



# Dynamic pricing in regulated automobile insurance markets with heterogeneous insurers: Strategies nice versus nasty for customers<sup>☆</sup>

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## ABSTRACT

This study examines a phenomenon in one nation's automobile insurance market where insurers adopt diverse pricing strategies in this regulated industry that does not allow for such diversions—a homogeneous, insurance industry in which a government authority sets the official pricing formula as well as all of the rating factors. Insurers use a claim coefficient that reflects previous claim records of policyholder as an implicit pricing tool to over/under charge new and repeat customers. The aim here is not so much to blow-the-whistle on pricing practices that violate regulations but to describe execution details of the practices and their outcomes. The results show that firm-level, systematic, price variances that occur differ from prices that follow from applying regulated individual-claim coefficients. Based on the unique firm-level pricing strategies, this study finds that some insurers are more nice to new customers and nasty to repeat customers to increase market shares while other insurers earn high profits by being nasty to repeat customers. The assumption that a behavioral primacy effect may exist in the market may guide some firms' pricing strategies.

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## 1. Introduction

Traditional studies recognize that price dispersion for a homogeneous product can be an equilibrium outcome, in which consumers play the key role in decision-making depending on search cost (Burdett & Judd, 1983; Carlson & McAfee, 1983; Rob, 1985). Price dispersion reflects complexity when applied to insurance market where repeated purchasing behavior is present and multi-period contracts are common (Berger et al., 1989; Dahlby and West, 1986; Schlesinger & Schulenburg, 1991; and Seog, 2002). However, if the government adopts price regulation, price dispersion for the same type of insurance policy is supposed to vanish.

This study analyzes a phenomenon which is contrary to the above rationale that despite government authority setting the official pricing formula, as well as all of the rating factors, insurers adopt diverse pricing strategies in an automobile insurance market. In such a regulated market, consumers subjectively believe that the rating methods are the same for all insurers as no differences in premiums

are supposed to occur for consumers purchasing automobile insurance across the specific insurers.

Therefore, the search cost for the customer is zero as searching for lower offer is not necessary. However, as this study shows, insurers might under/over charge new/repeat customers by implicitly revising one key element in the official rating formula, the claim coefficient, which reflects the accumulated claim records of policyholder in the previous three years.

Based on the official pricing formula and regulations (detailed later), all else being equal, those who have more claims in the accumulating period should receive higher claim coefficient in the next year and pay a higher premium. Due to competition, as well as pricing strategy, insurers might not adjust the insured's claim coefficients accordingly. For example, insurers might treat policyholder nicely by hesitantly increasing premium in terms of higher claim coefficient of the policyholder. Alternatively, insurers might treat policyholder nastily by overcharging, such as not giving the premium bonus deserved when no claims are filed in the previous policy period.

The sustainability of different pricing strategies in a regulated insurance market is due to one-way information asymmetry between the insured and insurers. In this highly regulated market, insurers can share histories of previous claims of each individual from authority's intranet website while consumers do not know the implicit pricing strategy of each insurer.

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This study shows that different pricing strategies are associated with likely firm objectives that focus on profits versus market share. Based on the empirical results, this paper explains the rationale behind the findings in terms of marketing and pricing theory. One strategic pricing theory, the behavioral primacy effect (i.e., the influence of behavioral endowment effect; Thaler, 1980), fits the explanation that customers tend to repeat-buy the initial brand that they purchased more often than other brands when their use of the first brand is favorable given the same purchasing environment (Woodside & Uncles, 2005). Thus, some firms may adopt initial low-price strategies that can increase the probability of new customers trying their products and then increase their prices after these new customers return-to-buy a second time or in later time periods.

In addition, from the “memory-based process” argument of imprinting theory (first experience without considering alternative options), most customers remember their best experience from the first purchase. By applying the above theories to the automobile insurance market, it insurers would undercharge for premiums to gain the satisfaction of new customers.

However, when the insured renews the contract, the insurer may not decrease the premium that should follow from a good driving record (no claims) when offering such a bonus is standard practice in the insurance market. Not offering the bonus reflects a higher premium than should be applicable for the repeat buyers; insurers applying such a strategy may expect that most repeat buyers are insensitive to the overcharge. In other words, the insurance company can earn excess profit from long-term high-premium contracts to subsidize the losses from short-term low-premium contracts.

Kocas and Bohlmann (2008) stress that several empirical findings about pricing strategies remain puzzling; for example, within the same market, some small retailers decide to discount deeply, whereas others forgo the price-sensitive switchers and price high. Theory and research that explain such strategies are helpful. The present article demonstrates that pricing variations counter to regulation requirements do occur across firms for a homogenous product in a highly regulated market and provides explanations for their occurrence. In addition, the findings of this paper highlight the incapability of consumers to judge the fairness of insurance premiums which is similar to the findings of Shapira and Venezia (2008) in that amateurs (versus professionals) tend to buy too much insurance (low deductible) due to the lack of ability to select a better deal.

Prior studies describe linkages from relative firm size to customer retention rates and profitability (McGahan & Ghemawat, 1994). The findings of the present study provide alternative views in that, in addition to market share, different pricing policies (nice versus nasty) differ in the abilities to attract customers and increase profits.

Following the identification of the topic and literature review in Section 1, Section 2 describes the rating system and pricing of insurance premiums in a highly-regulated market. Section 3 formally states hypotheses that follow from the literature review. Section 4 describes the data to test the hypotheses. Section 5 presents the analyses of the data. Section 6 discusses the findings and offers limitations and conclusions.

## 2. The rating system for vehicle damage insurance in Taiwan

In Taiwan, the automobile insurance market has free entry but is under highly regulated. In addition to the insurance companies, various kinds of agents and providers play major roles in this market (Bourgeon et al., 2008). Insurance authorities set up the standard pricing formulas and base premiums. All insurers follow the official formulas to determine the premium of individual policy based on the specific characteristics of each policyholder. It is worth noting that the regulation focuses on the formula itself, not the final premium. The consequence is that insurers have some discrepancy to use the detailed rating factors. The official rating formula to

calculate vehicle damage coverage premiums for all of the policy options is as follows:

$$P = B \times M \times C \quad (1)$$

$P$  denotes the actual premium,  $B$  is the basic premium (including unified loading),  $M$  and  $C$  are the manufacture coefficient and the insured coefficient, respectively. In addition, the insured coefficient involves a gender–age coefficient and a claim coefficient.

In Eq. (1), the basic premium varies according to the different coverage types. Equation provides the detail of manufacture coefficient, which relates with vehicle type and age, reflecting the car value or replacement cost. In general, new or expensive cars versus old and inexpensive cars have higher manufacture coefficients.

The calculation of insured coefficient is as follows:

$$\text{insured coefficient} = \text{gender–age coefficient} + \text{claim coefficient} \quad (2)$$

where the first factor represents immutable characteristics (primarily gender and age) and the second factor reflects driving records. Younger persons have a higher rating coefficient than older persons; men have a higher gender–age coefficient than women. See Table 1.

The claim coefficient comes from the conversion of cumulative claim point, which is the sum of no-claim point and claim point in the past three years. That is,

$$\text{Cumulative Claim Point} = \text{Non–claim Years Point} + \text{Claim Frequencies Point} \quad (3)$$

where “Non-claim Years Point” decreases 1 for each no claim year and “Claim Frequencies Point” increases 1 for each additional claim except for the first claim in a policy year. Multiplying the cumulative claim point by 0.2 provides the claim coefficient. All insurers share the same information about claim coefficients of the insured. Claim size plays no role in the rating formula.

Intuitively, the formula to calculate the claim coefficient appears to be complex. The insured customers are usually unable to clearly remember the claim frequency of the past three years. They might have difficulty realizing or be insensitive to how the claim number results in the changes in premium, creating a kind of information asymmetry. Therefore, some insurers may believe that they have an incentive to adopt the pricing strategy of not adjusting the claim coefficient regardless of whether claims are made or not, by believing such a strategy is highly profitable. Under this situation, the high-risk policyholders are better off but low-risk policyholders are worse off.

Customers who stay with the same insurer for many years tend to be low risk with fewer claims and insurers usually earn more profit from long term customers (Cohen, 2008). Thus, a pricing strategy by adjusting the claim coefficients systematically can serve as a competition tool for attracting new customers and discriminating against long term customers who might simply be persistent in the same insurance contract without switching. This study attempts to verify that some firms actually implement this pricing strategy—nice to new customers and nasty to repeat customers.

**Table 1**  
Gender–age coefficients.

| Age                      | Male | Female |
|--------------------------|------|--------|
| Under 20                 | 1.89 | 1.70   |
| 20 or above but under 25 | 1.74 | 1.57   |
| 25 or above but under 30 | 1.15 | 1.04   |
| 30 or above but under 60 | 1.00 | 0.90   |
| 60 or above but under 70 | 1.07 | 0.96   |
| 70 or above              | 1.07 | 0.96   |

Source: Automobile insurance rating standard. Taipei: non-life insurance association of the R.O.C. (2002).

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