**Can Winners be Losers?
The Case of the Deming Prize for
Quality and Performance among
Large Japanese Manufacturing Firms¹**

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Abstract

Prior research argues a positive relationship exists between winning a quality award and firm performance. We presented an alternative perspective that performance may be negatively associated with winning. Results support the latter argument for the vast majority of the firms in our sample. However, results also suggest the relationship between winning and performance may be contingent on other variables.

I. Introduction

Perhaps no other trend in the last several decades has influenced the strategic focus of managers as much as the pursuit of quality as a competitive advantage. Among other things, improvements in quality are said to lead to increases in customer satisfaction, decreases in manufacturing costs, as well as, greater profitability and market share (cf., Garvin, 1984; Mann, 1989). Supporters of various quality programs have gone as far as touting "their perspectives as a universal panacea for all organizational difficulties (Gehani, 1993: 41)."

To encourage a greater emphasis on quality among management, both private and government institutions have established quality award competitions, e.g. the Deming Prize in Japan and the Baldrige Award in the United States. Although proponents of these awards contend that winning firms are model enterprises that have gained a competitive advantage over others (cf. Chen, 1989; Gehani, 1993), criticisms of the utility of winning a quality award have recently surfaced (cf., Harvard Business Review, Jan-Feb. 1992). Interestingly, though it can be seen as a strategic option open to company executives, the benefit of winning a quality award has seen little attention among strategy researchers. Therefore, by focusing on Japan's Deming Prize, the purpose of this study is to investigate the performance implications of winning a quality award.

II. Literature and Hypotheses

For more than four decades, numerous writers have asserted that there is a strong link between quality control and firm performance (Crosby, 1980; Deming, 1986; Feigenbaum, 1956; Juran, 1974). For example, Deming (1986) argues that an increase in quality is directly correlated with increases in productivity and customer satisfaction. In turn, productivity gains and loyal customers produce higher profit margins and greater market share.

Among other things, Deming feels a company's final goal should be to achieve zero defects in their manufacturing process. To achieve that goal, Deming and his contemporaries, such as I. Juran and A.V. Feigenbaum, advanced the idea of Total Quality Management (TQM) or Total Quality Control (TQC). Cusumano (1985) states that the concept of TQM/TQC stresses the need for companies to devise processes that act on statistical data to correct quality problems and to extend quality control programs to other areas of the firm; such as marketing, research & development, inventory control, cost control and procurement. Among other things, this broader approach to quality control emphasizes defect prevention rather than inspection, and making quality the responsibility of all workers rather than only management or a group of specialists (Cusumano, 1985). In short, TQM/TQC is

not merely about productivity and quality control; it is a broad vision

on the nature of organizations and how organizations should be [managed] (Gartner & Naughton, 1988).

Quality awards

In commemoration of Dr. Deming's contributions to the Japanese quality movement, the Deming Prize for quality control was founded in 1951 by JUSE (Japanese Union of Scientists and Engineers). The Deming award was set up to promote the continued development of quality management among Japanese companies (JUSE, 1992). Decades later, in 1987, the U.S. government helped establish the Baldrige award as the centerpiece of a national initiative to improve quality management (Reimann, 1989). National quality awards have also been founded in Australia, Canada, within the European Community and by some U.S. states. Finally, several large private enterprises also sponsor quality award competitions, eg., Toyota in Japan (Cusumano, 1985) and Motorola and Westinghouse in America (Blackburn & Rosen, 1993).

Among corporate executives, various reasons have been given as to why they would want their company to win a quality award. Some simply view winning a quality award as a useful public relations or marketing tool (Houston, 1990). Other organizations believe that by winning a quality prize they will have a superior management process in place allowing them to survive economic downturns, shifts in technology, or changes in fashion (Garvin, 1991). As one Japanese company stated, "our goal in winning the Deming Prize was to improve the corporate health and character of the company, to upgrade the quality of its

products, and to raise the profit picture (Gabor, 1990: p.95)." In short there is a perception among many practitioners that winning a quality award leads to superior performance (cf., Houston, 1990, Mann, 1989).

Academics have also linked winning a quality award with improvements in firm performance. For example, pointing to the list of Deming Prize winners which includes some of the most successful firms in Japan (e.g., Hitachi, Matsushita, NEC, Nissan Motors, Toyota Motors, and Komatsu), champions of quality awards argue that winners have developed a competitive edge over other firms in their industries (Chen, 1989). Others writers have claimed to demonstrate an empirical relationship between Deming winners and superior performance (cf., Mann, 1989). In one study, Chen (1989) asserts that Deming prize winners increased annual sales by an average of about 14 percent, while Japanese industry as an average increased sales by 12 percent. Chen also contends that the annual profit margin of Deming companies increased by almost 3 percent, which was higher than Japanese industry average of 1 percent.

Unfortunately, prior studies that have linked winning a quality award to firm performance contain a number of limitations. For example, Chen's (1989) study does not provide an adequate discussion as to the methodology employed. Therefore, it is difficult to discern what controls, if any, were used in their study. Nor is it possible to ascertain whether the differences in the performance figures were statistical significant or not. Given these limitations, further examinations

of the performance implications of winning a quality award appear to be warranted.

Quality awards and performance: An alternative perspective

Recently, several writers have begun to question the value of quality awards (Houston, 1990; Main, 1991). These contributors contend that winning a quality award may actually serve as a liability to individual enterprises. Indeed, there is anecdotal evidence that suggests a negative relationship may exist between winning a quality award and firm performance. For example, several Baldrige winners have seen substantial declines in performance after winning (Main, 1991).

Below, we will present an alternative perspective on the relationship between winning a quality award and firm performance. More specifically, we will utilize two theories, the danger of simplicity (Miller, 1993) and the winner's curse (Kagel & Levin, 1986), to hypothesize that a negative relationship might exist between winning a quality award and firm performance.

The Danger of Simplicity

Success has been seen as a function of an organization's ability to identify, cultivate, and exploit distinctive or core competencies (cf., Prahalad & Hamel, 1990). These competencies are viewed as unique strengths of a firm that are not easily matched or imitated by their competitors (Hill & Jones, 1992). Often used

examples of core or distinctive competencies are marketing at Proctor & Gamble, manufacturing at Toyota (Cusumano, 1985), research & development at 3M (Hill & Jones, 1992), and Sony's ability to miniaturize (Prahalad & Hamel, 1990). Organizational decline, therefore, is said to be the direct result of firm's failure to maintain these competencies. For example, if a company previously known for high quality merchandise were to begin producing inferior quality products (Miller, 1993 and citations contained therein).

Recently, Miller (1993) proposed that the threat to successful organizations is not always due to their failure to sustain their competencies. He argues that another danger to successful firms is in becoming too narrowly focused on one or a few competencies at the exclusion of other activities of the organization. As Miller (1993) points out:

Most outstanding organizations lapse into decline precisely because they have developed too sharp an edge. They amplify and extend a single strength or function while neglecting most others (Miller, 1993: 116).

He adds that various writers "have presented numerous examples of formerly thriving companies that came to focus--almost to the exclusion of everything else--on the one goal, aspect of strategy, department, or even skill that they credited for their success (Miller, 1993: 116)."

Contributors have used a similar argument when discussing reasons why winning a quality award may be harmful to firm performance. These critics have

complained that the distraction of winning a quality award may cause key executives to lose sight of the marketplace or other activities of their organization that need their attention (cf., Harvard Business Review, 1992).

Indeed, anecdotal evidence suggests that the effort required to win a quality award may divert the companies attention away from other activities. For example, Florida Power & Light "assigned one of 2 executive vice-presidents to run its Deming campaign full-time (Main, 1991: 65)" In competing for the Baldrige award, General Motors's cadillac division formed a team of 30 people to complete its application. Each week the group assembled in Detroit at least once, sometimes requiring people to fly in from as far away as Texas (Houston, 1990). When Corning decided to compete for the Baldrige award, it picked a team of 16 people who worked full time on the application process. In turn, these 16 recruited another 120 people throughout the division to address various aspects of the Baldrige application. Corning estimates that it invested some 7,000 man-hours in the Baldrige application, producing some 1100 pages of documentation. It also dedicated 7,000 man hours for the visit by the Baldrige examination committee (Houston, 1990).

Our interviews with Deming winners in Japan produced similar stories. For example, managers from Fuji-Xerox, a 1980 Deming winner, described how intensely committed management and workers were to winning a quality award. After Fuji-Xerox President Tony Kobayashi challenged his workers to win the

Deming Prize, "people would actually punch out after their shifts and then go back and work another eight hours without punching in again... (Jacobson & Hillkirk, 1986: p. 306)." Managers confessed to us that during the last three to six months of the competition period many of them spent a significant portion of their time devoted almost exclusively to the process of winning.

The danger from these anecdotes is simple, the goal of winning a quality award may become an obsession for a firm and a threat to distract corporate attention away from other critical activities (Miller, 1993). At its worst, the goal of winning may even displace the goal of achieving real quality (Main, 1991).

The Winner's Curse

Much of the work done on the concept of a winner's curse can be found in economic theory (cf., Kagel & Levin, 1986). A winner's curse occurs when winning firms systematically bid above the actual value of objects and thereby incur losses (Lind & Plott, 1991). Economists have generally viewed the winner's curse with caution since it implies "that bidders err, in violation of basic notions of economic rationality (Kagel & Levin, 1986: 894)." Yet, a winner's curse has been observed in a variety of settings including; experimental (Kagel & Levin, 1986; Lind & Plott, 1991), oil companies bids for oil leases (Kagel & Levin, 1986; references cited therein), and in bidding within the context of FDIC auctions for failed banks (Giliberto & Varaiya, 1989). As Lind and Plott (1991) concluded in their study, the "winner's curse is a general phenomenon exhibited by most agents (p. 336)." Given

that managers are agents (Fama, 1980) the winner's curse has also been used to analyze the strategic behavior of successful corporations (Davidson, 1990). Therefore, it would seem reasonable that the winner's curse could be applied to those firm's that are 'bidding' to win a quality award.

Indeed, an often stated concern among critics of quality awards is that the enormous costs, particularly financial and human, associated with winning outweigh any potential benefits (Houston, 1990; Main, 1991). For example, the monetary costs of winning a quality award can be staggering. Although no figures were available for Japanese firms that have won the Deming Prize, Florida Power & Light estimated that its costs included \$399,000 of direct expenses, \$885,000 in fees to Japanese consultants, and \$721,000 for trips to Japan in one year alone (Houston, 1990). In competing for the Baldrige Award, Xerox figures that its out-of-pocket expenses amounted to \$800,000, not including the cost of paying a team of 20 people who worked full-time on its application for several months (Houston, 1990).

Perhaps more important, winning a quality award can be overly demanding on a firm's human resources. For instance, to complete an application that can reach 1000 pages, Japanese employees of Deming companies complained of the harsh hours, seven day work weeks and lack of vacation time during the competition period. In the case of NEC Tohoku, a 1989 Deming winner, the directives, plans, and reports that were needed to satisfy the evaluation committee

totaled 244,000 pages (Business Week, 1991). Often, the stress and pressure of competing requires employees to become workaholics and forgo their personal lives which, in turn, has lead to some drinking problems, failing health and even suicides (Houston, 1990; Main, 1991).

These significant human costs can have a direct impact on how successful firms are in maintaining TQM/TQC programs after winning a quality award. At Nissan, for example, quality (as well as overall firm performance) declined soon after winning the Deming award in 1960 (Cusumano, 1985). As a former Nissan Executive Vice-President Kanao Kaiichi claimed -

there was internal resistance to continuing the (QC) program; top executives and other employees simply became tired after nearly two years of preparations for the examination....They did not make quality control a top priority after 1960 (Cusumano, 1985: p. 371).

To sum, the danger of simplicity argues that focusing too narrowly on one activity, such as winning a quality award, at the exclusion of other activities may be a threat to firm performance (Miller, 1993). The winner's curse argues that winners systematically pay more than the value of the item that they won (Kagel & Levin, 1986). Both of these theories, therefore, suggest that a negative relationship might exist between winning a quality award and firm performance. This leads to our hypothesis:

Hypothesis 1. Winning a quality award will be negatively associated with firm performance.

III. Methodology

Overview. This study focused on large Japanese manufacturing firms that won the Deming Prize for quality between 1964 and 1989. Large firms, as defined by the Deming Prize Committee, includes those public corporations that appear in the first or second section of the Tokyo Stock Exchange or similarly sized privately held companies (JUSE, 1992). We used 1964 as our starting point since it was the first year that successful use of TQM/TQC became the prerequisite for capturing the Deming Prize (Business Week, 1991). Firms that won the Deming award after 1989 were excluded from the sample because of data limitations (see below).

A list of past Deming prize winners was obtained from JUSE. A review of **The Japan Company Handbook** and the **Nikkei's Corporate Annual Reports** provided information on each company. Along with performance data, these two books were also utilized to help determine the industry for each of the Deming Prize winners. More specifically, **The Japan Company Handbook** and the **Nikkei's Corporate Annual Reports** listed sales information on each firm broken down by product line. Each Deming winner's industry was determined by the product line that produced the largest share of each company's sales. We also used the two books noted above to select other firms with documented sales in each Deming winner's industry to be used as controls.

Among the Deming winners used in this study, sales in the product line

that indicated their industry averaged 62% of each company's total sales. Among the control firms, an average of 61% of their total sales were in the same industry as their respective Deming winner.

The complete list of Deming award winners, their industry designations, and a list of each of their competitors were then distributed to two independent judges. This was done to ascertain the accuracy of the industry designations and the list of control firms. One juror was an academic with many years of experience conducting research on Japanese firms. The other judge was an analyst for a regional stock brokerage firm in Nagoya, Japan. Each of these individuals found our list to be quite accurate in terms of the industry designations and the respective competitors for each Deming winner. Minor differences of opinions that existed were discussed at length among the three parties until a consensus was achieved.

Research revealed that it took Japanese firms an average of three years of formal competition to win the Deming prize (Ikezawa, 1981; Inohara, 1990). Similarly, a GAO study found that most American companies took two and a half years of formal competition to win the Baldrige award (Blackburn & Rosen, 1993). As such, with t representing the year a particular firm won the Deming prize, data was collected for the three years ($t-2$, $t-1$, and t) that Japanese companies took to formally compete and win the Deming award. These three years will hereafter be called the competition period. We also gathered data for the three

years ($t+1$, $t+2$, $t+3$) representing the time after a firm won the Deming prize, henceforth called the post-competition period. In sum, a total of six years of data was collected for each Deming Prize winner. A corresponding six years of data was also collected for each of the Deming winner's competitors.

Sample. 43 large manufacturing corporations won the Deming award from 1964 to 1989. Data was unavailable for 12 of these firms, and as such, were not included in the analyses. This left us with a sample of 31 Deming award winners. As outlined above, these firms were assigned an industry classification and a list of other firms in those industries was compiled. In total, data was gathered for 164 firms. This averages to just over five firms per group. A list of the Deming Prize winners used in this study, the year they received the Deming Prize, and their industry designations can be seen in Table 1.

Insert Table 1 about here

Measures. Firm Performance. This study included two measures of firm performance. First, as a measure of profitability we incorporated return on sales (ROS), defined as operating income divided by total sales. While it has been shown to be highly correlated with other performance measures (e.g., ROA, ROE, ROI), ROS is the profitability yardstick used by most Japanese companies to measure

their success (Nakajima, 1986)

Our measure of ROS was calculated in the following manner. First, ROS was computed for each firm for each of the six years in which data was collected. Second, an industry group average (mean) was calculated for each of the 31 groups of firms for each of the six years. To get the industry adjusted performance figure for each firm for each year, the industry average was subtracted from each firm's performance figure. To calculate the industry adjusted ROS for the competition and the post-competition periods we computed the three year average of the industry adjusted figures for (t-2, t-1, and t) and (t+1, t+2, and t+3) respectively.

Other contributors have noted that some Japanese firms rarely saw profitability as their main strategic objective (cf. Abegglen & Stalk, 1985). Instead, these Japanese firms have tended to be more concerned with other performance indicators, e.g., market share. Therefore (as detailed below) we have included a measure of market share as another indicator of firm performance.

Our measure of market share for each firm was calculated in the following manner. First, we determined the industry for each Deming winner and their competitors (see above). We then calculated an industry sales figure for each firm for each of the six years of data. This was done by multiplying the percentage of sales in that industry times a firm's total sales. Market share for each year was then calculated by dividing each firm's industry sales figure by the sum of the

industry sales figures for all the firms in the group in which that firm was located. To calculate the market share for the competition and post-competition periods, we computed the three year average market share for (t-2, t-1, and t) and (t+1, t+2, and t+3) respectively.

Deming Winners. This variable was represented by a dichotomous variable (0=non-winning firms, 1=winning firms).

Control variables. Organizational performance is often constrained by a variety of factors, such as past performance, organizational age, and size (Hannan & Freeman, 1977; Aldrich, 1979). Therefore, three control variables were included in the model for each firm -- (1) past performance (the prior period's three year average adjusted ROS or market share), (2) age (years since founding), and (3) size (total sales).

Our sample contained a variety of six year periods stretching from 1964 to 1989, depending on the year a firm won the Deming Prize. As such, simply using age and size was somewhat problematic. For example, firms included in groups centered on winners from the 60's would generally all be younger than those firms in groups centered on Deming winners from the 1980's. Similarly, given the growth of the Japanese economy during those 25 years, firms included in groups centered on Deming winners from the 60's would generally all be smaller than those firms from groups centered on winners from the 1980's, even after

controlling for inflation.

To account for this bias, we utilized relative measures of firm age and firm size. To do this we first calculated an industry group average (mean) for firm age (year $t-2$ only) and firm size (years $t+1$, $t+2$, and $t+3$). These calculations were done on each of the 31 groups of firms. To get a relative age figure for each firm, the industry average age (year $t-2$) was subtracted from each firm's age (year $t-2$). To arrive at a relative size figure for each firm, we first subtracted each firm's size figure from the industry average size figure for each of the three years; $t+1$, $t+2$ and $t+3$. We then calculated the three year average ($t+1$, $t+2$, and $t+3$) to get a relative size measure.

IV. Results

Table 2 provides descriptive statistics - means, standard deviations, minimums, and maximums - for all variables. Table 3 presents the zero-order correlations among all variables. A look at row one reveals a strong positive relationship between Deming winners and market share during both the competition and post-competition periods. These initial results would appear to support prior studies that have argued a positive relationship exists between winning a quality award and firm performance. Row 1 shows no association between winning a Deming award and adjusted ROS.

Insert Table 2 about here

Insert Table 3 about here

In a more explicit test of H1, we analyzed the relationship between winning the Deming Prize and firm performance after incorporating several control variables; past performance, relative firm age, and relative firm size.

Table 4 presents the results of the multiple regression analyses using industry adjusted ROS during the post-competition period as the dependent variable. Prior to testing hypothesis H1, we conducted a regression analysis with the three control variables (past performance, relative firm age, and relative firm size). The first column of Table 4 indicates two significant coefficients, those for prior ROS (.4184, $p < .01$) and relative firm size (.0020, $p < .05$). The second column of the same table adds the dichotomous variable depicting Deming winners. This equation also reveals two significant coefficients -- prior performance (.4181, $p < .01$) and firm size (.0019, $p < .05$).

Insert Table 4 about here

Table 5 presents the results of the multiple regression analyses using market share during the post-competition period as the dependent variable. The first column of Table 5 indicates only one significant coefficient, that for prior market share (.9309, $p < .01$). The second column of the same table adds the dichotomous variable depicting Deming winners. This equation also reveals one significant coefficient -- prior market share (.9396, $p < .01$).

Insert Table 5 about here

The first conclusion that we can draw from our findings is that firms that previously performed well generally continued to do so. Second, analysis controlling for past performance and other factors (Tables 4 & 5) failed to support those who have argued that a positive relationship exists between winning a quality award and firm performance. However, the results in the second column of Tables 4 and 5 also failed to provide any support for our Hypothesis 1, that there is a negative relationship between winning a quality award and firm performance.

Additional Analysis

A review of our sample revealed that 10 out of 31 (32%) of our Deming winners were members of the Toyota keiretsu (industry group). [It should be noted

that although ties among members of an industry group can be strong these firms are, strictly speaking, independent corporate entities.] Therefore, we conducted additional analysis using an interaction term depicting firms that won the Deming Prize and were also members of the Toyota group (1=Toyota Deming winning firms, 0=winning firms that were not a member of the Toyota keiretsu).

The third column of Table 4 reveals the results of further analyses using adjusted ROS as the dependent variable and including the interaction term (Toyota Deming winners). As noted there, this equation now indicates three significant coefficients, those for prior performance (.4186, $p < .01$) and firm size (.0020, $p < .05$), as well as Deming winners that were not a member of the Toyota keiretsu (-.0113, $p < .05$). The third column of Table 5 reveals the results of further analyses using market share as the dependent variable and including the interaction term (Toyota Deming winners). As noted there, this equation indicates three significant coefficients, those for prior market share (.9393, $p < .01$), as well as those Deming winners that were **not** a member of the Toyota Keiretsu (-.0135, $p < .05$) and Deming winners that **were** a member of the Toyota Keiretsu (.0241, $p < .05$).

The additional analysis indicates that among Deming winning companies that were **not** members of the Toyota group, there is a significant negative relationship between winning a quality award and firm performance. This relationship held true using either adjusted ROS or market share as a measure

of performance. Yet, among winners that were members of the Toyota group, there is either a strong positive association between winning and performance, in the case of market share, or no relationship between winning and performance, in the case of adjusted ROS. A discussion of our results follows.

V. Discussion.

The purpose of this study was to examine the performance implications of winning a quality award. Prior contributors have argued that a positive relationship should exist between winning a quality award and firm performance. In this paper, we presented an alternative perspective, that firm performance may be negatively related with winning a quality award.

One interpretation of our results is that perhaps neither perspective is totally correct. Instead, the relationship between winning a quality award and firm performance may be contingent on a third variable. Our research found that the relationship between winning a quality award and firm performance is dependent on whether or not a firm is member of the Toyota keiretsu. Utilizing the winner's curse, we can offer a possible explanation as to why membership in the Toyota group moderates the relationship between winning a quality award and firm performance.

Researcher's have found that while the phenomenon of the winner's curse rarely dissipates, it can diminish in size (Lind & Plott, 1991). In one study,

Hanson & Lott (1991) found that reducing the uncertainty over an item's value can decrease the average price paid by the winners. Therefore, the reduction of uncertainty appears to have a moderating effect on the size of the winner's curse.

Lind & Plott (1991) found that in winner's curse situations, experience is related to the degree of uncertainty reduction. Specifically, the more experience a firm has with the item that it is bidding for, the more efficient and effective those firms are in providing the winning bid. Applied to the current paper, it would seem reasonable to suggest that the degree of experience a firm has with TQM/TQC, the more efficient and effective they could be in 'bidding' for a quality award. This may be particularly true for firms that have won a Deming award since the principles associated with TQM/TQC are used as guidelines for picking winning firms (Business Week, 1991; JUSE, 1992). In other words, the degree of experience in TQM/TQC might moderate the relationship between winning a quality award and firm performance. Going further, one might predict that firms that generally have had more experience in TQM/TQC prior to winning a quality award should perform better than those with less experience in TQM/TQC prior to winning.

Cusumano (1985) argues that the concept of quality control has had a long history in the Toyota keiretsu going back as far as 1937. He describes Toyota Motors, the lead company in this group, as an innovator in the quality movement being one of the first companies to adopt the principle that in-process self-

inspection by line workers was the best way to insure against manufacturing defects (Cusumano, 1985). After winning the Deming award in 1965, and unlike other Deming winners such as Nissan, Toyota Motors embarked on a new quality program which "attempted to promote similar quality assurance measures for the entire Toyota group (Cusumano, 1985: p. 366)."

Secondary sources, as well as on site interviews, revealed that many of the other Deming winners in our sample rarely attempted to integrate a TQM/TQC program prior to competing for the Deming Prize. Instead, companies such as Pentel used the Deming Prize criteria as a guide and the award itself as a carrot for implementing a TQM/TQC program (Inohara, 1990). Unfortunately, obtaining a reliable quantitative measure of experience in TQM/TQC for all the firms in our sample was not possible. Therefore, while it is plausible that experience in TQM/TQC plays a role in moderating the relationship between winning a quality award and firm performance, it is not certain.

Another possibility is that our interaction term may be picking up differences in the degree of commitment to quality programs among winning firms. As stated early, the preparations needed to win a quality award can exact a heavy toll on a firms human capital. It has been suggested that this burden causes managers and employees alike to lose their enthusiasm for quality control once they have won an award (Cusumano, 1985).

The possibility that winning firms would become exhausted or complacent about quality and not make it a top priority after winning was also a concern of JUSE, the sponsors of the Deming Prize. As such, they established the QC Award. Open only to prior winners of the Deming Prize, it was seen as a tool to keep those firms from slackening on their quality initiatives after winning the Deming Prize (JUSE, 1992).

Cusumano (1985) contends that the Toyota group of companies have been extremely committed to quality for several decades. For instance, various measures taken by Toyota Motors encouraged firms within the Toyota group to maintain active quality control programs throughout the 1970s and 1980s (Cusumano, 1985). This significant degree of commitment to TQM/TQC may explain the fact that of the 43 large manufacturing firms that won the Deming prize between 1965 and 1990, nearly one fourth were members of the Toyota group of companies. Further, of our sample of 31 Deming winners, only six have gone on to win the QC Award (see above). Five of those six are members of the Toyota group of companies.

Like experience, obtaining a valid measure of commitment to TQM/TQC for all the firms in our sample was not possible. Therefore, while it is plausible that commitment to TQM/TQC plays a role in moderating the relationship between winning a quality award and firm performance, again it is not certain.

Finally, the interaction term used above may be picking up other differences in our sample. An industry effect is a possibility given that many of the Deming winners from the Toyota group can be classified as belonging to a single industry, Motor Vehicles and Parts. Unfortunately, there is little theoretical reason to expect that industry would play a moderating role in the relationship between winning a quality award and firm performance.

In sum, the results of the present study indicate that for a vast majority of firms (about 70%) there is a negative relationship between winning a quality award and firm performance. However, our results also seem to indicate that the association between winning a quality award and firm performance may be contingent on a third variable. We have suggested that the degree of experience or commitment to TQM/TQC might moderate the relationship between winning a quality award and firm performance.

VI. Limitations

Before moving on we must recognize the potential limitations of this study. For instance, we limited our observations to only two performance measures, ROS and market share. It is entirely possible that winning a quality award might have a greater impact on other measures of performance, such as productivity or consumer complaints. However, it was felt that the selection of these two variables was appropriate for the following reasons. First, most TQM/TQC contributors have ultimately linked TQM/TQM with market share and profitability (cf., Deming,

1982, Garvin, 1984). In addition, this study wanted to be consistent with prior studies (e.g., Chen, 1989) that have examined the relationship between winning a quality award and firm performance. Finally, though we recognize that the use of market measures (e.g., stock price) may be preferable to accounting measures (e.g., ROS), several of the winners in our sample, e.g., Yanmar Diesel, Fuji-Xerox, Yokogawa-Hewitt Packard, and Pentel are privately held, and as such, information on stock prices was not available.

Another limitation of this study may be its time frame. Proponents of quality awards have argued that implementing TQM/TQC programs should be seen as investments rather than costs and should be evaluated over the long term. Therefore, any analysis of the performance implications of winning a quality award should utilize long term measures of performance. Unfortunately, however intuitive appealing those arguments are, there is no empirical analysis that can support their claim. Further, anecdotal evidence suggest that sometimes the burden of winning causes managers and employees alike to lose their enthusiasm for quality control once they have won an award (Cusumano, 1985). Therefore, as we have already suggested, any benefits gained in winning a quality prize could easily be lost if a firm is not committed to maintaining their TQM/TQC programs.

VII. Implications for Managers

There is growing fear among critics of quality awards that executives mistake winning an award for a cure-all, and that the award does not guarantee

anything accept the intense pressure that companies put themselves through to successfully compete for it (Main, 1990). Deming himself has been critical of the Baldrige award guidelines, "some of the recommendations...will do incalculable damage to American industry... no one could measure nor imagine the destruction to our economy that will come from such misguided efforts (Deming, 1991)."

For managers the question is simple - Does meeting the standards of a quality award improve firm performance? The results of the present study seem to indicate that for the vast majority of firms the answer is no. Instead, winning a quality award may potentially lead to performance declines. Therefore, a CEO must seriously considered whether he or she should put their company under the stress and strains of competing for a quality award in hopes of improving performance. Instead, they may want to ask if there are any alternative methods for designing and implementing improvements in quality control.

VIII. Conclusions

This study was not an assessment of TQM or TQC. Rather, it sought to determine, at least by inference, if firms that have won a quality award have developed a competitive advantage over other firms within their industry. The results of the present study indicate that winning a quality award for many firms leads to performance declines. Yet, our results also suggest that the relationship between winning a quality award and firm performance may be contingent on other factors, such as the degree of experience or commitment to TQM/TQC.

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Table 1

Sample¹

Year		Deming Winner	Industry
1964		Komatsu	Construction Equipment
1965	T	Toyota Motors	Motor Vehicles
1967		Shinko Wire	Steel Wires
1968		Yanmar Diesel	Diesel Engines
1968		Bridgestone	Tires
1971	T	Hino Motors	Trucks
1972	T	Aisin Seiki	Auto Parts, Drive Train
1975		Ricoh	Optics
1976		Pentel	Pens & Pencils
1976		Sankyo Seiki	Electric Components
1977	T	Aisin Warner	Transmissions
1978	T	Tokai Rika	Automobile Electric Parts
1979		Sekisui Chemical	Building materials
1980		Kayaba	Hydraulic Equipment
1980		Komatsu Forklift	Forklifts
1980		Fuji Xerox	Copiers
1982		Rhythm Watch	Timepieces
1982		Yokogawa/Hewitt Packard	Measuring Instruments
1983		Japan Steel Works	Cast and Forged Steel
1984		Yasakawa	Heavy Electric Manufacturing
1984		Komatsu Zenoah	Farm & Forestry Equipment
1985		Nippon Zeon	Synthetic Rubber
1985	T	Toyoda Gosei	Automobile Rubber Parts
1985	T	Toyoda Machine Works	Machine Tools
1985		Nippon Carbon	Artificial Graphite Electrodes
1986	T	Toyoda Automatic Loom	Industrial Machinery
1987		Daihen	Transformers
1987	T	Aichi Steel Works	Specialty Steel
1988	T	Asmo	Small Electric Motors
1989		Itoki Kosakusho	Office Furniture
1989		Toto	Ceramic Bathroom Fixtures

¹ T signifies a member of the Toyota Group

Table 2

Means, Standard Deviations, Minimums, and Maximums
Among All Variables
(N=164)

<u>Variable</u>	<u>Mean</u>	<u>Std Dev</u>	<u>Max</u>	<u>Min</u>
Competition/ROS	.004	.034	-.126	.161
Post-comp/ROS	-.004	.041	-.129	.220
Competition/Mktshare	.177	.162	.003	.895
Post-comp/Mktshare	.177	.155	.004	.901
Relative Firm AGE	-3.712	11.352	-37	25
Relative Firm SIZE	66647	260900	-106042	2192661
Deming	.177	.383	1	0

Table 3
Correlations

	2	3	4	5	6	7
1. Deming	.10	.05	.46***	.44***	-.19**	.02
2. Competition/ROS		.22***	.15*	.15*	-.10	.14*
3. Post-comp/ROS			.11	.10	-.02	.00
4. Competition/Mktshare				.98***	-.01	.28***
5. Post-comp/Mktshare					.01	.29***
6. Relative Firm Age						.10
7. Relative Firm Size						

*** p < .01

** p < .05

* p < .10

Table 4

Standardized GLS Estimates
with Post-Competition Industry Adjusted ROS
as the Dependent Variable¹

	1	2	3
Prior Performance	.4184*** (.0559)	.4181*** (.0559)	.4186*** (.0557)
Relative Age	-.0118 (.0080)	-.0096 (.0082)	-.0108 (.0082)
Relative Size	.0020** (.0010)	.0019** (.0009)	.0020** (.0010)
Deming		.0071 (.0060)	-.0113** (.0047)
ToyotaDeming			.0160 (.0118)
Constant	-.0016	-.0026	-.0027
R-squared	.2973	.3035	.3117
F-value	22.143***	16.997***	14.036***

*** p < .01

** p < .05

* p < .10

¹ standard errors in parentheses

Table 5

Standardized GLS Estimates
with Post-Competition Market Share
as the Dependent Variable¹

	1	2	3
Prior Performance	.9309*** (.0147)	.9396*** (.0167)	.9393*** (.0165)
Relative Age	.0064 (.0076)	.0045 (.0078)	.0062 (.0093)
Relative Size	.0013 (.0008)	.0012 (.0008)	.0012 (.0008)
Deming		-.0072 (.0066)	-.0135** (.0089)
ToyotaDeming			.0241** (.0114)
Constant	.0111	.0110	.0110
R-squared	.9691	.9693	.9701
F-value	1659.5***	1246.5***	1019.9***

*** p < .01

** p < .05

* p < .10

¹ standard errors in parentheses