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Review of J. D. Power Quality Measurement of U. S. and Japanese Automotive Industry

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ABSTRACT

J. D. Power and Associates (JDP) conducts customer surveys and reports information on automobile quality, reliability, safety, satisfaction and buyer behavior. The Initial Quality Study (IQS) by JDP provides feedback on the quality of new vehicles during the first 90 days of ownership. This paper evaluates the quality measurements of IQS and its economic impact on the sales performance of major U.S. automakers (GM, Ford, and Chrysler) and Japanese automakers (Toyota, Honda, and Nissan) between 2001 and 2010. The following research questions are addressed: (1) Does IQS have significant impact on the customers' purchasing behavior during the period of study? (2) Who benefits more from IQS, U.S. or Japanese automakers? (3) How can the quality information of IQS be measured and evaluated? In order to address the first two questions, the event study methodology is used to analyze the impact the IQS surveys on U.S. market sales. IQS resulted in the positive response to the market (or increasing market share) for Japanese automakers with the opposite result for U.S. auto manufacturers. To address the third question, two quality measures (IQS score and event type, i.e., positive or negative event) are defined and analyzed. The analysis shows that there is a positive relationship between IQS score and market share response. Similarly, positive news had a significant effect on the market response of IQS reports, while the effect of negative news was not significant.

Keywords: Quality, automobile, reliability, safety

INTRODUCTION

J. D. Power and Associates (JDP) conducts customer surveys and reports information on automobile quality, reliability, safety, customer satisfaction and buyer behavior. Driven by the results of these studies, car manufacturers have substantially improved vehicle quality over the years. The Initial Quality Study (IQS) provides feedback on quality of new vehicles during the

first 90 days of ownership. The results from the IQS surveys (Greywitt & Tews, 2001, 2002; 2003, 2004, 2005; Tews & Dadlani, 2006; Tews & Perryman, 2007, 2008, 2009, 2010) provide consumers with information on the awards for the three best vehicles in each car segment. These awards are used extensively in advertising that influences purchasing decisions. Before purchasing a car, consumers review the available literature on the quality of a product to minimize their risk of purchasing a defective car. Such information reduces the risk of making a decision with partial or imperfect information (Heizer & Render, 2012).

This paper evaluates the quality measurements of IQS and its economic impact on the sales performance of major U.S. automakers (GM, Ford, and Chrysler) and Japanese automakers (Toyota, Honda, and Nissan) between 2001 and 2010. The following research questions are addressed in this study: (1) Does IQS have significant impact on the customers' purchasing behavior during the period of study? (2) Who benefits more from IQS, U.S. or Japanese automakers? (3) How can the quality information of IQS be measured and evaluated?

In order to address the first two questions, the event study methodology (Bowman, 1983; De Jong, 2007) is used to analyze the impact the IQS surveys on U.S. market sales. Event study is a statistical method that has been used extensively in financial research to find the stock market reaction to important financial events such as mergers and acquisitions, earnings announcements, corporate reorganizations, investment decisions and corporate social responsibility (MacKinlay, 1997; McWilliams & Siegel, 1997). In this paper, event study is used to measure the impact on sales performance instead of applying it to the financial performance. Impact on individual firms as well as groups based on national sales and market share are measured and analyzed. Specifically, the IQS survey and the sales impact for major U.S. and Japanese automakers are analyzed and compared as specified in the second research question. The third research question is to identify what factors in IQS affect sales performance change, and how much they affect those changes. In this paper, the following two factors of IQS are considered:

- Awards list: identifies the three best models in each segment (i.e., compact car, midsize car, full-size car, etc.)
- IQS ranking based on the number of identified problems per 100 vehicles

The effect of the first factor (i.e., the awards list) is measured by employing IQS scores (Richardson, 2009). An automaker's adjusted IQS score is computed by assigning the weight of three for the first place, two for the second place, and one for the third place (Richardson, 2009). In case of the second factor (i.e., IQS ranking), a measure called *event type* is introduced. Consumers' perception of IQS ranking can be categorized as a *positive event* or a *negative event* to an automaker based on the number of defects. An event is defined as negative if the reported number of problems for the automaker is greater than average and positive otherwise. Regression analysis is performed to analyze the relationship between these two factors and the impact on sales and to quantify the strength of the effects by the factors.

This paper is organized as follows. In section 2, the event study methodology is introduced and applied to the U.S. sales data (specifically U.S. and Japanese automakers) between 2001 and 2010. Section 3 introduces two quality measures (IQS score and event type) that are defined and

analyzed. Finally, a discussion of the application of the model and its limitations and future work is presented in the fourth section.

MODEL DEVELOPMENT

Data Collection

Sales data is obtained from Automotive News Data Center (Automotive News Data Center, 2011) that contains each automaker's monthly sales in the U.S. between January 2001 and December 2010. Consistent with prior studies (Borenstein & Zimmerman, 1988; Grafton, Hoffer, & Reilly, 1981; Rhee & Haunschild, 2006), this research was conducted using **month** as the unit of analysis. **Market share** is used as a proxy for the monthly return of sales performance instead of **sales units** because market share, unlike sales by unit, is not affected by temporal fluctuations in seasonal demand. This is consistent with literature in the auto industry (Rhee & Haunschild, 2006).

Event Study to Measure the Effect of IQS

Event study (Bowman, 1983; De Jong, 2007) is a statistical method that has been used extensively in financial research to determine the stock market reaction to important financial events such as mergers and acquisitions, earnings announcements, corporate reorganizations, investment decisions, and corporate social responsibility (MacKinlay, 1997; McWilliams & Sigel, 1997). In this paper, event study is used to measure the impact of the IQS report on the sales performance of a firm. The model involves three steps:

1. Identify the event;
2. Establish the normal return;
3. Calculate the abnormal return.

Identify the event. The first step is to define the event that generates a market response. In this paper, the *event* is defined as the announcement of IQS to the public. *Event date* refers to the date when IQS is announced. Since IQS is announced at the end of June each year, there were 10 events during the study period (each June between 2001 and 2010).

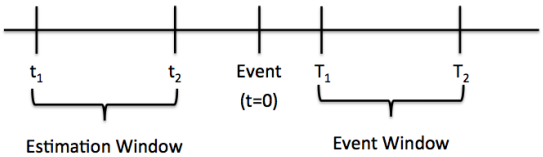

Figure 1: Event Window and Estimation Window.

Establish the normal return. A normal return is used as a benchmark to be compared against, after an IQS has been announced. In other words, it serves as a basis level of sales performance for each company if there had been no special IQS event for this company. To estimate a normal return, it is necessary to define an estimation window period [t_1, t_2]. The choice of the estimation period is not fixed in the literature. This estimation window period should be established by analyzing prior recall periods to identify when a stable, consistent sales return is produced. The

estimation period adopted is one year, (or 12 months) prior to the event date, which is common in the literature (Shin, Richardson, & Soluade, 2012). The result of the normal return calculation is listed in Table 1. Mean-adjusted return model was used to define the *normal return* as:

$$B_i = \frac{1}{T}\sum_{t=t_1}^{t_2} R_{it} \quad (1)$$

where *i* is the company index and $T = t_2 - t_1 + 1$, which equals to the number of months during the estimation period. In Equation (1), R_{it} is the *monthly return* of the sales performance for company *i* at time *t*; and is defined as:

$$R_{it} = \frac{M_{it} - M_{it-1}}{M_{it-1}} \quad (2)$$

where *i* is the company index, *t* refers to the time (in months), and M_{it} is the *market share* of company *i* at time *t*.

	GM	Ford	Chrysler	Toyota	Honda	Nissan
2001	0.37%	0.73%	0.37%	1.19%	0.80%	0.15%
2002	0.98%	0.39%	-0.19%	0.95%	0.51%	3.08%
2003	0.12%	0.35%	1.10%	0.87%	1.64%	1.39%
2004	0.28%	0.78%	0.82%	1.37%	1.71%	1.81%
2005	0.71%	0.16%	0.19%	2.12%	0.20%	1.68%
2006	0.49%	0.16%	-0.33%	1.69%	1.90%	0.26%
2007	0.57%	0.75%	0.64%	0.85%	0.18%	1.00%
2008	1.16%	0.34%	-1.51%	0.68%	2.33%	2.20%
2009	0.89%	1.39%	1.95%	0.44%	0.61%	1.76%
2010	1.61%	0.42%	-0.14%	0.22%	0.55%	0.15%

Table 1: Normal Returns.

Calculation of the abnormal return. The third step is to calculate the sales loss measured by *abnormal returns* after the event. Since news spreads gradually to the public, *event window*, defined as [T_1, T_2] in Figure 1, is set to find the impact on an automaker's market share during the event window periods. Abnormal return is defined as the difference between the return since the event occurred and the normal return (De Jong 2007; Bowman 1983). This is illustrated by the formula:

$$AR_{it} = R_{it} - B_i \quad (3)$$

where AR_{it} is the abnormal return of the sales performance of the company *i* at time *t*; R_{it} is the return of the sales performance for the company *i* at time *t;* B_i is the normal return of the company *i* at time *t*. Then, the abnormal returns matrix can be constructed as:

$$\begin{pmatrix} AR_{1t_1} & \cdots & AR_{nt_1} \\ \vdots & \ddots & \vdots \\ AR_{1t_2} & \cdots & AR_{nt_2} \end{pmatrix} \tag{4}$$

where n is the total number of companies used for the event study. In order to measure the overall market response after the event, the summation of abnormal returns over the period [t_1, t_2] (cumulative abnormal return) can also be constructed as:

$$CAR_i = \sum_{t=T_1}^{T_2} AR_{it} \tag{5}$$

Then, the cumulative average abnormal returns of all the companies' sales performance is defined as

$$CAAR = \frac{1}{n}\sum_{i=1}^{n} CAR_i \tag{6}$$

It is required to test if IQS has an influence on the sales performance of an automaker. The null hypothesis is that the abnormal return during the event window is zero (or no effect on the sales performance) and the alternative hypothesis is that abnormal return *before* the event is different from abnormal return *after* the event. These are specified as:

$$H_0: E(CAR_{it}) = 0 \tag{7}$$

$$H_1: E(CAR_{it}) \neq 0 \tag{8}$$

Determining which statistical test of this hypothesis is appropriate depends on the way in which the abnormal returns are constructed and on the statistical properties of the returns. The most commonly-used test for such a scenario is a t-test (De Jong, 2007). For an arbitrary event window [T_1, T_2], the standard deviation is defined as:

$$s = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(CAR_i - CAAR)^2} \tag{9}$$

and the test statistic is:

$$t = \sqrt{n}\frac{CAAR}{s} \sim t_{n-1} \tag{10}$$

Various event window sizes were tested for measuring the effect of IQS, specifically by setting T_1 as 1 and T_2 between 2 and 6 in the event window [T_1, T_2]. The impact on the sales performance was tested from one-month after the announcement of IQS and then two-, three-…, to six-months. Table 2 shows the values of *CAAR* in Equation (6), the values of *s* in Equation (9), the values of *t* in Equation (10), and the *p-value* of the test statistic (double-sided test for n – 1 or 9 degrees of the freedom) for the corresponding event window.

Company	[t1, t2]	[1,1]	[1,2]	[1,3]	[1,4]	[1,5]	[1,6]
	CAAR	1.24%	-0.41%	2.48%	-2.01%	-5.33%	2.55%
	s	0.03	0.06	0.09	0.06	0.03	0.06
	T	1.18	-0.21	0.83	-1.08	-4.82	1.29
CHRYSLER	**P-value**	0.27	0.83	0.43	0.31	0.00	0.23
	CAAR	-5.39%	-5.75%	-2.29%	1.74%	0.31%	-1.48%
	s	0.02	0.02	0.02	0.01	0.02	0.02
	T	-6.90	-8.45	-3.59	4.38	0.43	-2.77
FORD	**P-value**	0.00	0.00	0.01	0.00	0.68	0.02
	CAAR	-9.62%	-6.08%	-1.32%	1.14%	4.69%	2.63%
	s	0.03	0.01	0.03	0.03	0.05	0.03
	T	-11.26	-15.79	-1.15	1.11	2.87	2.51
GM	**P-value**	0.00	0.00	0.28	0.30	0.02	0.03
	CAAR	0.07	0.10	0.00	-0.02	-0.02	-0.03
	s	0.05	0.11	0.05	0.06	0.05	0.07
	T	4.52	2.80	0.02	-0.77	-1.10	-1.34
HONDA	**P-value**	0.00	0.02	0.99	0.46	0.30	0.21
	CAAR	10.11%	8.98%	9.47%	6.95%	8.55%	7.30%
	s	0.09	0.08	0.06	0.04	0.07	0.07
	T	3.54	3.39	5.03	5.76	3.93	3.04
NISSAN	**P-value**	0.01	0.01	0.00	0.00	0.00	0.01
	CAAR	5.40%	5.47%	0.41%	4.21%	5.42%	-4.10%
	s	0.03	0.04	0.01	0.03	0.02	0.05
	T	5.60	4.21	0.93	4.77	7.48	-2.71
TOYOTA	**P-value**	0.00	0.00	0.38	0.00	0.00	0.02
	CAAR	-3.45%	-3.44%	0.43%	-0.36%	-1.31%	1.06%
	s	0.00	0.01	0.02	0.01	0.01	0.01
	T	-33.08	-19.90	0.80	-1.05	-3.39	2.46
U .S. Automakers	**P-value**	0.00	0.00	0.45	0.32	0.01	0.04
	CAAR	6.99%	8.03%	2.63%	3.49%	4.61%	-0.51%
	s	0.04	0.06	0.02	0.02	0.02	0.03
	T	5.69	4.34	3.76	4.61	5.69	-0.59
Japanese Automakers	**P-value**	0.00	0.00	0.00	0.00	0.00	0.57
	CAAR	0.40%	-0.29%	0.71%	0.04%	-0.39%	0.07%
	s	0.01	0.00	0.00	0.00	0.00	0.00
	T	2.18	-2.26	68.99	2.51	-16.75	1.36
TOTAL	**P-value**	0.06	0.05	0.00	0.03	0.00	0.21

Table 2: Statistical Test Results of Event Study.

For various event window sizes ($T_1 = 1$ and $T_2 = 1, 2, \ldots, 6$), correlation test results of *CAR*s for Japanese (Toyota, Honda, and Nissan) and U. S. automakers (GM, Ford, and Chrysler) is -8.885

which is significant at the 0.01 level. This significant and negative correlation test result indicates that the effect of IQS on Japanese automakers is the opposite of the effect on the U.S. automakers. More specifically, IQS resulted in the positive response to the market (or increasing market share) for Japanese automakers while the effect was the opposite for the U.S. automakers. This is confirmed by the regression analysis using Equation (11) to test the linearity of the trend lines of *CAR* during the event window.

$$Y_i = \beta_0 + \beta_1 t_i + \epsilon_i \tag{11}$$

		Coefficients		t-value	Sig.
		B	**Std. Error**		
U.S. Automakers	β_0	-.038	.018	-2.052	.045
	β_1	.009	.005	1.851	.070
Japanese Automakers	β_0	.092	.023	3.975	.000
	β_1	-.015	.006	-2.610	.012

Table 3: Coefficient Estimates.

Table 3 displays the coefficient estimates of Equation (11). The constant, β_0, is negative for U.S. automakers (positive for Japanese automakers) indicating that market response to the IQS can be negative (or positive). In addition, for Japanese automakers, there is strong evidence that the positive market response effect diminished as time elapsed at the significance level of .012. Similarly, for U.S automakers, the market's negative response diminished at a significance level of .07.

DETERMINATION OF FACTORS FOR ABNORMAL RETURNS

The objective of this section is to analyze the factors that had the significant impact on abnormal returns. Quality ratings provided by third parties such as JDP is one of the key components affecting perceptions of quality (Levin, 2000; Podolny & Hsu 2003). IQS published by JDP uses data based on the experiences of actual owners of new vehicles. Consistent with the market share data, data published in the IQS between year 2001 and 2010 is used. The IQS report includes two types of quality information: (1) sorted list of automakers based on the number of reported problems and (2) awards lists (1st, 2nd, and 3rd) for each segment (i.e., Luxury, Full-size, Midsize, Compact, Pickup, Sport Utility Vehicle, Sporty Car, and Van). To measure the impact of these factors, two indicators (*event type* and *IQS score*) are used in this analysis.

Independent Variable: Event Type

An event can be perceived by an automaker as (1) a *positive event* or (2) a *negative event* based on performance in the sorted list of reported problems. For example, if an automaker is placed above the average, this can be perceived as positive. On the other hand, if the company's performance is below average, this can be perceived as negative. It can be safely assumed that a reasonable customer is less likely to purchase a car with a below average rating, than one with an above average one. In this paper, two dummy variables (positive event and negative event) are

introduced. An event is defined as *negative* if the reported number of problems for the automaker is below average and *positive* otherwise.

Independent Variable: IQS Score

The effect of the awards list is measured by introducing an adjusted IQS score. An automaker's adjusted IQS scores ate calculated by computing (1) the number of first place awards given to each automaker and (2) the weighted average of the awards by assigning the weight of three for the 1st place, two for the 2nd place, and one for the 3rd place. For example, in Table 4, the IQS score for GM is $3 \times 3 + 2 \times 4 + 1 \times 2 = 19$ where 3 is the number of models awarded for the 1st place, 2 is for the 2nd place, and 1 is for the 3rd place for GM in year 2001.

Correlation test result of IQS scores for Japanese automakers and U.S. automakers is -0.675 with significance level at 0.032, which indicates that Japanese automakers have been competing with U.S. automakers for the IQS awards. Figure 3 illustrates the IQS award score trends of U.S. automakers and Japanese automakers during years 2001 and 2010. In most cases, their scores move in opposite directions.

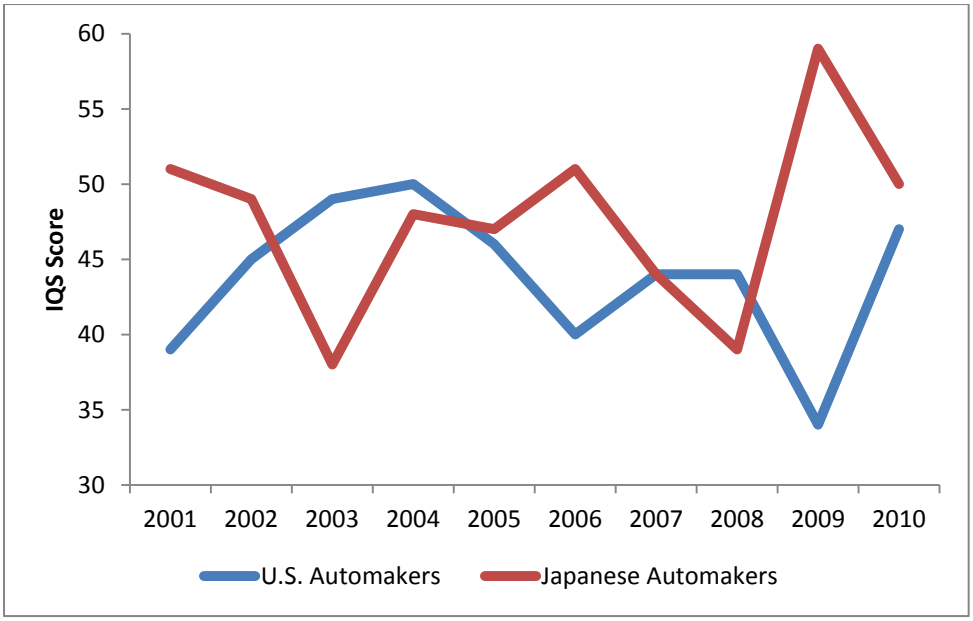

Figure 3: IQS Score Trends between 2001 and 2010.

Year	Award	U. S. Automakers				Japanese Automakers			
		GM	Ford	Chrysler	Total	Toyota	Honda	Nissan	Total
	1st	3	1	1	5	7	2	2	11
	2nd	4	2	3	9	2	4	0	6
	3rd	2	2	2	6	4	1	1	6
2001	IQS Score	19	9	11	39	29	15	7	51
	1st	4	3	0	7	9	0	0	9
	2nd	5	3	0	8	5	2	1	8
	3rd	3	5	0	8	3	2	1	6
2002	IQS Score	25	20	0	45	40	6	3	49
	1st	3	5	0	8	6	1	0	7
	2nd	5	2	1	8	5	0	1	6
	3rd	6	0	3	9	2	2	1	5
2003	IQS Score	25	19	5	49	30	5	3	38
	1st	2	2	2	6	7	3	0	10
	2nd	6	3	1	10	3	2	0	5
	3rd	6	5	1	12	4	2	2	8
2004	IQS Score	24	17	9	50	31	15	2	48
	1st	5	2	0	7	10	0	1	11
	2nd	5	3	1	9	2	2	0	4
	3rd	2	3	2	7	3	2	1	6
2005	IQS Score	27	15	4	46	37	6	4	47
	1st	2	2	1	5	11	0	0	11
	2nd	5	5	0	10	0	4	1	5
	3rd	4	0	1	5	4	2	2	8
2006	IQS Score	20	16	4	40	37	10	4	51
	1st	3	5	0	8	4	2	0	6
	2nd	1	3	0	4	6	4	1	11
	3rd	5	6	1	12	3	0	1	4
2007	IQS Score	16	27	1	44	27	14	3	44
	1st	3	3	2	8	3	3	2	8
	2nd	1	3	1	5	3	1	2	6
	3rd	6	4	0	10	3	0	0	3
2008	IQS Score	17	19	8	44	18	11	10	39
	1st	2	4	1	7	10	2	2	14
	2nd	4	0	0	4	3	1	3	7
	3rd	4	1	0	5	1	2	0	3
2009	IQS Score	18	13	3	34	37	10	12	59
	1st	3	4	0	7	6	3	1	10
	2nd	3	3	2	8	2	5	1	8
	3rd	3	6	1	10	0	2	2	4
2010	IQS Score	18	24	5	47	22	21	7	50

Table 4: IQS Reports Award Results.

Control Variables

Four other factors that may affect an automaker's abnormal returns are used as control variables. First, it is expected that abnormal returns vary with an automaker's experience such as

bankruptcy. GM filed for bankruptcy on June 1, 2009; and after the filing, effective Monday, June 8, 2009, GM was temporarily removed from the Dow Jones Industrial Average (Tkaczyk, 2009). This filing might be conceived as a warning to U.S. customers that resulted in the considerable decline of GM auto sales.

Second, a dummy variable was created for Japanese automakers, with the U.S. automakers as the reference category, because Japanese automakers may face different market challenges/opportunities and governmental regulations than domestic automakers do (Rhee & Haunschild, 2006).

Third, another dummy variable is created to control for the effect of massive media attention to Toyota during year 2009 and 2010. On August 28, 2009, a two-car collision killed four people riding in a Lexus dealer-provided loaner car in San Diego, California (10News.com, 2009). NHTSA released a safety investigation report on October 25, 2009 finding that the accident vehicle was improperly fitted with all-weather rubber floor mats meant for the RX 400hSUV, and that these mats were not secured by either of the two retaining clips (Bensinger & Vartabedian, 2009). The report stated that the accelerator pedal's hinge did not allow for relieving obstructions. NHTSA investigators recovered the accident vehicle's accelerator pedal, which was still "bonded" to the SUV floor mat (Bensinger & Vartabedian, 2009). The report concluded that the pedal entrapment caused the unintended acceleration resulting in the accident. People's perception of Toyota might have been changed and thus affecting the abnormal return to the market share in year 2009 and 2010.

Fourth, economic incentives may improve the sales of automakers. U.S. federal government had a program, called Car Allowance Rebate System, also known as "Cash for Clunkers" to promote auto sales. The program officially started on July 1, 2009 and ended on August 24 of the same year, as the inventories were exhausted (Bunkley 2009; Fuller 2009; Valdes-Dapena, 2009).

Dependent Variable and Model Specification

We can analyze the factors that had the significant impact on abnormal returns by formulating the relationship between *CAR* (which is the dependent variable) and the factors as follows:

$$CAR_{i,t} = \beta_0 + \beta_1 IQS_{i,t} + \beta_2 PE_{i,t} + \beta_3 NE_{i,t} + \beta_4 T_{i,t} + \beta_4 J_i + \beta_5 C_{i,t} + \beta_6 B_{i,t} + \varepsilon_{i,t} \quad (12)$$

Here, IQS_{it} is the IQS score of automaker *i* during time *t*; $PE_{i,t}$ refers to a dummy variable indicating whether the automaker *i* experienced a positive event (1) or not (0), during time *t*. $NE_{i,t}$ refers to a dummy variable indicating the occurrence of a negative event (1) or not (0) for automaker *i* during *t*. $T_{i,t}$ refers to a dummy variable indicating whether automaker *i* experienced massive media attention of Toyota (1) or not (0) during *t*. J_i refers to a dummy variable indicating whether automaker *i* is Japanese (1) or not (0). $C_{i,t}$ refers to a dummy variable indicating whether the car allowance rebate system (or cash for clunkers) was applied to automaker *i* (1) or not (0) during *t*. $B_{i,t}$ refers to a dummy variable indicating whether an automaker *i* filed for bankruptcy (1) or not (0) during *t*; and $\varepsilon_{i,t}$ is the error term.

Discussion of Results

Following recent analyses of longitudinal data (Dobrev, Kim, & Hannan, 2001), Generalized Estimating Equations (GEE) estimators were used to analyze both inter- and intra-firm variation (Liang & Zeger, 1986). GEE specifies the relationship between the mean and variance of the dependent variable, rather than the full distribution of the population, as is required by the cluster-specific maximum likelihood estimators, such as random effects or fixed-effects models (Rhee & Haunschild, 2006). GEE has solutions that are consistent and asymptotically Gaussian, even when the time dependence is not properly specified (Rhee & Haunschild, 2006). The GEE procedure in SPSS Statistics Version 20 was the adopted model used in this analysis.

Parameter	B	Std. Error	Hypothesis Test		
			Wald Chi-Square	Sig.	Sig.
(Intercept)	-2.699	3.1489	.734	.391	.391
IQS Score	0.259	0.0748	12.008	.001	.001
Positive News	3.323	1.4247	5.441	.02	.02
Negative News	-2.679	2.7643	.939	.332	.332
Toyota Accident	3.752	3.7904	.98	.322	.322
Japanese	-1.357	3.1353	.187	.665	.665
CARS	-0.884	6.9816	.016	.899	.899
GM Bankruptcy	-2.653	5.4934	.233	.629	.629

Table 5: IQS Reports Award Results.

Table 5 presents the results from GEE estimates of the CAR model shown in Equation (12). IQS score is positive and significant, indicating a positive relationship between IQS score and market share response. Similarly, positive news is also positive and significant to the market response of IQS reports. However, negative news is not significant, indicating that there is not enough evidence that the market is responding to the negative news of IQS report. This may be explained by the fact that the manufacturers advertise the positive results extensively in the media, while the negative events are only presented briefly in the news. None of the control variables produces significant effects. This non-significant result shows that market responses to the IQS for Japanese automakers and U.S. automakers are not significantly different from each other, and CARS program and Bankruptcy filing may have no impact on the abnormal return of market response.

CONCLUSION

Before purchasing a car, consumers review the available literature such as IQS reports on the quality of a product to minimize their risk of purchasing a defective car. This paper evaluates the quality measurements of IQS and its economic impact on the sales performance of major U.S. automakers (GM, Ford, and Chrysler) and Japanese automakers (Toyota, Honda, and Nissan)

during 2001 and 2010. Event study result showed that the IQS had been used as a major information source to make a decision to minimize their risk of purchasing a defective car. Our analysis results indicated that IQS had a negative impact on the market share of U.S. automakers. On the other hand, it had a positive impact on the Japanese automakers. For both U.S. and Japanese automakers, the effect lasted at least five months after the IQS publication date. As a result, the market shares of Japanese automakers had increased continuously for a 10-year period (2001 to 2010), while those of U.S. automakers had decreased. To measure the effectiveness of the IQS, IQS score and event type such as positive event and negative event were introduced. The analysis results showed that there was a positive relationship between IQS score and the resulting market share. Similarly, positive news was also positive and significant to the market response of IQS reports. However, negative news was not significant, indicating that there was not enough evidence that the market was responding to the negative news of IQS report. This may be explained by the fact that the manufacturers advertise the positive results extensively in the media, while the negative events are only presented briefly in the news.

Recommendations for Further Research

This research was limited to a 10-year period (2001 to 2010). It would be interesting to investigate this phenomenon over a longer time interval, with the expectation that the impact of the IQS can be more precisely determined. Also, instead of using the SPSS GEE technique, it is recommended that a series of step-wise regression analyses be performed, so as to isolate the impact of each of the independent variables on market share.

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