
Service Quality in Private Passenger Automobile Insurance

J. Tim Query,^{*} Robert E. Hoyt,^{**} and Min (Enya) He^{***}

Abstract: This study extends previous research on service quality in the private passenger automobile insurance industry by providing empirical evidence using an improved proxy for the value of service. The endogeneity of the value of service is recognized and treated statistically with the two-stage least squares approach. The empirical model also includes a number of control variables that affect the service quality of an insurer. The measures of quality are customer satisfaction scores that are collected from two consumer surveys: the Consumer Reports Survey and the DALBAR Survey. Of critical interest in the analysis of these two different surveys is their respective treatment of claims problems and non-claims problems. For customers who have filed claims with their insurers, more weight is given to the value of service they perceive. In particular, how fast their insurers handle their claims is much more important to these customers than to the general population of policyholders. In contrast, for general consumers of automobile insurance, their satisfaction is based on a number of factors. Specifically, the insurer's capacity to provide service, output in auto lines, advertising expenditures, and distribution system all affect the quality of service perceived by consumers. [Key words: experimental/theoretical treatment, property casualty insurance, quality control]

INTRODUCTION

In today's customer-focused marketplace, service is a critical driver of customer retention and profitable growth. A key to ensuring the loyalty of customers lies in creating a predictably positive experience for them. By delivering on their service promise successfully at every opportunity,

^{*}Mountain States Insurance Group Chair, New Mexico State University, Las Cruces, NM 88003, email: tquery@nmsu.edu

^{**}Dudley L. Moore, Jr., Chair of Insurance, Terry College of Business, University of Georgia, Athens, GA 30602, email: rhoyt@terry.uga.edu

^{***}Assistant Professor, College of Business, University of North Texas, Denton, Texas 76201, email: enyahe@unt.edu

effective organizations go beyond “customer satisfaction” and ultimately earn customer loyalty. This is particularly true for the automobile insurance industry, where policies offered by insurers are relatively equivalent. Thus, quality of service is critical to insurers seeking to remain competitive since quality of service is arguably the single most important factor that differentiates one insurer from the next.

Extensive research examining service quality factors has been conducted in various industries, such as retail trade and transportation. However, only limited attention has been paid to determinants of service quality and customer satisfaction in the financial services literature. While previous studies in the insurance literature have assessed the effect of individual components of service quality, an integrated study of service quality in property-casualty insurance has not been conducted and is warranted.

In this paper, we build upon the framework laid out in Doeringhaus (1991) and conduct a more comprehensive study on service quality in the automobile insurance industry by analyzing data collected from the Consumer Reports Survey and the DALBAR Survey. The empirical results indicate that important differences exist between policyholders who have actually filed one or more claims and the general policyholder population, which includes insureds with and without claims experience. The policy attribute of claims-handling efficiency is more important to those with past claims experience, while value-related attributes such as capacity, output, and advertising, appear to be of greater importance to the general policyholder population.

Our study contributes to the literature in three main ways. First, prior studies of service quality in the insurance industry have been limited to a few states because of their utilization of complaint data (e.g., Carson et al., 2005). Ours is the first insurance study that examines state differences on a national scale by utilizing qualitative surveys conducted on a national basis. Moreover, the survey data used in this study differ significantly in their respective objectives. One study (Consumer Reports) focuses primarily on the claims-oriented customer satisfaction experienced by policyholders who have recently filed a claim. The other study (DALBAR) is a more general questionnaire covering basic customer satisfaction issues, and is not limited to policyholders who have actually filed a claim with their insurers. As a result, we are able to differentiate customer satisfaction for claims-related services and satisfaction with overall services, which, to our knowledge, has never been done in prior literature. In addition, this paper contributes to the literature by appropriately using a simultaneous estimation procedure to examine the two-way relationship between value of service and quality of service.

The remainder of the study is organized as follows. The next section discusses the theoretical framework. Section III presents the empirical model and associated hypotheses. Section IV describes the empirical results. Section V concludes.

THEORETICAL FRAMEWORK

Our theoretical framework is based on the model developed by DeVaney and Saving (1983), which represents the first fundamental equation of the general theory of product quality. Doerpinghaus (1991) uses this model as a foundation and applies it within an insurance context. However, in Doerpinghaus (1991), quality is modeled indirectly with the number of complaints. The unique data set in our study allows direct modeling of insurance quality with customers' satisfaction scores. The theoretical model for quality is specified as follows:

$$Q = f(v, o, c),$$

where Q is the quality of service, which is a function of the value of service to the insured (v), the total output of service (o), and the capacity of the insurer to provide service (c).

The function Q is assumed to be increasing in v since quality of service increases with the insured's marginal value of service. Holding the capacity of service constant, we might expect the function Q to decrease in output of policy service. Given the limited resources a firm has, the higher the frequency and severity of claims or greater need for services of the firm, the greater the drain on the firm, which could lead to lower quality. On the other hand, if the firm is operating with an increasing return to scale, then an increase in output may not result in lower quality of service. Therefore, the effect of output on the quality of service remains an empirical question. As for the impact of capacity on quality, we expect to observe a positive relationship between the capacity of a firm to provide service and the quality of its service. Everything else equal, the greater capacity an insurer has to provide the service desired by the insured, the higher the expected quality of service.

To our knowledge, Doerpinghaus (1991) is the first study that models the quality of service in automobile insurance. Her empirical work, however, is limited by data availability when measuring the three determinants of quality: value of service, output of service, and capacity of the firm to provide service. In particular, the proxy for value of service used by Doerpinghaus (1991) is restricted to an indicator variable for direct writer

(or direct solicitation firms) in contrast to independent agency companies. We believe that the distribution system is only one piece of the puzzle involving the value of service an insurer provides to its customers. Not only does the current study utilize an improved proxy for the value of service, but the endogeneity of the value of service is recognized and treated statistically with the two-stage least squares approach, which is discussed in detail in the next section. In addition, our empirical model also includes a number of control variables that would be expected to affect the service quality of an insurer.

EMPIRICAL MODEL

In accordance with the theoretical framework discussed above, we develop our empirical model of service quality as specified here:

Service Quality = f (capacity, output, value of service, and control variables),

where control variables include the following: distribution system, leverage, organizational form, firm size, business concentration, regulation, and advertising.

The data set is a compilation of annual financial statement data for the property-casualty industry during the period 1991 to 1996. The majority of these data are collected from the National Association of Insurance Commissioners (NAIC) data tapes. Other sources of data include the DALBAR Ratings of insurers, *Best's Insurance Reports*, *Best's Flitcraft*, Conning and Company's Regulatory Survey, *Consumer Reports*, and *Best's Aggregates and Averages*. Note that during our sample period, only one DALBAR Survey (1994) and two Consumer Reports (1991 and 1994) are available to us. In other words, we have a snapshot of consumers' perceptions of these companies. For each company, we assume that its DALBAR score remains the same over the sample period and thus assign each firm's DALBAR score in 1994 to all other years; for the Consumer Reports scores, we assign each firm's 1991 score to 1992 and 1993, and assign its 1994 score to 1995 and 1996, as we do not expect dramatic change in perception from year to year.¹

The sample sizes for the line under investigation ranged from 47 companies to 80 companies on a year-to-year basis. Most of the filtering of the original 2,500 to 3,000 companies contained on the NAIC data tapes was due to the constraints placed on the data by the consumer satisfaction surveys. However, the sample represents a significant percentage of the total private passenger automobile insurance market. Total assets of the

insurers in the sample vary from 34 to 39 percent of total assets for the entire private passenger automobile insurance industry. Net premiums written for the sample insurers represent 64 to 74 percent of total private passenger automobile insurance net premiums written (NPW) for the industry.

Dependent Variables

The measures of quality (the two specifications of the dependent variable) are customer satisfaction scores that are collected from the two consumer surveys: the Consumer Reports Survey and the DALBAR Survey. Of critical interest in the analysis of these two different surveys is their respective treatment of claims problems and non-claims problems. Claims problems include difficulty reaching an agent or claims representative regarding a claim; delay in handling a claim or paying out the agreed-upon settlement; disagreement over the dollar amount of damages, who was at fault, or what the policy covered; rude treatment; and complicated procedures. Non-claims problems include unfairly large rate increases; not enough information from the company about changes in coverage and other issues; poor service when changing coverage; difficulty contacting the company or agent about a non-claims issue; unclear explanation of coverage; and late or incorrect billing. The DALBAR survey includes consumers who have filed claims with their insurers as well as those who have never filed claims. The Consumer Reports survey is restricted only to those consumers who have actually experienced the claims filing process.

DALBAR's Consumer Satisfaction Survey (CSATS) is a national survey targeting mid- to high-income households (\$50,000 and above). One thousand and thirty-six households responded to the survey, with a response rate of almost 30 percent. The margin of error for the sample is ± 3 percent. Respondents were asked to rate their satisfaction with each company providing financial services, as well as to provide reasons (triggers) as to why they were or were not satisfied with each provider. Responses were given using a four-point scale, as follows: 4 = very satisfied, 3 = satisfied, 2 = dissatisfied, and 1 = very dissatisfied. Variables of interest in the study included price, service, agent personality, accessibility, claim response, and scope of coverage. The main reasons cited for satisfaction were "very dependable," "excellent service," "efficient, courteous people," "hassle-free claims," and "fair rates." Primary reasons for dissatisfaction included "price," "too many hassles over claims," "inadequate coverage," and "rude and discourteous agents."

Consumer Reports conducts a survey of insurance consumers on a periodic basis. For the 1994 survey, nearly 34,000 readers provided information on the service received on their most recent auto-insurance claim within the period 1991 to 1994. The overall score is based on readers'

Table 1. Insurers with the Five Highest and Five Lowest Customer Satisfaction Ratings

COMPANY	DALBAR 1994	COMPANY	CONSUMER REPORTS 1994
Five highest ratings		Five highest ratings	
California Casualty	3.94	Amica Mutual	94
USAA	3.88	Utd. Svcs. Auto Assn.	93
N.J. Manufacturer	3.80	USAA Casualty	93
AAA	3.69	Cincinnati	92
Amica Mutual	3.67	Erie Ins. Exchange	91
Five lowest ratings		Five lowest ratings	
State Auto	2.80	Metropolitan P & C	82
Metropolitan Insurance	3.10	Aetna Cas. & Surety	83
SAFECO Insurance	3.15	Farmers Ins. Exchange	83
Aetna	3.18	Allstate Indemnity	83
General Accident	3.22	Travelers Indemnity	84

judgments of how well the insurance company handled their claim. Other areas covered on the questionnaire include claims problems, non-claims problems, and payment delays. Consumer Reports used a six-point scale: 100 = excellent, 80 = very good, 60 = good, 40 = fair, 20 = poor, 0 = very poor. Each insurer included in the ratings received at least 179 responses.

A point can be made that Consumer Reports is generally read by consumers with larger incomes and higher educational backgrounds, and combined with the DALBAR ratings (household incomes greater than \$50,000), a large group of consumers are excluded. If low-income drivers tend to be higher risks (i.e., generally have more claims, as evidenced by the popularity of credit scores by insurers), then the exclusion of low-income drivers in this study allows for analysis specifically affecting a standard insured driver. While the findings can be applied to some insureds and insurers, the exclusion of households with lower incomes may not allow the findings to be applied in a general sense to all insurers/insureds.

Table 1 presents the satisfaction ratings for the five insurers with the highest ratings and the five insurers with the lowest ratings, based on both surveys. Table 2 shows the summary statistics of satisfaction ratings for our sample firms.

Table 2. Summary Statistics of Customer Satisfaction Ratings

Ratings	N	Mean	Median	Maximum	Minimum	Std. dev.
Consumer score	241	85.7	85.0	94.0	77.0	3.9
DALBAR score	408	3.5	3.5	4.0	2.8	0.3

Explanatory Variables

The explanatory variables fall into two categories: one is the three determinants of service quality based on the model developed by DeVaney and Saving (1983); the other is a group of control variables that potentially influence service quality.

The three determinants of service quality in this study are capacity, output, and value of service. They are defined as follows:

Capacity

An insurer's capacity is measured by the inverse of the premium to surplus ratio.² The higher the capacity, the better the ability an insurer has to pay claims, and the higher quality its customers perceive its services to be. Therefore, we expect a positive relationship between capacity and quality of service.

Output

Doeringhaus (1991) employs net premiums written as a proxy for output.³ Doherty (1981), however, argues that there are two problems associated with using premium income as an output measure—one resulting from the existence of market imperfections, and the other related to measurement error. As "the function of insurance is to resolve risk and uncertainty" and "this function is achieved by the delivery of contingent dollars to the insured; the contingency being an event that has caused loss as defined in the policy. As such, output is provided in the guarantee of the payment of claims and a useful measure of this output would be the expected value of that guarantee. Ex post the actual value of total claims paid might be substituted for the expected value," (Doherty, 1981, p. 392). In line with Doherty (1981), we also measure output with the claims paid in personal auto lines.

Value of service

As mentioned earlier, Doeringhaus (1991) proxies value of service with an indicator variable for direct writer. An enhanced proxy for value of service is proposed in the current study—the inverse loss ratio, which is the ratio of premiums earned to losses incurred. Several other studies use the inverse loss ratio as a proxy for price. We believe this measure is a superior proxy for value of service since it represents the portion of the premiums collected to cover the real services an insurance company provides to its customers beyond the amount used for paying claims. The higher this inverse loss ratio, the higher the proportion of an insurer's funds that is utilized in providing non-claim services. Everything else equal, the higher this ratio, the higher the value of service provided by the insurer. Given that better service is costly, this further justifies an expected positive relationship. However, the inverse of the loss ratio may not accurately reflect the funds available to enhance the value of service, as premiums taken include not only profit, but also costs such as premium taxes and expenses.

In addition to the three determinants of quality (i.e., capacity, output, and value of service) discussed above, there are a number of other factors that may have important implications on an insurer's quality of service. These factors are described in the following paragraphs.

Distribution system

Property-liability insurance in the United States is marketed through several distribution systems, including the exclusive agency system, the independent agency system, the salaried employee distribution system, and some other systems such as direct mail or direct response marketing. The distribution system used affects the quality of service through its influence on claims practices. In particular, companies employing the independent agency system may be viewed more favorably by insureds, as independent agency insurers may provide superior service. For example, independent agency companies may allow insureds to shop at local repair garages, while direct writing insurers may often settle claims at drive-in assessment centers. In addition, Barrese, Doeringhaus, and Nelson (1995) provide evidence that independent agency system insurers are associated with a lower number of complaints. To examine the influence of distribution system on quality, we include two indicator variables: one is an "independent agency dummy" that equals one if the insurer employs the independent agency system and zero otherwise, and the other is a "direct response dummy" that equals one if the direct response system is employed and zero otherwise. Insurers using primarily exclusive agents or direct writers constitute the base category.

Regulation

The regulatory environment in which an insurer operates may affect the quality of service by imposing compliance costs on the insurer, and this may cause insurers to compromise in providing services. For example, Harrington (1984) suggests that the effect of setting rates for certain groups below market levels may cause the insurers to offset expenses elsewhere by reducing services or slowing down claim payments. If that is the case, heavy regulation may well cause the value of service provided by insurers to decline. We construct the "regulation" variable using data obtained from a study conducted by Conning and Company.

Since 1984, Conning and Company has periodically asked property-casualty companies to rate states in terms of the relative freedom each state allows them in the management of their personal and commercial lines of business. Companies consider such factors as regulatory climate, implementation of rating classifications and territories, setting adequate rate levels, cancellation and non-renewal of risks, and involuntary assignments.⁴ This variable has a scale of 1 to 10, with 10 indicating the most stringent regulatory environment. The lower the value, the more freedom from regulation an insurer enjoys and the higher quality we might expect to observe from such insurers.

Business concentration

We employ two measures of business concentration: one is the fraction of direct premiums written from personal auto lines and the other is the geographic Herfindahl index for personal auto lines (based on direct premiums written across states). The more concentrated an insurer's business is in personal auto lines, the higher the insurer's capacity to offer service to personal auto policyholders. Everything else equal, higher capacity implies higher quality. In addition, geographically concentrated insurers are able to respond more promptly to policyholders' needs and are more likely to provide higher quality of service, relative to those insurers with their business dispersed geographically.

Advertising

Kihlstrom and Riordan (1984) argue that advertising may signal quality if market mechanisms exist that produce a positive relationship between product quality and advertising expenditures. They show that consumers interpret advertising as a signal of quality and rationally infer high quality when advertising expenditures are sufficiently large. When a firm signals by advertising, it demonstrates to consumers that its production costs and the demand for its product are such that advertising costs can be recovered.

Therefore, we expect to observe a positive relationship between advertising expenses and quality of service.

Finally, we also include firm size and organizational form to control for the potential difference in service quality due to firms' different scales of operations or organizational structures. Firm size is the natural log of total assets, while organizational form is an indicator variable that equals one if the insurer is a stock company and zero otherwise.⁵

Endogeneity of the Value of Service

As discussed earlier, an insurer's service quality is modeled as a function of the determinants of service quality (i.e., capacity, output, and value of service) and a number of control variables (e.g., distribution system). Evidence in prior literature indicates that value of service, which reflects the customers' perceived value of the service they receive from their insurers, is endogenously determined by a number of factors. For example, the speed of claims payments by an insurer, the concentration of an insurer in auto lines, an insurer's default risk, and advertising expenditures all could affect the value of service perceived by the insured. Given the endogenous nature of the value of service, we employ a two-stage least squares approach in which we model the value of service in the first stage and use the estimated value of service in the second stage when modeling the quality of service. The variables in the first-stage model of the value of service are described in the following paragraphs.

Speed to pay claims

Since insurance is a contractual promise to indemnify the insured when a loss occurs, how fast a claim is settled is an important component of the insurance product. In automobile insurance, property losses are usually settled within two years after the end of the policy period. Conversely, bodily injury liability and personal injury protection (no-fault) loss settlements can span over substantial periods of time. Companies earn more interest on unexpended premium balances until losses are paid during this extended payout tail. Using data from Schedule P of the NAIC Data Tapes, we construct the "claim" variable to capture the promptness of paying losses at the firm-specific level. We construct the variable in such a way that its value is constrained between 0 and 9, where 0 represents no service lag in the claim settlement process while 9 indicates the longest waiting time in collecting loss payments. The claim variable is the weighted average of all claim payments over the ten-year period since the year of loss, with more weight assigned to later payments than earlier payments. As a result, the higher the value of this variable, the longer it takes for the insurer to pay its auto claims. Controlling for other factors, we expect that

the quicker claims are resolved, the higher the value of service perceived by customers. In other words, we anticipate a negative relationship between “claim” and value of service.

Default risk

Previous literature has shown an inverse relation between insurer’s insolvency risk and insurance prices (e.g., Sommer, 1996). The rationale behind such a relation is that insureds perceive insurers with lower default risk as higher value compared to insurers with higher default risk. We employ a commonly used measure of default risk—A. M. Best ratings (A. M. Best, 1991–1997). We recognize that, as with any other measure of insolvency risk, Best’s ratings are not a perfect proxy for insolvency risk. However, Pottier and Sommer (2002) provide evidence that Best’s ratings are superior to RBC ratios and FAST scores in predicting insurer insolvency.⁶ Two indicator variables are created representing these ratings: top rating equals 1 if an insurer’s rating is A++, and 0 otherwise; second best rating equals 1 if an insurer’s rating is A+, and 0 otherwise. Since A++ and A+ are the highest ratings an insurer could receive from A. M. Best Company and thus represent firms with the lowest default risk, we expect to observe a positive relation between these variables and value of service. The omitted group (i.e., the base group) includes insurers with Best’s Ratings below A+.⁷ Note that the ratings of our sample firms do not vary much from one firm to another, ranging from B+ to A++, suggesting that all of the insurers in our sample are relatively sound financially.

Business concentration in personal auto lines

The degree of an insurer’s concentration in personal auto lines affects consumers’ perceived value of service in two ways. First, the focus of an insurer in personal auto lines may well represent the company’s expertise in this line, which enables the company to provide better service for its automobile policyholders. Second, if an insurer’s business is concentrated in personal auto insurance, it indicates that relatively more resources are committed to this line, and the insurer’s ability to pay claims and provide other relevant services is relatively stronger. In either case, one would expect that customers may perceive the value of service to be higher from an insurer specialized in auto lines than that offered by a multi-line insurance company whose resources are more dispersed across different lines of business. Thus, we expect a positive correlation between value of service and business concentration. We measure business concentration in auto lines by the ratio of direct premiums written in auto lines over total direct premiums written in all lines.

Advertising

Nelson (1974) posits that consumers believe that the more a brand advertises, the more likely it is to be a better buy. In other words, consumers perceive advertising as a signal for higher value of the services, and thus a signal for higher quality of the services. If that is the case, we will observe a positive relation between value of service and advertising expenses. To control for the fact that large firms are likely to advertise more, we scale a firm's advertising expenditures by its direct premiums written.

Regulation

Another factor that has important implications for the value of service is regulation. Regulation of insurance rates, policy coverages, and so forth represents better protection of consumer interests and may be considered value-enhancing by consumers. As previously mentioned, our measure of regulation is constructed in such a way that higher value of the measure corresponds to more stringent regulation. As a result, we expect to observe a positive relation between regulation and the value of service.

To summarize our discussions above, our empirical model employs a two-stage least squares approach in which

the first stage is:

value of service = f (speed to pay claims, distribution system, advertising, business concentration, capacity, default risk, and regulation);

the second stage is:

quality of service = f (output, capacity, value of service, and control variables).

The estimated value of service from the first stage is substituted into the second stage to control for the endogeneity of the value of service.⁸

Table 3 summarizes the factors that determine the value of service, while Table 4 summarizes our predictions for the factors that explain the insurer's quality of service for automobile insurance.

EMPIRICAL RESULTS

Given the two specifications of the dependent variable (i.e., quality of service), we also have two sets of results to report: one set for the model in which quality is measured by Consumer Score ("Consumer Score specification" hereafter) and the other set for the model in which quality is measured by DALBAR Score ("DALBAR Score specification"). In both

Table 3. Factors Affecting Value of Service

Independent variables	Measure/Proxy	Expected sign
Speed to handle claims	Claim (claims settlement lag: the higher the value of this variable, the longer it takes to settle a claim)	-
Distribution system	Dummy for independent agent	+
Advertising	Advertising costs scaled by total direct premium written	+
Business concentration	% of DPW from auto business	+
Capacity	Inverse premium to surplus ratio	+
Low default risk	Best's ratings (top rating; second best rating)	+
Regulation	Degree of freedom from regulatory restrictions (scale of 1 to 10; 10 means totally free)	-

models, the value of service is modeled in the first stage and its estimated value enters the second stage as an explanatory variable. We start our discussion with results from the first stage, where the value of service is modeled as a function of firm size, organizational form, speed to settle claims, business concentration, default risk, and advertising expenses.

Results from the First-Stage Regressions on the Value of Service

Table 5 reports the regression results for determinants of the value of service for the Consumer Score specification. As expected, the insurer's speed to settle claims is negatively correlated with the value of service provided by the insurer, indicating that customers value faster claims settlement. Furthermore, both rating variables are positively related to value of service, consistent with the notion that lower default risk is valued by customers since insurers with lower default risk are better able to pay claims.

The first-stage results for the DALBAR Score specification are reported in Table 6. The signs of coefficient estimates for both the speed to settle claims and insurers' ratings are similar to those in the Consumer Score specification. The magnitudes of coefficient estimates, however, are quite different. The coefficient estimate for speed to settle claims in the Consumer Score specification (-0.04) is almost twice as much as that in the DALBAR

Table 4. Determinants of Quality of Service

Independent variables	Measure/Proxy	Expected sign
Determinants of service quality		
Value of service	Inverse loss ratio	+
Output	Total direct claims paid on auto insurance	-
Capacity	Inverse premium to surplus ratio	+
Control variables		
Distribution system	Direct response dummy	
	Independent agency dummy	+
Organization form	Stock dummy	
Firm size	Natural log of total assets	+
Concentration	DPW from auto/DPW from all lines	+
	Geographic Herfindahl for auto line only	
Regulation	Degree of freedom from regulatory restrictions	-
Advertising costs	Log (advertising expenses/DPW)	+

Score specification (-0.02).⁹ This result is consistent with the fact that the Consumer Reports survey is restricted only to those consumers who have actually experienced the claims filing process, while the DALBAR Survey includes both consumers who have filed claims with their insurers and those who have never filed claims. It is very likely that those who have filed claims put much more weight on the insurer's speed to settle claims than those consumers who haven't had any claims experience on which to base the rating of service received from their insurers.

Results from the Second Stage-Regressions on the Quality of Service

The results for the model on quality of service are summarized in Tables 7 and 8, where quality is proxied by Consumer Score and DALBAR Score, respectively. Note that these results are based on the two-stage least squares approach in which the first stage models value of service as reported in Tables 5 and 6. For those consumers who have had claims experience with their insurers, a positive and significant relationship between quality of service and value of service is observed. In addition,

Table 5. First-Stage Regression Results on Value of Service:
Consumer Score Specification

Dependent variable: Value of service (inverse loss ratio)			
Measure of quality: Consumer score			
Number of observations: 241			
Adjusted R-square: 0.11			
Variable	Expected signs	Parameter estimate	Pr > t
Intercept		1.77***	<.0001
Firm size		-0.01*	0.0736
Stock dummy		0.02	0.3879
Speed to settle claims	-	-0.05***	0.0095
Fraction of DPW from auto lines	+	-0.01	0.8715
Top rating (Rating being A++)	+	0.14***	<.0001
Second best rating (Rating being A+)	+	0.08***	0.0027
Advertising expenses adjusted by DPW	+	-1.43	0.4576

***, **, and * indicate significance at .01 level, .05 level, and .10 level, respectively.

insurers employing the direct response distribution system are associated with higher quality of service compared to insurers using primarily exclusive agents or direct writers. None of the remaining independent variables are significant. Overall, the results suggest that the value of service is the single most important determinant of quality of service for those customers who have claims experience with their insurers.

For general consumers who may or may not have filed a claim with their insurers, however, quality of service is determined by a number of factors: the insurer's capacity, advertising expenditures, and distribution system. First, quality of service is positively related to insurer's capacity, consistent with the hypothesis that higher capacity implies higher quality. Second, those insurers using independent agency distribution systems are associated with lower quality of overall service while insurers employing direct response distribution systems seem to offer higher quality of service than those insurers using primarily exclusive agents or direct writers. Thirdly, the insurers' capacity has a positive impact on customer satisfaction, consistent with the notion that the higher the capacity, the better the ability of the insurer to pay claims, and the higher quality its customers perceive its services to be. As we expected, geographically concentrated

**Table 6. First-Stage Regression Results on Value of Service:
DALBAR Score Specification**

Dependent variable: Value of service (inverse loss ratio)			
Measure of quality: DALBAR score			
Number of observations: 408			
Adjusted R-square: 0.15			
Variable	Expected signs	Parameter estimate	Pr > t
Intercept		1.66***	<.0001
Firm size		-0.01**	0.0260
Stock dummy		0.01	0.4297
Speed to settle claims	-	-0.02**	0.0157
Fraction of DPW from auto lines	+	-0.13***	0.0011
Top rating (Rating being A++)	+	0.14***	<.0001
Second best rating (Rating being A+)	+	0.08***	<0.0001
Advertising expenses adjusted by DPW	+	-0.50*	0.0549

***, **, and * indicate significance at .01 level, .05 level, and .10 level, respectively.

insurers are associated with higher DALBAR scores. In addition, advertising expenditures are negatively related to quality of service, contrary to our predictions. The remaining explanatory variables are insignificant, except for "freedom from regulation," which is marginally significant.

Unlike Doerpinghaus (1991) who indirectly measures customer satisfaction with number of complaints per thousand automobiles written, we offer two direct measures of customer satisfaction: Consumer Score and DALBAR Score. Comparing our findings with those of Doerpinghaus (1991), we observe some interesting differences as well as similarities. First, Doerpinghaus (1991) does not find any relationship between insurer's capacity and number of complaints. Our results are dependent upon whether customers have had claims experience. For customers who do have claims experience, insurer's capacity does not seem to affect the overall customer satisfaction level, consistent with her findings. For customers in general (i.e., those who may or may not have filed a claim), however, we do observe a positive relationship between insurer's capacity and customer satisfaction as proxied by the DALBAR Score. These results

Table 7. Determinants of Quality of Claim Service

Dependent variable: Consumer score Number of observations: 241 Adjusted R-square: 0.18			
Variable	Expected signs	Parameter estimate	Pr > t
Intercept		37.74**	0.0317
Value of service	+	32.46***	0.0003
Dummy for independent agency distribution	+	-0.33	0.7602
Dummy for direct response distribution		2.23*	0.0756
Leverage		-0.35	0.4655
Dummy for stock insurer		-0.74	0.3913
Firm size	+	0.01	0.9768
Loss paid on personal auto lines	-	-0.0000000001	0.7009
Capacity	+	1.09	0.4373
Freedom from regulation	-	-0.27	0.3558
Advertising expenses	+	-46.27	0.5302
Geographic Herfindahl in auto lines	+	2.62	0.3783

***, **, and * indicate significance at .01 level, .05 level, and .10 level, respectively.

Note: Value of service is the predicted value from the first stage, in which the results are reported in Table 5.

suggest that different customers may value different aspects of insurers' operations, depending whether claims are involved. Second, our results in both specifications indicate that insurers using a direct response distribution system are associated with a higher level of customer satisfaction than insurers using primarily exclusive agents or direct writers, while Doerpinghaus (1991) documents a negative relation between the number of complaints and indicator for direct writers. Third and lastly, our results that insurers with independent agency distribution are associated with lower customer satisfaction level is consistent with Doerpinghaus (1991), whose results show a negative relation between the number of complaints and insurers using independent agency distribution, though our results are significant only in the DALBAR Score regression.¹⁰

Table 8. Determinants of Quality of General Service

Dependent variable: Consumer score Number of observations: 408 Adjusted R-square: 0.28			
Variable	Expected signs	Parameter estimate	Pr > t
Intercept		79.63***	<.0001
Value of service	+	-6.40	0.3987
Dummy for independent agency distribution	+	-0.09***	<.0001
Dummy for direct writer distribution		4.97***	<.0001
Leverage		0.54	0.2053
Dummy for stock insurer		1.48	0.1082
Firm size	+	0.27	0.2804
Loss paid on personal auto lines	-	0.0000000001	0.7444
Capacity	+	3.54***	<.0001
Freedom from regulation	-	-0.37	0.1005
Advertising expenses	+	-44.83***	0.001
Geographic Herfindahl in auto lines	+	9.17***	<.0001

***, **, and * indicate significance at .01 level, .05 level, and .10 level, respectively.

Note: Value of service is the predicted value from the first stage, in which the results are reported in Table 6.

CONCLUSION

This paper represents the first comprehensive study to use customer satisfaction scores as a proxy for service quality. The results provide valuable insight into customers' satisfaction with claims services and with overall services. For customers who have filed claims with their insurers, more weight is given to the value of service they perceive. In particular, how fast their insurers handle their claims is much more important to these customers than to those who may or may not have filed any claim. In contrast, for general consumers of automobile insurance, their satisfaction is based on a number of factors. Specifically, the insurer's capacity to provide service, output in auto lines, advertising expenditures, and distribution system all affect the quality of service perceived by consumers.

Important differences exist between policyholders who have actually filed one or more claims and the general policyholder population, which includes insureds with and without claims experience. The policy-attribute of claims handling efficiency is more important to those with past claims experience, while value-related attributes appear to be of greater importance to the policyholder population, which includes those with no prior claims filing experience.

The study of service quality within the setting of the property-casualty insurance industry has important implications in the areas of economics, consumer behavior, marketing, and pricing strategy. The research adds to the existing empirical research in the insurance literature by providing an integrated study of the relations among service quality factors. It also adds to previous service quality literature found in other industries as this paper is the first integrated simultaneous estimation of value of service and service quality in the insurance industry, and one of a small number found in financial services research.

While this study produced several important findings, ample opportunities exist for future research. An extension of this study would be to test for additional variables that might influence the exogenous variables of interest—service quality and value of service. Some possibilities under consideration include loss adjustment expenses, commissions, and underwriting expenses.

Many of the potential future areas of research are dependent on data availability. For example, if a proxy for customer satisfaction existed on an annual basis, a time-series analysis using panel data would be of interest. Under this scenario additional time-specific variables such as the risk-free rate, inflation, and the level of catastrophic claims paid could be tested for possible incorporation into the model.

Another potential area for future research is examination of the relation between service quality and price relation at the group level. This is motivated by the fact that some annual statement data are aggregated or pooled at the group level by a few reporting firms, and most of the companies represented in the survey data used in this study are part of a group.

NOTES

¹The correlation coefficient for Consumer Report scores in 1991 and 1994 for 35 insurers that were reported in both periods is 0.8891.

²Doerpinghaus (1991) uses the ratio of net premiums written to surplus as a proxy for output to financial capacity.

³According to Doerpinghaus (1991), net premiums written to surplus, NPWS, is used as a proxy for output to financial capacity, or the ability to pay claims. Written premiums are summed across all lines, and surplus is total surplus for the insurer or insurance group where appropriate (Doerpinghaus, 1991, p. 123).

⁴The Conning regulatory surveys have been used in previous regulatory studies. D'Arcy (1982) found loss ratio was negatively related to a measure of regulatory stringency based on Conning and Company surveys of managerial opinion. Grabowski et al. (1989) employed a measure of regulatory stringency constructed from the Conning and Company rating to examine the price and availability tradeoffs that result from regulatory practices.

⁵Correlation among independent variables is not an issue. Unreported correlation tests show that the correlation coefficients range from 0.16 to 0.59.

⁶Investigating the abilities of four key summary risk measures to predict property-liability insurer insolvencies, Pottier and Sommer (2002) study the NAIC's risk-based capital ratios (RBC), the NAIC's financial analysis solvency tools (FAST) scores, A. M. Best's Capital Adequacy Relativity ratios, and A. M. Best's ratings. Their results demonstrate that the risk measures produced by the private-sector rating agency, A. M. Best, have greater predictive abilities than the corresponding measures produced by the NAIC. Their results also demonstrate that while risk-based capital measures can be useful in insolvency prediction, broader measures of overall risk (e.g., Best's ratings) are much more effective.

⁷Note that not much variation exists among the ratings of our sample insurers. On average, our sample firms are companies in relatively strong financial condition.

⁸We utilized the regression-based form of the Hausman test for endogeneity as suggested by Hausman (1978, 1983). The test statistic is highly significant for both the Consumer Score specification and the DALBAR Score specification (t -values -6.79 and 3.30 , respectively), indicating that the value of the service variable is indeed endogenous in both specifications. Consistent with our theoretical model, the Hausman test results suggest that 2SLS estimates are preferred to OLS estimates in this case. For details regarding the regression-based form of the Hausman test, see Wooldridge's *Econometric Analysis of Cross Section and Panel Data* (pp. 118–122).

⁹Tests show that the coefficient estimates on the speed to settle claims are statistically different between the DALBAR Score specification and the Consumer Score specification.

¹⁰Our results are consistent with customers exhibiting more appreciation for the role of agents (exclusive or independent) when they have had a claim. Also, it is important to note that we are focusing only on private passenger automobile insurance. Other studies suggest that the value of agent services (from exclusive or independent agents) is more important in complex insurance lines.

REFERENCES

- Barrese, J., H. I. Doerpinghaus, and J. M. Nelson (1995) "Do Independent Agent Insurers Provide Superior Service? The Insurance Marketing Puzzle," *Journal of Risk and Insurance*, **62**, pp. 297–308.
- Carson, J., K. McCullough, and D. Russell (2005) "Complaint Ratios and Property-Casualty Insurer Characteristics," *Journal of Insurance Issues*, **28**, pp. 151–166.
- D'Arcy, S. P. (1982) "An Economic Theory of Insurance Regulation," Ph.D. Dissertation, University of Illinois.
- DeVaney, A. S. and T. R. Saving (1983) "The Economics of Quality," *Journal of Political Economy*, **91**, pp. 979–1000.
- Doerpinghaus, H. I. (1991) "An Analysis of Complaint Data in the Automobile Insurance Industry," *Journal of Risk and Insurance*, **58**, pp. 120–127.

- Doherty, N. A. (1981) "The Measurement of Output and Economies of Scale in Property-Liability Insurance," *Journal of Risk and Insurance*, **48**, pp. 390–402.
- Grabowski, H., K. W. Viscusi, and W. N. Evans (1989) "Price and Availability Tradeoffs of Automobile Insurance Regulation," *Journal of Risk and Insurance*, **56**, pp. 275–299.
- Harrington, S. (1984) "The Impact of Rate Regulation on Prices and Underwriting Results in the Property-Liability Insurance Industry: A Survey," *Journal of Risk and Insurance*, **51**, pp. 577–623.
- Hausman, J. (1978) "Specification Tests in Econometrics," *Econometrica*, **46**, pp. 1251–1271.
- Hausman, J. (1983) "Specification and Estimation of Simultaneous Equations Models," *Handbook of Econometrics*, Z. Griliches and M. Intriligator, editors. Amsterdam: North Holland.
- Kihlstrom, R. E. and M. H. Riordan (1984) "Advertising as a Signal," *The Journal of Political Economy*, **92**, pp. 427–450.
- Nelson, P. (1974) "Advertising as Information," *Journal of Political Economy*, **82**, pp. 729–754.
- Pottier, S. W. and D. W. Sommer (2002) "The Effectiveness of Public and Private Section Summary Risk Measures in Predicting Insurer Insolvencies," *Journal of Financial Services Research*, **21**, pp. 101–116.
- Sommer, D. W. (1996) "The Impact of Firm Risk on Property-Liability Insurance Prices," *Journal of Risk and Insurance*, **63**, pp. 501–514.
- Wooldridge, J. (2001) *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: The MIT Press.