IS THE U.S. VEHICLE INDUSTRY RISING FROM THE ASHES?

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This study uses Consumer Reports surveys by vehicle owners over publication years from 1998 to 2010 to draw annual reliability comparisons of vehicle engines associated with the U.S. and Japan. The reliability comparisons includes vehicles from five years old to less than one year old. Test results indicate that as the measurement of vehicles assessed progresses toward more recent manufacturing, the difference in assessed quality nearly disappears with the superior scores fluctuating between Japanese and the U.S. in the most recent years. However, since consumer perception of reliability may not match reality in assessed engine reliability, U.S. firms face a significant marketing challenge.

INTRODUCTION

Under tremendous financial pressure, the U.S. vehicle manufacturers compete in a worldwide battle for survival with entrenched and tenacious competitors from many cultures. Experts assert the U.S. vehicle firms' viability is in doubt with a multitude of jobs at stake. According to Paul Krugman, the recent Nobel economic prize winner, the U.S. auto industry will likely disappear because…"It is no longer sustained by the current economy" (Rising 2009).

Statistics flooding the popular press and trade journals indicate the challenges facing the vehicle manufacturers in the U.S. with huge sales declines in both units and dollar sales (Terlep and Dolan 2009). With reduction in units sold to levels of 1992, financial losses by vehicle manufacturers reaches into the billions of dollars and former powers such as GM and Chrysler actively and publicly sought monetary relief from the U.S. government in terms of emergency loans. While Japanese auto manufacturers face difficult times in the U.S. along with European and South Korean firms, bankruptcy appears to hover primarily over the U.S. vehicle manufacturers. Chrysler and General Motors have recently emerged from bankruptcy (Bennett and Kellog 2009; Stoll and Terlep 2009). The market share loss of the U.S. passenger vehicle market by U.S. firms to Japanese firms over the years appears to have gathered a substantial momentum.

One dimension of assessing vehicles that may be telling in this market share shift is that of vehicle quality. The promise of less trouble in terms of repairs could have a substantial impact on buyers' perceptions of brand offerings. The Japanese proved keen on this aspect of vehicles and have positioned themselves as champions in the area. Further, the Japanese have not been content to merely remain in the lead in terms of quality, but have consistently pursued continuous improvement in efforts to increase their advantage relative to the U.S. firms and others.

The purpose of this paper is to examine owner assessments of vehicles associated with both Japan and the U.S. to determine quality judgment comparisons and resulting marketing implications.

LITERATURE REVIEW

Study perspectives of the automobile industry ranges extensively. Researchers have

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concentrated in areas such as the effect of brand names (Sullivan 1998), age and reliability effects on used car prices (Betts and Taran 2004), product differentiation and price discrimination (Mertens and Ginsburgh 1985), the price and quality relationship (Hogarty 1975), market share (Train and Winston 2007), and the impact of recalls (Crafton, Hoffer and Reilly 1981; Bates, Holweg, Lewis and Oliver 2007).

Automobile quality was an area of intense interest. Srinivasan, Pauwels, Silva-Risso and Hanssens (2009) found higher automobile quality and ground-breaking innovations result in higher stock prices. Zaman and Unsal (2000) wrote that Japanese vehicles were considered by consumers to be the most reliable during the 1980s and 1990s. Nichols and Fournier (1999) found the poor reputation of U.S. vehicles caused U.S. used car prices to have discounts of 5 percent more than Japanese vehicles. Using product recalls as a measure of reliability from 1973 to 1992, Barber and Darrough (1996) found the Japanese vehicles of Honda, Nissan, and Toyota were significantly more reliable than the U.S. vehicles of Chrysler, GM, and Ford. Train and Winston (2007) indicated the loss of market share for U.S. car manufacturers could be attributed to reliability and other vehicle attributes such as operating cost, power, size, price, transmission, and body type. In a study of the strategies of GM and Toyota, Regassa and Ahmadian (2007) reported U.S. auto manufacturers had not equaled the Japanese automakers in terms of quality and reliability. However, a recent study reported some improvement in U.S. vehicle quality. Using J. D. Powers 2009 data, Cole and Flynn (2009) stated that Ford and Chevrolet were close in quality to Honda and did not differ statistically from Toyota.

The importance of Japan's reputation for automobile quality is underscored by Toyota's recent acceleration problems. In the fall of 2009, Toyota recalled several models indicating the floor mats could entrap the gas pedal and cause the vehicle to suddenly accelerate (Mitchell 2009). In January 2010, Toyota issued a recall on the gas pedal itself saying it could stick without interference from the floor mat and cause sudden acceleration (Linebaugh 2010a). Toyota also stopped production on the troubled models for a short period (Linebaugh 2010b). Although Toyota says that there are no problems with the electronics in their cars, the Department of Transportation is investigating electromagnetic interference with electronic gas pedals (Terlep and Mitchell 2010). While Toyota was having trouble with acceleration problems, they also issued a recall for the brakes of the Prius (Tabuchi 2010). The recalls and incidents involving sudden acceleration with Toyotas received extensive coverage by the news media. With Toyota's quality reputation in question, the President of Toyota, Akio Toyoda, issued a public apology and stated that the company would create a global quality committee (Shirouzu and Takahashi 2010).

Country of Origin

Our study analyzes the quality/reliability of vehicles by the country-of-origin: specifically U.S. versus Japan. At first blush, the classification of automobiles as U.S. or Japanese does not seem a difficult task. Historically, most would consider the vehicles made by Ford, General Motors and Chrysler from the U.S. Toyota, Honda, Subaru, Mitsubishi, Mazda, Nissan, and Suzuki would be considered Japanese brands.

When examining corporate ownership, however, the classification becomes murky. On the U.S. side, for example, is the case of Chrysler. Starting in 1998, Chrysler merged with and was controlled by German manufacturer Daimler-Benz (Rutberg 2007). In 2007, however, Daimler-Benz sold Chrysler to Cerberus Capital Management, a U.S. hedge fund (White 2009). After Chrysler emerged from bankruptcy, Fiat, the Italian automobile manufacturer, acquired 20 percent of Chrysler. Fiat can raise its stake to a controlling 51 percent after Chrysler repays its auto loans to the U.S. government (Bennett and Kellogg 2009).

On the Japanese side, the corporate ownership also becomes cloudy. Nissan is a name that most people would consider Japanese. However, the French automaker Renault presently controls the company (Meichtry and Stoll 2009). The CEO of Nissan, Carlos Ghosn, was sent by Renault to turn Nissan around after Renault acquired Nissan. He succeeded in his turnaround mission and is also the CEO of Renault (Kiley, Rowley and Matlock 2008).

When it comes to individual car makes, the picture is no clearer. For example, most people might consider the Toyota Camry, Honda Accord, Nissan Altima, and Subaru Legacy as Japanese vehicles. While some of the vehicles like the Camry and Accord are built in multiple countries, all of those vehicles are built in the U.S. (Global Game 2007). The Cadillac Escalade, Chevrolet Avalanche, Ford Fusion, and Chevrolet Impala generally are considered U.S vehicles. However, the Cadillac Escalade, Chevrolet Avalanche, and Ford Fusion are made in Mexico, while the Chevrolet Impala is made in Canada (Global Game 2007).

Under the American Automobile Labeling Act, all new cars sold in the U.S. must reveal the percent of parts made in the U.S. or Canada (White 2009). However, according to the National Highway Traffic Safety Administration (NHTSA), most car buyers are unaware of the information on the window sticker and would not allow it to affect their decision even if it was known (White 2009).

To establish an appropriate method to classify a car company and make of car, we examined the rich terrain of country-of-origin literature (Hong and Wyer 1990; Samiee 1994; Al-Sulaiti and Baker 1998; Verlegh and Steenkamp 1999; Gurhan-Canli and Maheswaran 2000; Beverland and Lindgree 2002; Dinnie 2002; Liefeld 2004; Liu and Johnson 2005; Pharr 2005; Yasin, Noor and Mohamad 2007). Researchers found a product's country-of-origin influences a consumer's evaluation of the product's quality (Pharr 2005).

Several researchers have studied country-of-origin and automobile evaluations. Chao and Gupta (1995) found country-of-origin had an impact on the efficiency (quality for the price) of a car purchase. They discovered purchases of Japanese and European cars were more efficient except for mini and subcompact cars. However, they noted that since Japanese cars were known to have better quality, the result was not surprising. Haubl (1996) found country-of-origin had a significant influence on German and French citizens' automobile evaluations. Further, Lawrence, Marr and Pendergrass (1992) determined an automobile's country-of-origin influenced New Zealanders' vehicle perceptions.

For the purpose of this paper, we are concerned how the researchers classified products as associated with one country or another. Country-of-origin researchers realized the difficulty in determining the country to which a product should be associated. Consequently, they have broken the country-of-origin concept into several categories and examined the relevance of these categories. These categories include country-of-assembly (Tse and Lee 1993; Insch and McBride 1998; Chao 2001), country-of-design (Sauer, Young and Unnava 1991; Chao 1993; Ahmed and d'Astous 1995; Insch and McBride 1998; Chao 2001), country-of-parts (Insch and McBride 1998; Chao 2001) and country-of-manufacture (Ulgado 2002; Thakor and Lavack 2003).

Several researchers examined the historical origins of the product. A measure incorporating a product's historical roots is brand origin, which is defined as the country where consumers perceive the brand to originate (Thakor 1996). Researchers found brand origin influences consumers' attitudes toward the brand (Harris, Garner-Earl, Sprick and Carroll 1994; Leclerc, Schmitt and Dube 1994; Thakor and Lavack 2003). Thakor and Lavack (2003) found the country-of-corporate-ownership, a brand origin substitute, was more influential than the country-of-assembly or country-of-parts. Other researchers found brand origin labeled as country-of-brand-origin

or country-of-brand had a greater influence than the country-of-manufacture (Ulgado 2002; Chen 2004). In essence, researchers determined the product's historical origins have a greater influence on consumer perceptions than other country-of-origin measures (Thaker and Lavack 2003).

Consequently, we chose to group the U.S. and Japanese vehicle manufacturers by their brand origin regardless of company ownership, the source of parts, or where an individual car make was manufactured. In our study, the U.S. car companies are Ford, General Motors, and Chrysler. The Japanese automobile manufacturers are Toyota, Honda, Subaru, Mitsubishi, Mazda, Nissan, and Suzuki.

DATA SOURCE CONSIDERATIONS

Consumer Reports has a rich history of offering information to aid in investigating marketing research in a number of areas (Riesz 1978, 1979; Gerstner 1985; Bodell, Kerton and Schuster 1986; Steenkamp 1988; Montgomery and Wernerfelt 1992; Faulds, Grunewald and Johnson 1995). The use of *Consumer Reports* data in examining the vehicle industry is time-tested (Uri 1986; Friedman 1987; Arguea, Hsiao and Taylor 1994; Gupta and Lord 1995; Yerger 1996; Nichols 1998; Sullivan 1998; Apelbaum, Gerstner and Naik 2003).

As one of the most comprehensive sources on vehicle assessment for U.S. users, *Consumer Reports* annually publishes survey results gathered by Consumers Union of vehicle assessments by vehicle owners. The vehicle quality is determined by a trouble index that ranges from "5" to "1." The index figures indicate both a relative grade for vehicle attributes and an absolute grade, depending on publication issue year. So, a "5" indicates much better than average, "4" indicates better than average, "3" indicates average, "2" indicates worse than average, and "1" indicates much worse than average. The assessment for each variable is considered relative to all other vehicles of a specified model year reported in the survey. So, for example, a Chevrolet Impala for 2006 would be compared to all other vehicles for all other model years in the same *Consumer Reports* issue. Further, since vehicles may generate problems based on both miles driven and sheer age, an adjustment is made by *Consumer Reports* to eliminate differences in assessments caused by varying mileage by vehicles. According to the issue's 2010 instructions on how to read the reliability charts, because problem rates in some trouble spots are very low, *Consumer Reports* did not assign a score of "1" or "2" unless the model's problem rate exceeds three percent. If a problem rate is below two percent, it was assigned a "4." If the problem rate is below one percent, it was assigned a "5."

Several other aspects give credence to *Consumer Reports* annual assessment. The number of survey results (by 1.4 million *Consumer Reports* and ConsumerReports.org subscribers) based on driver experience was 1.4 million vehicles according to *Consumer Reports* in 2010. Another factor is the Consumer Union does not accept compensation through advertising funding from auto firms. This may further reduce the possibility of *Consumer Reports* bias in publishing the survey results.

Based on the information, we felt the survey information garnered and published by the Consumers Union constitutes a reasonable source of data on vehicle quality experiences by U.S. consumers. For this study's hypotheses concerning all vehicle variables, a "5" to "1" scale was used with "5" as the highest assessment and "1" as the lowest assessment.

DATA

Data was collected from the annual issues of *Consumer Reports* from 1998 through 2010. The *Consumer Reports* variable examined is "Engine" (or "Engine, Major") depending on the reporting year. The variable "Engine" ("Engine, Major") was chosen because *Consumer Reports* has listed it first of all variables examined in all years encompassed in the study and *Consumer Reports* specifically

identified it as especially serious and expensive to repair. Our depth of analysis and limited reporting space demanded a sharply limited scope for this paper. Certainly, analysis of other or all variables included in the *Consumer Reports* publications could help cast light on the comparisons we study.

Each annual *Consumer Reports* vehicle reliability data offers information on vehicles that extends back at least five years. For example, the 2009 *Consumer Reports* for the Chevrolet Avalanche 1500 show the vehicle survey results for the model years of 2003 through 2008. With the *Consumer Reports* reliability data being one year old when published and extending back at least five years, our data included the model years from 1992 to 2009.

STUDY HYPOTHESES

H_1: The "Engine" ("Engine-Major") ratings specified by *Consumer Reports* for U.S. and Japanese vehicles are not significantly different for five-year-old vehicles.

H_2: The "Engine" ("Engine-Major") ratings specified by *Consumer Reports* for U.S. and Japanese vehicles are not significantly different for four-year-old vehicles.

H_3: The "Engine" ("Engine-Major") ratings specified by *Consumer Reports* for U.S. and Japanese vehicles are not significantly different for three-year-old vehicles.

H_4: The "Engine" ("Engine-Major") ratings specified by *Consumer Reports* for U.S. and Japanese vehicles are not significantly different for two-year-old vehicles.

H_5: The "Engine" ("Engine-Major") ratings specified by *Consumer Reports* for U.S. and Japanese vehicles are not significantly different for one-year-old vehicles.

H_6: The "Engine" ("Engine-Major") ratings specified by *Consumer Reports* for U.S. and Japanese vehicles are not significantly different for less than one-year-old vehicles.

HYPOTHESES TESTING

Hypotheses 1 through 6 test vehicle engine reliability for model years from 1992 through 2009. The equality hypotheses stated in the null form were tested using a two-tailed t-test to detect both size and direction of any difference in the mean vehicle assessments between the Japanese and U.S.

The t-test is appropriate when the mean of the null hypothesis is known and the standard deviation is unknown. Since the population size in the hypotheses tests are considerably greater than 30, the population of scores were assumed to be normally distributed (Pagano 1990). The statistical software used in the analysis was SPSS 16.0 for Windows. A p-value of less than .05 was the criterion for differences in means to be considered significant.

TESTING RESULTS FOR VEHICLE ENGINE RELIABILITY FOR U.S. VERSUS JAPAN

The tables below show the assessment results for the *Consumer Reports* scores for the variable of "Engine" ("Engine-Major") for model years 1992 to 2009 specified in the 1998 through 2010 publications. The scoring ranges from "5" meaning top assessed quality to "1" indicating the lowest assessed quality score.

DISCUSSION

The study objective was to compare the vehicle engine evaluations of those associated with Japanese culture and those of the U.S. The data used to make this comparison was generated by *Consumer Reports* surveys completed by vehicle owners of vehicle models from 1992 to 2009. The data variable of engine reliability

TABLE 1
***Consumer Reports* "Engine" Five-year-old Vehicle**

Five-Year-Old Engine	Engine Model Year	D.F.	Japan	U.S.	Mean Diff.	P-value
1997	1992	146	3.75	3.10	.65	p < .001
1998	1993	52	3.85	3.27	.58	p = .003
1999	1994	145	3.86	3.35	.51	p = .003
2000	1995	152	4.03	3.13	.93	p < .001
2001	1996	129	4.00	3.10	.90	p < .001
2002	1997	136	4.42	3.31	1.11	p < .001
2003	1998	136	4.35	3.19	1.16	p < .001
2004	1999	140	4.37	3.47	.90	p < .001
2005	2000	148	4.29	3.16	1.13	p < .001
2006	2001	150	4.52	3.66	.86	p < .001
2007	2002	112	4.48	3.92	.56	p = .005
2008	2003	105	4.58	4.23	.35	p = .098
2009	2004	124	4.67	4.50	.17	p = .261

TABLE 2
***Consumer Reports* "Engine" Four-year-old Vehicle**

Four-Year-Old Engine	Engine Model Year	D.F.	Japan	U.S.	Mean Diff.	P-value
1997	1993	161	4.08	3.61	.47	p < .001
1998	1994	44	4.17	3.71	.46	p = .022
1999	1995	158	4.14	3.39	.75	p < .001
2000	1996	143	4.14	3.54	.60	p = .002
2001	1997	137	4.51	3.60	.91	p < .001
2002	1998	141	4.59	3.68	.91	p < .001
2003	1999	119	4.53	3.53	1.00	p < .001
2004	2000	151	4.60	4.00	.60	p < .001
2005	2001	155	4.51	3.09	1.42	p < .001
2006	2002	162	4.66	4.05	.61	p < .001
2007	2003	103	4.81	4.30	.51	p = .001
2008	2004	133	4.67	4.57	.10	p = .489
2009	2005	118	4.80	4.59	.21	p = .081

TABLE 3
***Consumer Reports* "Engine" Three-year-old Vehicle**

Three-Year-Old Engine	Engine Model Year	D.F.	Japan	U.S.	Mean Diff.	P-value
1997	1994	57	4.36	3.89	.47	p < .002
1998	1995	159	4.41	3.80	.61	p < .001
1999	1996	149	4.33	3.71	.62	p = .001
2000	1997	138	4.84	3.89	.95	p < .001
2001	1998	149	4.73	4.01	.72	p < .001
2002	1999	137	4.76	3.94	.82	p < .001
2003	2000	153	4.67	4.16	.51	p < .001
2004	2001	160	4.74	4.09	.65	p < .001
2005	2002	168	4.30	3.17	1.13	p < .001
2006	2003	171	4.86	4.56	.30	p = .004
2007	2004	137	4.81	4.68	.13	p = .262
2008	2005	140	4.85	4.62	.23	p = .060
2009	2006	117	4.89	4.77	.12	p = .166

TABLE 4
***Consumer Reports* "Engine" Two-year-old Vehicle**

Two-Year-Old Engine	Engine Model Year	D.F.	Japan	U.S.	Mean Diff.	P-value
1997	1995	166	4.61	4.09	.52	p < .001
1998	1996	143	4.63	4.06	.57	p < .001
1999	1997	133	4.77	4.19	.58	p < .001
2000	1998	154	4.95	4.43	.52	p < .001
2001	1999	121	4.82	4.42	.40	p < .001
2002	2000	152	4.81	4.46	.35	p < .001
2003	2001	143	4.89	4.38	.51	p < .001
2004	2002	166	4.82	4.72	.10	p = .117
2005	2003	125	4.77	4.12	.65	p < .001
2006	2004	170	4.89	4.75	.14	p = .082
2007	2005	120	4.93	4.75	.18	p = .046
2008	2006	96	4.96	4.77	.19	p = .042
2009	2007	100	4.96	4.81	.15	p = .037

TABLE 5
***Consumer Reports* "Engine" One-year-old Vehicle**

One-Year-Old Engine	Engine Model Year	D.F.	Japan	U.S.	Mean Diff.	P-value
1997	1996	159	4.61	4.48	.13	p = .321
1998	1997	148	4.93	4.68	.25	p < .001
1999	1998	150	4.95	4.79	.16	p = .002
2000	1999	147	4.95	4.82	.13	p = .009
2001	2000	114	4.88	4.81	.07	p = .292
2002	2001	113	4.98	4.73	.25	p < .001
2003	2002	156	4.96	4.89	.07	p = .164
2004	2003	129	4.97	4.89	.08	p = .053
2005	2004	139	4.81	4.47	.34	p = .002
2006	2005	156	4.96	4.86	.10	p = .036
2007	2006	173	4.92	4.90	.02	p = .672
2008	2007	116	4.97	4.84	.13	p = .067
2009	2008	88	5.00	4.97	.03	p = .083

TABLE 6
***Consumer Reports* "Engine" Less than One-year-old Vehicle**

< One-Year-Old Engine	Engine Model Year	D.F.	Japan	U.S.	Mean Diff.	P-value
1997	1997	115	4.97	4.98	.01	p = .788
1998	1998	88	5.00	4.92	.08	p = .007
1999	1999	92	5.00	4.90	.10	p = .002
2000	2000	88	5.00	4.96	.04	p = .045
2001	2001	76	5.00	4.97	.03	p = .159
2002	2002	81	5.00	4.98	.02	p = .159
2003	2003	73	5.00	4.97	.03	p = .159
2004	2004	61	4.98	5.00	.02	p = .321
2005	2005	156	4.91	4.87	.04	p = .524
2006	2006	94	5.00	4.95	.05	p = .058
2007	2007	78	4.99	5.00	.01	p = .320
2008	2008	77	5.00	4.98	.02	p = .083
2009	2009	61	5.00	5.00	.00	p = *

* : Cannot be computed because the standard deviations of both groups are 0.

examined was a vehicle dimension *Consumer Reports* always listed first and considered to be especially serious and expensive to repair.

The information presented by *Consumer Reports* variable of "Engine" ("Engine-Major") assessment indicates a gradual encroachment by the U.S. into the quality dominance associated with the Japanese. The five-year-old vehicle quality results shown in Table 1 illustrates the increasing emphasis on quality by the U.S. over the years. Since changes in manufacturing and quality inspections within manufacturing plants could have taken years to cultivate, that indicates the workers associated with the U.S. vehicles actualized changes probably beginning in the vicinity of 2000. However, that U.S. challenge of the Japanese strength of quality may not been clearly perceived by the vehicle buyers in the U.S.

The information shown in the tables appears to reflect the U.S. associated firms' drive toward higher quality both in measured levels and in comparison to Japanese quality ratings. As the flow of tables progress toward the more recent vehicles assessed in the *Consumer Reports* surveys (from five-year-old to less than one-year-old vehicles), the difference in assessed quality means nearly disappears with the top scores flip-flopping from Japanese to the U.S. in the most recent years. Neither country can claim clear superiority. Of course, the multi-billion dollar question is what does this result indicate?

As the progression of tables indicates, the quality gap noted in *Consumer Reports* survey summations continually narrows with few exceptions as the vehicles assessed are more recently manufactured. The less than one-year-old vehicles associated with the Japanese and U.S. have an extremely narrow gap. Perhaps the comparison could be described as a distinction without a real difference. In short, the U.S. has stormed back in the area of engine quality beginning at around the turn of the 21st century. The Japanese firms are hitting their heads on the ceiling of engine quality and the U.S. firms have steadily risen in the area and now stand equal to the Japanese as shown in Table 6.

Another view of the data is to compare engines from the most recent to the oldest. Examination of the tables starting with Table 6 and working backwards to Table 1 gives this aging view. One would expect with a new car that the quality of the engines would be high. Table 6 bears this out. The 2009 ratings for the less than one-year-old engine for the U.S. and Japan were found equal. In 2008, a less than one-year-old engine had a rating of 4.98 for the U.S. and 5.00 for the Japanese and the difference was not statistically significant. For a less than one-year-old engine, the years that the Japanese were higher at a statistically significant level were back in 1998, 1999 and 2000 and the differences were .08, .10 and .04 respectively. A considerable benefit to consumers is the reliability of the engine as the car ages. Examining older engines, Table 1 reveals that in 1997 a five-year-old U.S. engine had a rating of 3.10, while the Japanese five-year-old engine had a rating of 3.75. This .65 difference was significant at the .001 level.
By 2009, however, a five-year-old U.S. engine had a rating of 4.50, and the Japanese had a five-year-old engine rating of 4.67. The U.S. auto industry improved their absolute rating, and they cut the difference to .17 between their five-year-old engines and the Japanese five-year old engines. This difference was not statistically significant at the .05 level. Apparently, U.S. engines may be aging better today than in the past. Consequently, buyers of U.S. automobiles can expect to have fewer engine problems as their cars age than they have in the past.

To hear the comments directed at the U.S. vehicle CEOs during bailout hearings with the U.S. Congress, it may be difficult to believe the U.S. firms were making any substantial changes that would make them more competitive in the marketplace. However, a glance at the information shown on the tables above might indicate that the U.S. has been on a surge in overtaking the Japanese on the quality dimension. Once the vehicles associated with

the U.S. and Japanese are perceived as neck-and-neck on quality ratings, the slight differences may be ignored and other buying variables may be used as the prime buyer points of differentiation. For example, shoppers may then sort out the "best" vehicle through the use of variables such as style, perceived country associated with vehicle, price, prestige, fuel economy, and so on.

Another possible, though less likely, interpretation of the tables could be that the owners may be changing their use and maintenance of the vehicles over time, which leads to varying levels of engine problems. For example, have owners of Japanese cars been more diligent in performing the required maintenance on their vehicles than the owners of American cars?

A third possibility might have to do with how people take the survey. What might constitute a significant engine problem based on one person's perception and expectations might not be considered a noteworthy point for another. Therefore, the possibility of those driving Japanese vehicles may have different standards of "problems" compared to those who drive U.S. vehicles resulting in differing scores.

MANAGEMENT IMPLICATIONS

The study dealt with the engine component of *Consumer Reports* survey of vehicle owners. While survey results based on examination of other vehicle variables could certainly differ from the analysis of the engine, the assessment of that variable offers a starting point. If the U.S. vehicle manufacturers are now matching the Japanese on vehicle quality, those U.S. firms must make great efforts to inform their target market. Perceptions can lag reality for a very long time, especially when vehicles are often considered deeply and purchased infrequently over the course of years. Disseminating the vehicle quality comparisons to permit rapid information absorption could lead to change in determining which vehicle may be optimal and draw customers.

So, if the U.S. is matching the Japanese in quality, marketing research might best be aimed toward determining the "next" variable that is a motivating force for respective target markets. Discovering factor(s) that buyers will weigh in brand and vehicle decisions other than quality could permit a jump-start on both design of vehicles and facilitating promotion decisions that emphasize a positive point of differentiation.

STUDY LIMITATIONS

A prime limitation of the study is the abbreviated time frame of data used. Covering more years of survey data could be enlightening in better determining the implications of the results.

Another problem is the potential worldview orientation of those who took the vehicle survey compared to the rest of potential vehicle purchasers. Those who subscribe to *Consumer Reports* may have a different value system and manner of sorting out viable vehicles for purchase than those who are not *Consumer Reports* subscribers.

Another clear study limitation is the examination of only one variable "Engine" ("Engine-Major") from the list of 17 variables considered in latest available *Consumer Reports*. While it would be difficult to argue that the variable of vehicle engine quality was not a critical dimension to consider when shopping for a vehicle (which may be why *Consumer Reports* always lists it first), information about other variables may also offer insight.

FUTURE RESEARCH

Several areas of investigation emerge after analysis of the data. The next step might be to increase the number of years of data analyzed to determine if the pattern in quality comparisons between the Japanese and U.S. vehicle makers remains consistent. Another interesting comparison might be made that considers other countries' offerings in addition

to the U.S. and Japanese to see the larger picture. A study that analyzes not only the quality perceptions of vehicles, but also the actual sales of vehicles over time might be useful. Perhaps it can be discovered what type of association the perceptions of vehicle quality and the resulting sales of those vehicles share. A further study could research the car maintenance habits of owners of automobiles from different countries. Perhaps there are vehicle maintenance habits differences, which are associated with brand demands by consumers.

REFERENCES

Ahmed, Sadrudin A. and Alain d'Astous (1995), "Comparison of Country-of-Origin Effect on Household and Organizational Buyers' Product Perceptions," *European Journal of Marketing*, 29 (3), 35-51.

Apelbaum, Eidan, Eitan Gerstner and Prasad A. Naik (2003), "The Effects of Expert Quality Evaluations Versus Brand Name on Price Premiums," *Journal of Product and Brand Management*, 12 (3), 154-65.

Arguea, Nestor M., Cheng Hsiao and Grant A. Taylor (1994), "Estimating Consumer Preferences Using Market Data - An Application to US Automobile Demand," *Journal of Applied Econometrics*, 9 (1), 1-18.

Al-Sulaiti, Khalid I. and Michael J. Baker (1998), "Country of Origin Effects: A Literature Review," *Marketing Intelligence & Planning*, 16 (3), 150-99.

Barber, Brad. M., and Masako N. Darrough (1996), "Product Reliability and Firm Value: The Experience of American and Japanese Automakers," 1973-1992," *Journal of Political Economy*, 104 (5), 1084-99.

Bates, Hilary, Matthias Holweg, Michael Lewis and Nick Oliver (2007), "Motor Vehicle Recalls: Trends, Patterns and Emerging Issues," *Omega*, 35 (2), 202-10.

Betts, Stephen C. and Zinaida Taran (2004), "The 'Brand Halo' Effect on Durable Goods Prices: Brand Reliability and the Used Car Market," *Academy of Marketing Studies Journal,* 8 (1), 7-18.

Bennett, Jeff and Alex P. Kellog (2009), "New Day for Chrysler as Fiat Arrives --- But Many Challenges Lurk, Including Restarting Plants, Launching New Models and Boosting Quality," *Wall Street Journal*, June 11, B.1.

Beverland, Michael and Adam Lindgreen (2002), "Using Country of Origin in Strategy: The Importance of Contest and Strategic Action," *Journal of Brand Management*, 10 (2), 147-67.

Bodell, Richard W., Robert R. Kerton and Richard W. Schuster, (1986), "Price as a Signal of Quality: Canada in the International Context," *Journal of Consumer Policy*, 9 (4), 431-44.

Chao, Paul (2001), "The Moderating Effects of Country of Assembly, Country of Parts, and Country of Design on Hybrid Product Evaluations," *Journal of Advertising*, 30 (4), 67-81.

Chao, Paul and Pola B.Gupta (1995), "Information Search and Efficiency of Consumer Choices of New Cars: Country-of-Origin Effects" *International Marketing Review*, 12 (6), 47-59.

Chao, Paul (1993), "Partitioning Country-of-Origin Effects: Consumer Evaluation of a Hybrid Product," *Journal of International Business Studies*, 24 (2), 291-306.

Chen, Hsiu-Li (2004), "Testing the Role of Country of Origin in Consumer Adoption of New Products," *International Advances in Economic Research*, 10 (3), 245-56.

Cole, Robert E. and Michael S. Flynn (2009), "Automotive Quality Reputation: Hard to Achieve, Hard to Lose, Still Harder to Win Back," *California Management Review*, 52 (1), 67-93.

Crafton, Steven M., George E. Hoffer and Robert J. Reilly (1981), "Testing the Impact of Recalls on the Demand for Automobiles," *Economic Inquiry*, 19 (4), 694-703.

Dinnie, Keith (2002), "National Image and Competitive Advantage: The Theory and Practice of Country-of-Origin Effect," *Journal of Brand Management*, 9 (Apr/May), 396-98.

Faulds, David J., Orlen Grunewald and Denise Johnson (1995), "A Cross-National Investigation of the Relationship between the Price and Quality of Consumer Products: 1970-1990," *Journal of Global Marketing*, 8 (1), 7-25.

Friedman, Monroe (1987), "Survey Data on Owner-Reported Car Problems: How Useful to Prospective Purchasers of Used Cars?" *Journal of Consumer Research*, Vol. 14 (December), 434-39.

Gerstner, Eitan (1985), "Do Higher Prices Signal Higher Quality?" *Journal of Marketing Research*, 22 (2), 209-15.

"Global Game, What is an American Car?" (2007), *Consumer Reports*, April, p. 19.

Gupta, Pola B. and Kenneth R. Lord (1995), "Identification of Determinant Attributes of Automobiles: Objective Analogues of Perceptual Constructs," *Journal of Marketing Management*, 5 (Spring/Summer), 21-9.

Gurhan-Canli, Zeynep and Durairaj Maheswaran (2000), "Determinants of Country-of-Origin Evaluations," *Journal of Consumer Research*, 27 (6), 96-108.

Harris, Richard J., Bettina Garner-Earl, Sara J. Sprick and Collette Carroll (1994), "Effects of Foreign Product Names and Country-of-Origin Attributions on Advertisement Evaluations," *Psychology and Marketing*, 11 (2), 129-44.

Haubl, Gerald (1996), "A Cross-National Investigation of the Effects of Country of Origin and Brand Name on the Evaluation of a New Car," *International Marketing Review*, 13 (5), 76-98.

Hogarty, Thomas F. (1975), "Price-Quality Relations for Automobiles: A New Approach," *Applied Economics*, 7 (1), 41-51.

Hong, Sung-Tai and Robert S. Wyer, Jr. (1990), "Determinants of Product Evaluation: Effects of the Time Interval Between Knowledge of a Product's Country of Origin and Information about its Specific Attributes," *Journal of Consumer Research*, 7 (3), 277-88.

Insch, Gary S. and J. Brad McBride (1998), "Decomposing the Country-of-Origin Construct: An Empirical Test of Country of Design, Country of Parts, and Country of Assembly," *Journal of International Consumer Marketing*, 10 (4), 69-91.

Kiley, David, Ian Rowley and Carol Matlack (2008), "Ghosn Hits the Accelerator: The Renault-Nissan CEO is Fighting to Keep Pace in the U.S. and Chasing Chinese and Indian Customers," *Business Week*, 4083 (May 12), 48.

Lawrence, C., Norman. E. Marr and Gerald. P. Prendergast (1992), "Country-of-Origin Stereotyping: A Case Study in the New Zealand Motor Vehicle Industry, *European Journal of Marketing*, 26 (3), 37-51.

Leclerc, France, Bernd Schmitt and Laurette Dube, (1994), "Foreign Branding and Its Effects on Product Perceptions and Attitudes," *Journal of Marketing Research*, 31 (2), 263-70.

Liefeld, John P. (2004), "Consumer Knowledge and Use of Country-of-Origin Information at the Point of Purchase," *Journal of Consumer Research*, 4 (2), 85-97.

Linebaugh, Kate (2010a), "Toyota Issues Second Recall for Gas Pedal," *The Wall Street Journal*, Jan. 22, B.3.

Linebaugh, Kate (2010b), "Toyota Halts Sales Over Safety Issue," *The Wall Street Journal*, Jan. 27, A.1, A.12.

Liu, Scott S. and Keith F. Johnson (2005), "The Automatic Country-of-Origin Effect on Brand Judgments," *Journal of Advertising*, 34 (1), 87-98.

Meichtry, Stacy and John Stoll (2009), "Fiat Nears Stake in Chrysler That Could Lead to Takeover," *The Wall Street Journal*, Jan. 20, A.1.

Mertens, Yves and Victor Ginsburgh (1985), "Product Differentiation and Price Discrimination in the European Community: The Case of Automobiles," *Journal of Industrial Economics*, 34 (2), 151-66.

Mitchell, Josh (2009), "Floor Mats Prompt Largest Toyota Recall," *The Wall Street Journal*, Sept. 30, B.3.

Montgomery, Cynthia A. and Birger Wernerfelt (1992), "Risk Reduction and Umbrella Branding," *Journal of Business*, 65 (1), 31-50.

Nichols, Mark W. (1998), "Advertising and Quality in the U.S. Market for Automobiles," *Southern Economic Journal*, 64 (4), 922-39.

Nichols, Mark W. and Gary M. Fournier (1999), "Recovering from a Bad Reputation: Changing Beliefs about Quality of US Autos," *International Journal of Industrial Organization*, 17 (3), 299-318.

Pagano, Robert R. (1990), *Understanding Statistics in the Behavioral Sciences*. 3rd ed. 295-6. St. Paul, MN: West Publishing Company.

Pharr, Julie M. (2005), "Synthesizing Country-of-Origin Research from the Last Decade: Is the Concept Still Salient in an Era of Global Brands?" *Journal of Marketing Theory and Practice*, 13 (4), 34-45.

Regassa, Hailu and Ahmad Ahmadian (2007), "Comparative Study of American and Japanese Auto Industry: General Motors Versus Toyota Motors Corporations," *The Business Review*, 8 (1), 1-11.

"Reliability, Detailed Data on New and Used Models" (2009), *Consumer Reports*, April, 86-96.

Riesz, Peter C. (1978), "Price Versus Quality in the Market Place," *Journal of Retailing*, 54 (4), 15-28.

Riesz, Peter C. (1979), "Price-Quality Correlatiions for Packaged Food Products," *Journal of Consumer Affairs*, 13 (2), 236-47.

Rising, Malin (2009), "Krugman: Concentration of US Auto Industry Will Probably Disappear," *The Huffington Post*, January 14, www.huffingtonpost.com/2008/12/07/krugman-us-auto-industry_n_149082.html.

Rutberg, Sidney (2007), "'Sale' of Chrysler Group to Cerberus Or Take My Auto Company, Please," *The Secured Lender*, 63 (4), 64-6.

Sauer, Paul L., Murray A. Young, and H. Roa Unnava (1991), "An Experimental Investigation of the Processes Behind the Country-of-Origin Effects," *Journal of International Consumer Marketing*, 3 (2), 29-59.

Samiee, Saeed (1994), "Customer Evaluation of Products in a Global Market," *Journal of International Business Studies*, 25 (3), 579-604.

Shirouzu, Norihiko and Yoshio Takahashi (2010), "Toyota Apologizes for Massive Recall," *The Wall Street Journal*, Feb. 6, B.1.

Srinivasan, Shuba, Koen Pauwels, Jorge Silva-Risso and Dominique M. Hanssens (2009), "Product Innovations, Advertising, and Stock Returns," *Journal of Marketing*, 73 (1), 24-43.

Steenkamp, Jan-Benedict E. M. (1998), "The Relationship between Price and Quality in the Market Place," *The Economist*, 136 (4), 491-507.

Stoll, John D. and Sharon Terlap (2009), "GM Takes New Direction --- Car Maker Leaves Bankruptcy; Will Slim Down, Court Consumers," *Wall Street Journal*, Jul 11, B.1.

Sullivan, Mary W. (1998), "How Brand Names Affect the Demand for Twin Automobiles," *Journal of Marketing Research*, 35 (May), 154-65.

Tabuchi, Hiroko (2010), "Toyota is Expected to Add 2010 Prius to Safety Recalls," *The New York Times*, Feb. 8, B.1, B.3.

Terlep, Sharon and Josh Mitchell (2010), "U.S. Widens Toyota Probe to Electronics," *The Wall Street Journal*, Feb. 4, B.1.

Terlep, Sharon and Matthew Dolan (2009), "Auto Makers Close Books on Awful Year, Face More Ills," *The Wall Street Journal*, January 6, B.1.

Thakor, Mrugank V. (1996), "Brand Origin: Conceptualization and Review," Journal *of Consumer Marketing*, 13 (3), 27-42.

Thakor, Mrugank V. and Antoine M. Lavack (2003), "Effect of Perceived Brand Origin Associations on Consumer Perceptions of Quality," *Journal of Product and Brand Management*, 12 (6), 394-408.

Train, Kenneth E. and Clifford Winston (2007), "Vehicle Choice Behavior and the Declining Market Share of U. S. Automakers," *International Economic Review* 48 (4), 1469-96.

Tse, David K. and Wei-na Lee (1993), "Removing Negative Country Images: Effects of Decomposition, Branding and Product Experience," *Journal of International Marketing*, 1(4), 25-48.

Ulgado, Francis M. (2002), "Country-of-Origin Effects on E-Commerce," *Journal of American Academy of Business*, 2 (1), 250-53.

Uri, Noel D. (1986), "Forecasting Relative Quality," *Journal of Forecasting*, 5 (2), 105-15.

Verlegh, Peeter W. J. and Jan-Benedict E. M. Steenkamp (1999), "A Review and Meta-analysis of Country-of-Origin Research," *Journal of Economic Psychology*, 20 (5), 521-46.

White, Joseph B. (2009), "What Is an American Car?" *Wall Street Journal*, (Jan. 26), D.6.

Yasin, Norjaya Mohd, Mohd Nasser Noor and Osman Mohamad (2007), "Does Image of Country-of-Origin Matter to Brand Equity?" *The Journal of Product and Brand Management*, 16 (1), 38-48.

Yerger, David B. (1996), "Used Car Markets: Reliability Does Matter, but Do Consumer Reports?" *Applied Economics Letters*, 3 (2), 67-70.

Zaman, M. Raquibuz and Fahri Unsal (2000), "Comparative Performance of American, European and Japanese Automobile Companies in the 1990s" *American Business Review*, 18 (1), 115-22.