)$, is not obtained ex ante because the distribution of the hazard is unknown, it can be estimated ex post.[10] Figure 1 presents the baseline survival function $S_0(t)$ calculated from the estimated baseline hazard $h_0(t)$.[11] This function indicates the survival pattern of sample firms when any covariates do not affect the survival of firms, which is specified as

$$S_0(t) = \exp\{-H_0(t)\}, \quad (7)$$

where $H_0(t)$ is the cumulative function of baseline hazard, $h_0(t)$. This curvature suggests that the probability of exit is higher in an early period before covariates are taken into account. The deviation of actual hazard from the baseline hazard ($h_0(t)$) is

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conduct survival analysis of corporate firms.

[10] To estimate parameter β, we use the partial likelihood estimation method. When we denote the set of firms that have not experienced the event (exit) at time t as R(t), Risk Set, we estimate the parameter of covariates, β, by maximizing the partial likelihood estimator, $L = \prod_{i=1}^{m} \frac{\exp(\beta x_i)}{\sum_{k \in R(t_i)} \exp(\beta x_k)}$. Then, we do not have to specify the baseline hazard function, $h_0(t)$. For further explanation, please refer to Cox (1972, 1975), Kiefer (1988), or Kalbfleisch and Prentice (2002).

[11] The baseline hazard $h_0(t)$ is obtained from a regression with all samples.

explained by covariates.[12]

<Figure 1>

4. Explaining the probability of exits

For various reasons the exit of a firm can take different forms. For example, M&As are a typical form of a firm's exit, where poor corporate performance is not necessarily the trigger.[13] However, in Japan during the 1990s, hostile takeovers were quite rare; and thus the exit of a firm can largely be interpreted as a result of bad performance. In what follows, we discuss the expected sign of the coefficient for each explanatory variable based on such intuition. In addition, there is a possibility that a firm is an affiliate of another firm and exits as a part of corporate restructuring. We will take such cases into account by separating our data set into affiliates of other firms and independent firms.

The explanatory factors that possibly affect the survival and exit of firms are divided into four categories: (i) variables related to individual corporate performance, (ii) variables representing firms' competitiveness and technology, (iii) variables expressing internalization patterns and global commitment of firms, and (iv) industry dummies at the 2-digit level of the *Basic Survey*.[14] The list of variables with the

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[12] Figure 1 shows the baseline survival function because it is convenient to interpret the survival pattern of sample firms. However, the baseline hazard function $h_0(t)$ is used for estimating the proportional hazard model. The relationship between $h_0(t)$ and $S_0(t)$ is derived from equation (2) as follows;

$$h_0(t) = -\frac{d(\log(S(t))}{dt} \quad .$$

[13] McGuckin and Nguyen (1995), for example, found that, in the U.S. manufacturing sector in 1977-1987, M&As were more likely to occur for establishments with higher labor productivity, though the opposite applied for establishments with more than 250 workers.

[14] Note that the 2-digit industry classification of the *Basic Survey* covers 23 manufacturing sectors, which is a far more detailed break-down than the 2-digit level of usual industrial classifications.

expected signs (except industry dummies) is summarized in Table 1 (a).[15] Table 1 (b) and (c) present basic statistics of independent variables and the distribution of firm age for the whole sample set.

<Table 1>

The variables related to individual corporate performance include the size and the capital intensity of firms. As previous studies have found, firm size, here expressed by the natural logarithm of the number of regular workers, would have a positive relationship with the firms' survival.[16] Capital-labor ratio represents the quality of production equipment or efficiency in production, and thus a firm with a higher ratio would have stronger competitiveness to survive. Operating surplus ratio, which is operating surplus divided by total sales, is also included. The expected signs for the coefficient of these variables are negative. The expected sign of the coefficient for the value added ratio after controlling operating surplus ratio is not certain. The expected sign of the coefficient for the wage ratio is positive; heavy personnel payments would be a burden for firm survival.

The variables presenting firms' competitiveness and technological intensity include R&D dummy and advertisement cost ratios. The former indicates whether or not the firm has R&D expenditure, while the latter is the ratio of advertisement cost to operating cost.[17] As Audretsch and Mahmood (1994, 1995) have emphasized, R&D

[15] Note that all variables are for each corporate firm that includes its establishments but does not include its affiliates.

[16] Jovanovic (1982) theoretically demonstrated a strong positive relationship between firm size and firm performance, as opposed to the stochastic growth rate hypothesis regardless of firm size along the intuition of Gibrat's law. Many of the previous empirical studies on the survival of firms, including Audretsch and Mahmood (1994, 1995), Mata and Portugal (1994), and Mata, Portugal and Guimaraes (1995), also found a positive relationship between firm size and the survival of firms.

[17] Because roughly 60% of firms in the sample have no R&D expenditure, R&D dummy (whether a firm conducts R&D or not) are applied as an explanatory variable in the following analysis. The ratio of R&D expenditures to sales would be used instead, but the statistical power of such strongly censored data may be doubted. In addition, some important studies including Aw and Hwang (1995) emphasize that whether a firm conducts R&D or not would be more important than the magnitude of R&D expenditure in explaining corporate performance. In any case, we also applied the ratio of R&D

intensity would have a positive effect on the firms' survival. Advertising cost ratio is used as a proxy variable for product differentiation in the literature on industrial organization. In general, producers of differentiated goods would enjoy stronger competitiveness than producers of standardized goods. The expected signs for the coefficients of these two variables are thus negative.

The variables that we would like to highlight in our analysis are those representing the internalization and global commitment of firms. After controlling with the relatively well-established variables noted above, let us check whether or not internalization and global commitment affect the probability of a firm's survival. The outsourcing dummy, the number of establishments, and the owning affiliates dummy are intended to capture the degree of internalization. Outsourcing is in general a far more foot-loose form of inter-firm relationship than the traditional long-term subcontracting system. The expected sign of the coefficient for the outsourcing dummy is negative because outsourcing indicates parsimony in specifying internalized activities. The number of establishments, and having affiliates, show the extensiveness of internalized activities, which means that the expected signs of the coefficients are positive.

Multiple forms of global commitment are expressed as the foreign sales ratio, the foreign procurement ratio, the foreign outsourcing dummy, and the owning foreign affiliates dummy.[18] The expected signs are negative, except for the foreign procurement ratio, because global commitment is supposed to make a firm more likely to survive.[19] In the case of the foreign procurement ratio, we are not sure about the sign of the coefficient because although purchasing commodities and selling them in a domestic market certainly provides a competitive environment, a recession in the domestic economy might adversely affect such firms.

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expenditures to total sales and obtained basically the same results.

As for advertisement activities, we apply the ratio of advertisement expenditures to sales instead of an advertisement dummy as an explanatory variable because only 19% of firms in the sample have zero advertisement expenditure.

[18] Precisely speaking, foreign sales and foreign procurement are slightly different from exports and imports because they include sales and procurement of establishments located abroad. It does not make much difference, however, since the number of establishments located abroad is limited.

[19] Our expected signs are consistent with the U.S. case reviewed by Lewis and Richardson (2001).

The foreign ownership ratio indicates whether or not firms are affiliates of foreign firms and also shows the strength of foreign managerial control.[20] Foreign firms might make a decision on the exit of their affiliates in Japan more strictly and more quickly than Japanese indigenous firms if the performance of their affiliates in Japan deteriorates. We therefore expect a positive coefficient for foreign ownership.

The affiliate firm dummy is introduced to check whether affiliate firms owned by other firms, and independent firms, differ in their probability of survival. If the exiting cost is high, the exit of an affiliate would be easier than that of an independent firm. We thus expect a positive sign for the coefficient of the affiliate firm dummy.

Our regression equations are somewhat ad-hoc, just like the ones that have appeared in previous empirical studies, in the sense that they are not derived from any formal theoretical model. Due to the complicated nature of the micro behavior of corporate firms, we are still not able to clearly express causal relationships among the variables. For example, some explanatory variables may have a causal relationship with others, though it is usually very difficult to write down a system of simultaneous equations or to find decent instrumental variables in the micro data set. In this sense, our study is a preliminary one, and is merely trying to find statistical associations of internalization and global commitment with a firm's probability of survival, utilizing fairly well-established controls such as firm size, and R&D intensity.

5. Results

This section presents the results of our hazard model analysis and discusses their implications. Table 2 provides the results of analysis with respect to all firms with 100 or more workers. To try to avoid obvious multicollinearity, some explanatory variables are alternately dropped from regression equations. We also show the regression results with and without industry dummies. The regression results are fairly stable and mostly confirm our intuition.

[20] Note that the *Basic Survey* simply collects total foreign ownership ratios, and thus "foreign ownership" includes both foreign direct investment and portfolio investment.

<Table 2>

First, consistent with previous literature, firm size and R&D dummy have negative coefficients, which means that larger firms and firms that conduct R&D are more likely to survive. The coefficients for advertisement cost ratio unexpectedly have positive signs. Signs of these three variables are fairly robust even when we change the sample set in the following analysis. Capital labor ratio, operating surplus ratio, value added ratio, and wage ratio are sensitive to the sample set and will be discussed later.

Second, excessive internalization is proved to be a serious problem. The number of establishments has significantly positive signs while the outsourcing dummy has a negative sign. After being controlled by other variables, the compact design of a corporate structure concentrating on core competences is important for enhancing the probability of survival.

Third, global commitment seems to be important for survival though the result is mixed for some variables. The foreign sales dummy has a negative coefficient, which is consistent with our intuition that exporting activities are positively correlated with the likelihood of survival. However, the foreign outsourcing dummy and the owning foreign affiliates dummy have positive coefficients in these regressions, opposite to our prior expectations. Actually, the size of firms matters for the signs of these coefficients; this issue is discussed in more detail below.

Fourth, the sign of the coefficient for the foreign ownership ratio is not significantly different from zero. This means that the widely-held belief that foreign companies behave in a foot-loose way is not supported statistically.

Fifth, the affiliate firm dummy has a strongly positive coefficient, which means that affiliates of other firms are more likely to exit than independent firms. As shown in Appendix Table A1, the "exit ratio" of affiliates firms is 6.4% while that of independent firms is 5.6%.[21] Even after controlling other factors, the probability of exiting is different.

[21] As regards the definition of "exit ratio," please refer to the Appendix.

Related to the last point, we separate our sample set into two, affiliate firms and independent firms, and again conduct regressions. The results are shown in Tables 3 and 4. Most notable is that the signs of the coefficients for the operating surplus ratio, the value added ratio, and the wage ratio are negative, negative, and positive, respectively, for affiliate firms; while the signs are insignificant for independent firms. This means that whether or not an affiliate is closed down strongly depends on its performance, while a similar mechanism of natural selection does not work for independent firms. The exit of affiliates can be part of corporate restructuring, and in such cases the cost of exiting may be lower than usual exits, if the possible relocation of released resources is taken into account. In other words, the cost of exiting is high for the independent firm, so that it cannot get out of the market even if its performance is poor. Or, an alternative interpretation is that independent firms exit regardless of their performance due to financial pressures and other factors external to the firms themselves.

<Table 3>

<Table 4>

Tables 5 and 6 present regression results when we separate our sample into firms with affiliates and firms without. As shown in Appendix Table A1, the "exit ratio" of firms with affiliates (4.6%) is much lower than that of firms without (7.6%). However, both firm groups share pretty much the same factors that affect the probability of exiting.

<Table 5>

<Table 6>

Because the question of over-internalization seems to strongly influence survival and exit, we separated our sample into different employment size categories and then conducted regressions. As shown in Table 7, very clear-cut results are obtained for global commitment variables. The foreign sales dummy has a significant

negative coefficient when firms are small, but the significance diminishes as firms become larger. On the other hand, the owning foreign affiliates dummy switches the sign of its coefficient from positive to negative as the firm size goes up. Exporting activities seem to be a proper form of global commitment for small firms, while having foreign affiliates costs them too much. Large firms can afford to hold foreign affiliates in order to take advantage of global commitment. The foreign outsourcing dummy also changes its sign from positive to negative (though not significantly different from zero) as the firm size increases. The foreign procurement dummy has a significantly positive coefficient when firms are small but loses its significance as firm size increases. We can thus conclude that global commitment improves the probability of survival if the channel is properly chosen with particular consideration to the size of the firm.

<Table 7>

6. Conclusion

This paper conducts a survival analysis of Japanese corporate firms using census data collected by METI in the mid-1990s. Analyses, based on a study of exiting firms, confirm our intuition as regards the three generalizations listed in the introduction. Our findings can be summarized as follows.

First, excessive internalization in corporate structure and related activities seem to be harmful for corporate survival. This finding may depend on the historical background and on the market conditions that Japanese firms were confronted with during the mid-1990s. In the 1980s, the Japanese economic system was praised, and one of the components thought to be essential to the system was the extensive internalization of various activities within corporate firms as well as the construction of concerted long-term inter-firm relationships. In the 1990s, however, extensive internalization became an obstacle to staying alive rather than an advantage in a stagnant economic environment. In addition, we should point out that international

competition became far more intense in the 1990s, even in sectors such as electronic machinery in which Japanese firms previously enjoyed competitive strength. Having too many establishments and too many affiliates is no good for corporate survival. Concentration on core competences by using outsourcing contracts seems to enhance the probability of survival. The challenge that confronts Japanese firms is whether or not they can achieve efficient reorganization of corporate structure and inter-firm relationships.

Second, global commitment seems to help Japanese firms to be more competitive and more likely to survive. However, the channels or types of global commitment must be carefully chosen according to the size of the firm. Small firms can benefit from exporting activities, but having foreign affiliates or conducting foreign outsourcing may aggravate rather than assist performance. Large firms, on the other hand, can utilize the channels of foreign direct investment and foreign outsourcing and enhance the probability of their survival. Kimura and Kiyota (2003) found that global commitment accelerates corporate restructuring; but we add the caveat that an appropriate degree of internalization must be established, even in the context of global commitment.

Third, we find that corporate performance matters in the choice of exits for affiliate firms, but it does not matter in the survival/exit of independent firms. Taking into account the fact that M&As are not a common form of exit in Japan, we question the possible malfunctioning of market mechanisms in exits of independent firms. One possibility is that the cost of exiting is too high for independent firms, so they stay in the market for a lengthy period even when their performance is poor. Or, the selection of survival or exit is done regardless of each firm's performance because of financial constraints and incomplete information. Considering the low level of turnover ratios in Japan, there is a strong need for an economic environment conducive to easier and more efficient corporate turnovers.

Fourth, we do not find any statistically significant evidence that firms partially or wholly owned by foreigners are more likely to exit. There is an on-going debate on whether or not accepting inward foreign direct investment is beneficial. Some observers have expressed concern about the foot-loose behavior of foreign companies.

However, after controlling other factors, our regression results indicate that little evidence exists for such a tendency.

The analysis conducted in this paper utilizes only a small part of the information carried by the micro-data, but has already very effectively investigated at the micro level what happened during the long-lasting recession in Japan. Further empirical studies using micro data sets should be encouraged.

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Appendix: “Exit” of a firm

As discussed in section 2, the *Basic Survey* does not include a reconfirmation process to check whether or not a firm genuinely exits from the market. To avoid erroneous interpretation as far as possible, our study treats the “exit” of a firm as the omission of a firm from the survey in two sequent years.

Table A1 counts the number of observations and exit firms in our data set for regressions. If a firm survives, say, throughout the sample period of 1994 F/Y-1997 F/Y, it is counted as four observations. Hence, “exit ratio” shown in this table is much higher than the proportion of exit firms in one year.

<Table A1>

Table A2 presents the number of firms that dropped from the sample and “returned” later. These tables show that a considerable number of firms did return to the sample; about 30% of firms that disappeared from the sample returned the next year.[22] For example, among 1,552 firms that disappeared in the 1995 F/Y survey, 448 firms re-appeared in 1996 F/Y. This suggests that to treat a two-year sequent disappearance from the sample as a criterion of exit substantially reduces a possibly erroneous determination of “exit.”[23] In addition, if a firm returned to the sample in a period of over two years, we treated the firm as “no exit.”

<Table A2>

It is obvious that the “return” of firms is mostly due to ineffective responses to the questionnaire. The cut-off line in size applied by the *Basic Survey* would be

[22] Notice that such a problem is not even detected in empirical studies using census data in other countries because census data are not typically available every year. Our data analysis suggests that results with other statistics must also be carefully interpreted, even though a similar problem is explicitly presented.

[23] Applying a more-than-two-year sequent disappearance from the sample as a criterion

another factor responsible for the "return" of firms, but we believe that the problem is not very serious. Table A3 shows descriptive statistics of annual changes in the number of workers for the full sample, and Table A4 does the same, but for firms with less than 300 workers. Both tables are of course for firms that exist in the sample in two sequent years, so we must be careful lest these figures are somewhat understated by not including firms dropped from the sample. In the case of the full sample, the mean is around 30, and the standard deviation is about 150 while the median is 7 to 8. When looking at the sample for small and medium sized firms, the mean is 10 to 11, the median is 5, and the standard deviation is about 25. These imply that while some large firms alter the number of workers by a larger amount, smaller firms do not significantly change the number of workers. We can thus guess that the cut-off line in size does not greatly distort our study.

<Table A3>

<Table A4>

For reasons of caution, though, we have dropped firms with less than 100 workers from the sample when conducting the regressions reported in Tables 2 to 7. It is not very likely that a firm with 100 workers in one year reduces the number of workers to less than 50 in the next year. That is because the mean and median changes in employment for firms with less than 300 workers (survived firms only) are only 10-11 and 5. The standard deviation of 25 means that a change in the number of workers by more than 50 corresponds to a change by more than two sigmas if the standard deviation is assumed. Therefore, by dropping firms with less than 100 workers, we do not worry too much about the cut-off line issue in the sample.

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of exit would be a choice if we had longer time series data set.

Table 1: Expected signs and basic statistics

(a) The list of independent variables with expected signs of coefficients

Independent variables	Definition	Expected sign
Firm size	Number of total regular workers (natural logarithm)	-
Capital labor ratio	Tangible fixed assets / total regular workers	-
Operating surplus ratio	Operating surplus / total sales	-
Value added ratio	(Total sales-total procurement) / total sales	?
Wage ratio	Total wage / operating cost	+
R&D dummy	1 for firms with R&D expenditure; 0 for firms without	-
Advertisement cost ratio	Advertisement cost / operating cost	-
Foreign sales dummy	1 for firms with foreign sales; 0 for firms without	-
Foreign procurement dummy	1 for firms with foreign procurement; 0 for firms without	?
Outsourcing dummy	1 for firms with outsourcing; 0 for firms without	-
Foreign outsourcing dummy	1 for firms with outsourcing to firms abroad; 0 for firms without	-
Foreign ownership ratio	Foreign ownership ratio	+
Number of establishments	Number of establishments owned by each firm	+
Affiliate firm dummy	1 for firms that are affiliates of other firms; 0 for independent firms	+
Owning affiliates dummy	1 for firms with affiliate(s); 0 for firms without	+
Owning foreign affiliates dummy	1 for firms with foreign affiliate(s); 0 for firms without	-

(b) Basic statistics of independent variables

	Mean	s.d.	Minimum	Maximum
Firm size	402	1079	50	53584
Firm size (in natural logarithm)	5.280	0.996	3.912	10.889
Capital labor ratio	9.634	15.661	0.000	962.275
Operating surplus ratio	0.020	0.450	-89.032	0.860
Value added ratio	0.431	0.346	-30.427	1.000
Wage ratio	0.169	0.107	0.001	1.000
R&D dummy	0.393	0.488	0.000	1.000
Advertisement cost ratio	0.006	0.018	0.000	0.626
Foreign sales ratio	0.256	0.436	0.000	1.000
Foreign procurement ratio	0.242	0.428	0.000	1.000
Outsourcing dummy	0.506	0.500	0.000	1.000
Foreign outsourcing dummy	0.030	0.170	0.000	1.000
Foreign ownership ratio	0.013	0.095	0.000	1.000
Number of establishments	9.109	27.544	0.000	997
Affiliate firm dummy	0.345	0.475	0.000	1.000
Owning affiliates dummy	0.565	0.496	0.000	1.000
Owing foreign affiliates dummy	0.175	0.380	0.000	1.000

Data source: The MITI database.
Note: the following observations are dropped from the sample;
(1) firms with more than 100 affiliates
(2) firms with more than 1000 establishments
(3) firms with outsourcing cost larger than operating cost
(4) firms with R&D expenditure larger than operating cost
(5) firms with advertisement cost larger than operating cost
(6) firms with total wage larger than operating cost

(c) Distribution of firm age (1994 F/Y survey)

Firm age (years)	Number of firms
0-4	81
5-9	642
10-14	766
15-19	950
20-24	1414
25-29	1746
30-34	1775
35-39	1737
40-44	1734
45-49	3391
50-54	2342
55 and more	171
total	16749

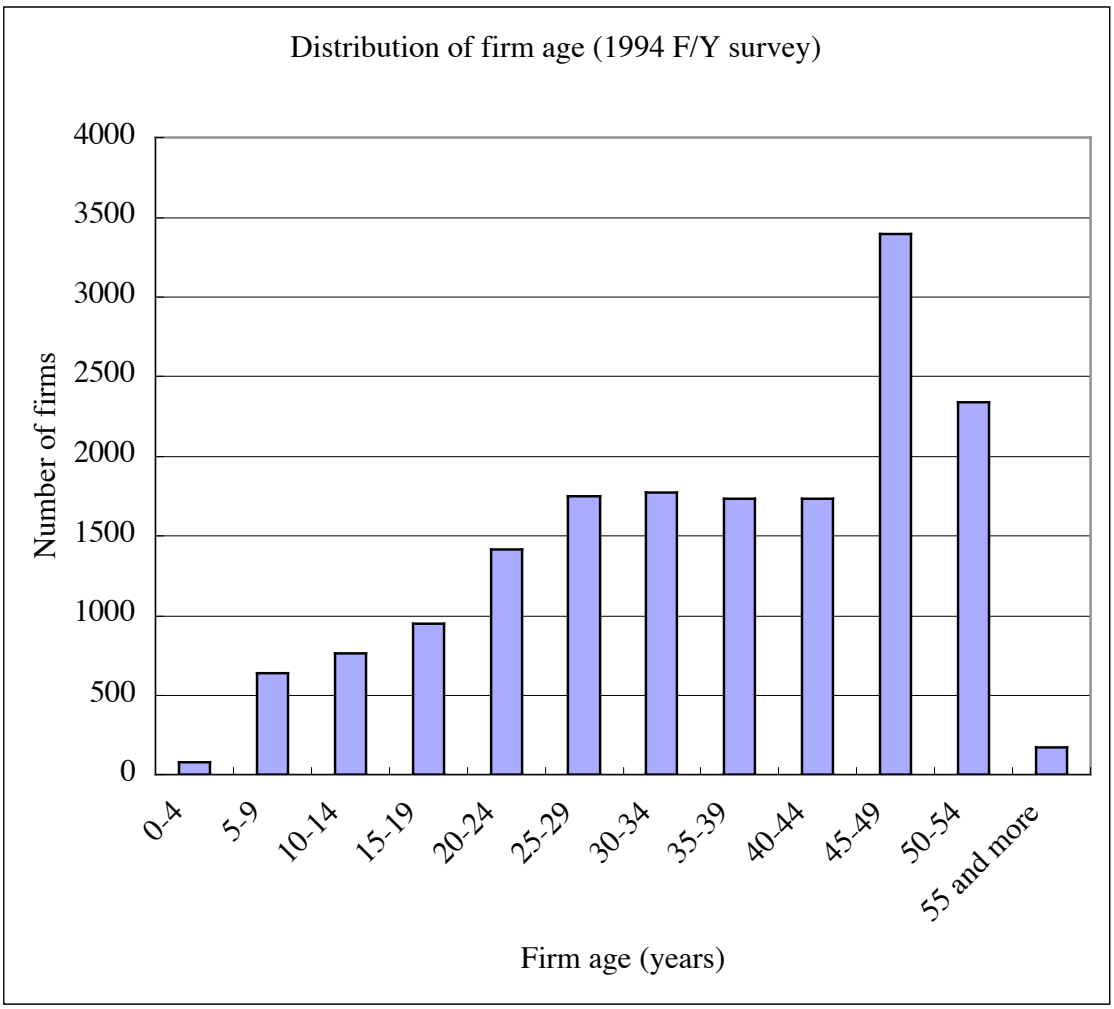


Table 2: Results of Cox regressions: firms with 100 or more workers

Independent variables	Model 1	Model 2	Model 3	Model 4
Firm size	-0.340***	-0.376***	-0.375***	-0.410***
	0.035	0.035	0.036	0.036
Capital labor ratio	-0.002	-0.002	-0.00003	-0.0002
	0.002	0.002	0.002	0.002
Operating surplus ratio	0.011	0.031	0.006	0.012
	0.035	0.034	0.036	0.036
Value added ratio	-0.102	-0.205*	-0.092	0.121
	0.126	0.124	0.133	0.133
Wage ratio	1.145***	1.112***	0.661**	0.748***
	0.261	0.259	0.278	0.277
R&D dummy	-0.215***	-0.282***	-0.138**	-0.171***
	0.056	0.054	0.060	0.059
Advertisement cost ratio	2.859***	3.322***	2.795**	2.864***
	1.035	0.981	1.108	1.102
Foreign sales dummy	-0.217***	-0.310***	-0.192***	-0.263***
	0.071	0.074	0.074	0.078
Foreign procurement dummy	0.260***	0.180**	0.252***	0.174**
	0.069	0.071	0.070	0.072
Outsourcing dummy	-0.225***		-0.145**	
	0.052		0.060	
Foreign outsourcing dummy		0.345**		0.293**
		0.136		0.138
Foreign ownership ratio	-0.005	0.105	0.137	0.220
	0.227	0.227	0.228	0.228
Number of establishments	0.003***	0.003***	0.002***	0.002***
	0.001	0.001	0.001	0.001
Affiliate firm dummy	0.961***	0.977***	0.937***	0.956***
	0.050	0.049	0.050	0.050
Owning affiliates dummy	-0.075		-0.072	
	0.052		0.053	
Owning foreign affiliates dummy		0.216***		0.218***
		0.078		0.079
Industry dummies	NO	NO	YES	YES
Log-likelihood	-16374.94	-16378.45	-16281.23	-16279.08
Chi-squared	643.27***	636.25***	830.69***	834.99***
N	48209	48209	48209	48209

Note: Standard errors are presented below the estimates of coefficients.
***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 3: Results of Cox regressions: affiliate firms with 100 or more workers

Independent variables	Model 5	Model 6	Model 7	Model 8
Firm size	-0.187***	-0.241***	-0.196***	-0.261***
	0.055	0.055	0.058	0.057
Capital labor ratio	0.001	0.001	0.001	0.001
	0.002	0.002	0.002	0.002
Operating surplus ratio	-0.357***	-0.345***	-0.393***	-0.401***
	0.123	0.123	0.129	0.130
Value added ratio	-0.602***	-0.660***	-0.557***	-0.557***
	0.195	0.193	0.210	0.210
Wage ratio	1.820***	1.899***	1.469***	1.688***
	0.354	0.348	0.388	0.383
R&D dummy	-0.131	-0.237***	-0.003	-0.062
	0.090	0.087	0.099	0.098
Advertisement cost ratio	5.134***	5.686***	4.666***	4.884***
	1.603	1.529	1.700	1.693
Foreign sales dummy	-0.188	-0.226*	-0.190	-0.212
	0.125	0.129	0.128	0.132
Foreign procurement dummy	0.332***	0.309***	0.323***	0.295**
	0.119	0.121	0.121	0.124
Outsourcing dummy	-0.324***		-0.166*	
	0.083		0.098	
Foreign outsourcing dummy		0.131		0.158
		0.255		0.258
Foreign ownership ratio	-0.026	0.081	0.049	0.151
	0.245	0.247	0.248	0.250
Number of establishments	0.002	0.002*	0.001	0.001
	0.001	0.001	0.002	0.002
Owning affiliates dummy	-0.428***		-0.464***	
	0.084		0.087	
Owning foreign affiliates dummy		-0.227		-0.191
		0.161		0.163
Industry dummies	NO	NO	YES	YES
Log-likelihood	-5749.25	-5769.31	-5717.94	-5733.85
Chi-squared	134.33***	94.21***	196.95***	165.14***
N	16700	16700	16700	16700

Note: Standard errors are presented below the estimates of coefficients.
***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 4: Results of Cox regressions: independent firms (not affiliate firms) with 100 or more workers

Independent variables	Model 9	Model 10	Model 11	Model 12
Firm size	-0.438***	-0.460***	-0.471***	-0.491***
	0.046	0.047	0.048	0.048
Capital labor ratio	-0.004	-0.004	-0.004	-0.003
	0.003	0.003	0.003	0.003
Operating surplus ratio	-0.031	-0.012	-0.030	-0.025
	0.054	0.053	0.054	0.054
Value added ratio	0.221	0.110	0.176	0.143
	0.164	0.161	0.174	0.173
Wage ratio	0.495	0.338	-0.012	-0.057
	0.374	0.373	0.398	0.397
R&D dummy	-0.253***	-0.286***	-0.209***	-0.215***
	0.071	0.070	0.076	0.075
Advertisement cost ratio	1.540	2.033	1.806	1.861
	1.447	1.378	1.533	1.517
Foreign sales dummy	-0.216**	-0.343***	-0.202**	-0.314***
	0.087	0.091	0.092	0.096
Foreign procurement dummy	0.213**	0.103	0.203**	0.099
	0.084	0.089	0.086	0.090
Outsourcing dummy	-0.171**		-0.133*	
	0.068		0.076	
Foreign outsourcing dummy		0.420***		0.356**
		0.162		0.164
Foreign ownership ratio	-1.349	-1.440*	-1.230	-1.333
	0.853	0.867	0.850	0.864
Number of establishments	0.003***	0.003***	0.002***	0.002***
	0.001	0.001	0.001	0.001
Owning affiliates dummy	0.185***		0.208***	
	0.069		0.070	
Owning foreign affiliates dummy		0.406***		0.413***
		0.092		0.092
Industry dummies	NO	NO	YES	YES
Log-likelihood	-9454.27	-9447.18	-9376.87	-9369.89
Chi-squared	197.98***	212.16***	352.78***	366.75***
N	31509	31509	31509	31509

Note: Standard errors are presented below the estimates of coefficients.
***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 5: Results of Cox regressions: parent firms with affiliate(s) with 100 or more workers

Independent variables	Model 13	Model 14	Model 15	Model 16
Firm size	-0.446***	-0.474***	-0.468***	-0.492***
	0.044	0.045	0.045	0.046
Capital labor ratio	-0.001	-0.001	-0.001	-0.001
	0.002	0.002	0.002	0.002
Operating surplus ratio	-0.012	0.007	0.003	0.011
	0.060	0.060	0.060	0.061
Value added ratio	0.123	0.022	0.018	-0.026
	0.172	0.171	0.181	0.181
Wage ratio	1.084***	0.940**	0.483	0.476
	0.408	0.409	0.442	0.443
R&D dummy	-0.170**	-0.219***	-0.166**	-0.193**
	0.073	0.072	0.079	0.079
Advertisement cost ratio	0.962	1.611	1.466	1.532
	1.843	1.796	1.922	1.912
Foreign sales dummy	-0.062	-0.164*	-0.054	-0.136
	0.086	0.091	0.092	0.096
Foreign procurement dummy	0.177**	0.082	0.181**	0.091
	0.084	0.088	0.086	0.090
Outsourcing dummy	-0.188***		-0.199***	
	0.071		0.079	
Foreign outsourcing dummy		0.396**		0.302*
		0.156		0.158
Foreign ownership ratio	-0.486	-0.432	-0.396	-0.351
	0.437	0.440	0.436	0.439
Number of establishments	0.003***	0.003***	0.002***	0.002***
	0.001	0.001	0.001	0.001
Affiliate firm dummy	0.703***	0.714***	0.683***	0.693***
	0.074	0.074	0.075	0.075
Owning foreign affiliates dummy		0.236***		0.234***
		0.087		0.088
Industry dummies	NO	NO	YES	YES
Log-likelihood	-8244.26	-8240.52	-8186.51	-8184.03
Chi-squared	255.74***	263.21***	371.24***	376.20***
N	30676	30676	30676	30676

Note: Standard errors are presented below the estimates of coefficients.
***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 6: Results of Cox regressions: firms without affiliates with 100 or more workers

Independent variables	Model 17	Model 18	Model 19	Model 20
Firm size	-0.170*** 0.061	-0.169*** 0.061	-0.201*** 0.063	-0.202*** 0.063
Capital labor ratio	-0.001 0.003	-0.001 0.003	0.001 0.002	0.001 0.002
Operating surplus ratio	-0.366*** 0.117	-0.347*** 0.117	-0.365*** 0.121	-0.365*** 0.121
Value added ratio	-0.406** 0.184	-0.514*** 0.180	-0.291 0.199	-0.296 0.198
Wage ratio	1.308*** 0.336	1.214*** 0.335	0.915** 0.361	0.931*** 0.361
R&D dummy	-0.285*** 0.089	-0.345*** 0.087	-0.154 0.095	-0.159* 0.094
Advertisement cost ratio	3.927*** 1.228	4.149*** 1.157	4.021*** 1.433	4.015*** 1.431
Foreign sales dummy	-0.507*** 0.136	-0.536*** 0.135	-0.474*** 0.139	-0.478*** 0.139
Foreign procurement dummy	0.364*** 0.118	0.347*** 0.120	0.337*** 0.119	0.317*** 0.121
Outsourcing dummy	-0.269*** 0.078		-0.049 0.094	
Foreign outsourcing dummy		0.193 0.289		0.252 0.291
Foreign ownership ratio	0.171 0.273	0.237 0.273	0.244 0.279	0.261 0.279
Number of establishments	0.003** 0.001	0.003*** 0.001	0.002* 0.001	0.002* 0.001
Affiliate firm dummy	1.177*** 0.072	1.162*** 0.072	1.166*** 0.073	1.165*** 0.073
Industry dummies	NO	NO	YES	YES
Log-likelihood	-6898.98	-6904.84	-6852.46	-6852.24
Chi-squared	375.19***	363.47***	468.23***	468.66***
N	17533	17533	17533	17533

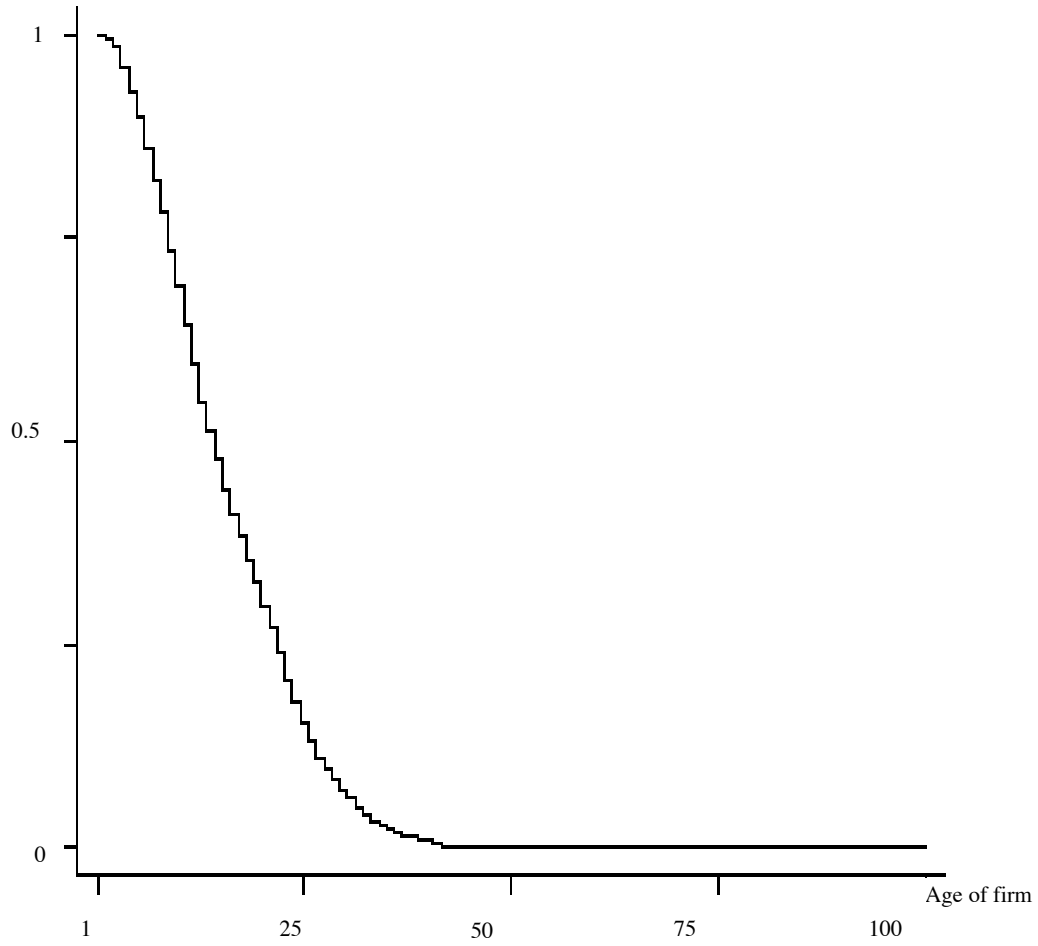
Note: Standard errors are presented below the estimates of coefficients.
***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 7 Results of Cox regressions: by firm size (number of regular workers)

Independent variables	Model 21 (Firm size:100-199)	Model 22 (Firm size:200-299)	Model 23 (Firm size:300-499)	Model 24 (Firm size:500-999)	Model 25 (Firm size:1000 or more)
Firm size	-0.553***	-0.253	0.286	0.528	-0.503**
	0.169	0.481	0.415	0.388	0.213
Capital labor ratio	0.001	0.003	-0.021**	-0.040***	-0.001
	0.002	0.002	0.009	0.014	0.008
Operating surplus ratio	-0.153	0.051	0.584	-0.109	-0.964
	0.121	0.089	1.436	0.175	2.257
Value added ratio	-0.263	-0.221	0.613	-0.041	0.298
	0.173	0.321	0.374	0.447	0.564
Wage ratio	0.489	1.405**	-0.294	1.789**	1.559
	0.380	0.649	0.832	0.816	1.153
R&D dummy	-0.169**	-0.332**	-0.338**	-0.362*	0.155
	0.083	0.136	0.160	0.203	0.278
Advertisement cost ratio	3.541***	3.877	4.623*	-14.919**	3.463
	1.371	2.953	2.507	7.507	4.968
Foreign sales dummy	-0.299***	-0.364**	-0.215	-0.164	0.058
	0.109	0.181	0.198	0.259	0.317
Foreign procurement dummy	0.191*	0.249	0.228	-0.169	0.142
	0.104	0.169	0.181	0.239	0.273
Foreign outsourcing dummy	0.236	0.449	0.582*	0.522	-0.208
	0.218	0.326	0.303	0.382	0.535
Foreign ownership ratio	0.321	0.337	0.391	0.895	-0.870
	0.363	0.568	0.492	0.689	0.721
Number of establishments	0.005	0.0002	0.009**	0.004*	0.002**
	0.006	0.007	0.004	0.002	0.001
Affiliate firm dummy	0.919***	0.909***	1.083***	1.226***	1.021***
	0.070	0.119	0.129	0.166	0.223
Owning foreign affiliates dummy	0.576***	0.044	0.218	-0.035	-0.657**
	0.117	0.186	0.181	0.237	0.268
Industry dummies	YES	YES	YES	YES	YES
Log-likelihood	-7717.71	-2399.95	-1879.50	-1140.37	-667.44
Chi-squared	332.26***	133.01***	145.46***	157.88***	94.55***
N	20241	8871	7789	6250	5058

Note: Standard errors are presented below the estimates of coefficients.
***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Figure 1: Survival probability and the age of firm



Note: survival probability (S_0(t): baseline survival function) is obtained as follows:

$$S_o(t) = \exp\{-H_0(t)\}$$

where H_0(t) is the cumulative function of baseline hazard h_0(t), which is estimated by the proportional hazard model,

$$h_i(t) = h_0(t)\exp(\beta x_i) \ .$$

Appendix Table A1: Number of exit firms

	Total observations	Exit firms	Exit ratio (%)
Independent firms	44514	2485	5.58
Afffiliate firms	23456	1511	6.44
Total	67970	3996	5.88
Firms with affiliates	38424	1764	4.59
Firms without affiliates	29546	2232	7.55
Total	67970	3996	5.88
Firm size: 50-99	19761	2175	11.01
Firm size: 100-149	12345	624	5.05
Firm size: 150-199	7896	319	4.04
Firm size: 200-249	5133	183	3.57
Firm size: 250-299	3738	147	3.93
Firm size: 300 or more	19097	548	2.87
Total	67970	3996	5.88

Notes:

(1) "Exit firms" are defined in our analysis as those which dropped from the surverys in two sequent years or more and also never returned to the survey once they dropped from the sample.

(2) The figures for total observations show the number of firm samples showed up in our panel dataset. Those that showed up in the sequent surveys from 1994 to 1997, for instance, are counted as 4 observations. On the other hand, the figures for "exit firms" show the number of exit firms as defined above. Thus, "exit ratio" is obtained by dividing the number of "exit firm" by the number of total sample firms.

Appendix Table A2: Number of "returned" firms: firms that appeared in the 1994 F/Y Survey

	Dropped in 1995	Dropped in 1996
Dropped Firm Total	1552	1070
Returned in 1996	448	
Returned in 1997	115	324
Returned firm total	563	324
Returned firm %	36.3	30.3

Note: Samples with missing data are included.

Appendix Table A3: Changes in firm size for the full sample (surviving firms only)
(Number of regular workers, absolute value)

	1994-1995	1995-1996	1996-1997
Mean	31.6	30.7	29.1
Median	8	7	7
s.d.	145.5	157.3	131.8

Appendix Table A4: Changes in firm size for firms with less than 300 workers (surviving firms only)
(Number of regular workers, absolute value)

	1994-1995	1995-1996	1996-1997
Mean	11.2	10.4	10.7
Median	5	5	5
s.d.	26.6	24.7	26.5