

Deregulation, Pricing Strategies, and Claim behavior in Taiwan Automobile Insurance Market

Abstract

For a long time, the automobile insurance market in Taiwan lacked a competitive system because of rate regulations. After several waves of liberalization, all regulations seemed removed in April 2009 and insurance companies are free to set their own auto insurance premiums rates. This paper applies the data of automobile physical damage policies from Taiwan automobile insurance market to examine three hypotheses that we propose on market share, loading factor, and last policy month claims under deregulation. The quantitative analysis results show that rate liberation indeed makes insurance providers to lower their rates. The effects of deregulation for insurers are determined by not only whether or not to deduct premiums, their deduction percentages, but also policy kinds and the length of deregulation period.

Keywords: deregulation; market share; loading; pricing strategy; automobile insurance

JEL: G22, L11

I. Introduction

Over a long period of time, the Taiwan authority used to set up official premium rates for the major types of automobile insurance. After several waves of liberalization, all regulations seemed removed in April 2009 and insurance companies are free to set their own auto insurance premiums. This policy change has a great impact on the car insurance market and provides a chance for researchers to conduct experimental analyses. The research goals of our study are to evaluate the effects of rate liberalization from standpoints of both customers and insurance companies, to compare the differences before and after the rate liberalization in effect and furthermore, to analyze implications behind this policy.

The most common regulations for automobile insurance are on factors that influence policy pricing, as discussed in Pope and Ma (2005), or on the approval process, whether the administrations should be notified in advance or not (Ippolito, 1979; Barro, 1996), rather than to regulate the actual amount of insurance premiums itself. In addition, each country has different motives to take regulating measures. Take the U.S. for example, several states forbid insurance providers to take some risk factors, such as gender and marital status, into account when companies determine insurance rates. The related studies are more likely to show that regulations contribute to relatively lower premiums (Cummins, Phillips, and Tennyson, 2001; Jaffee and Russell, 2002). On the contrary, regulations in Europe tend to protect insurance companies; accordingly, insurance premiums there are relatively high (Finsinger and Schmid, 1994; Swiss Re, 1996). Alternatively, deregulation considerably lowers insurance premiums and rates in Japan (Pope and Ma 2005) and in Spain (Cummins and Rubio-Misas, 2006).

Before liberalization, Taiwan's case included all factors influencing insurance premiums, which was considered as one of the strictest regulation in the world. And for the first time, the rate liberalization took place in 2009 allow local insurance companies to compete with one another. The chain effects generated by deregulation provide valuable data and deserve careful researches.

From the angle of insurance providers, the direct impacts from deregulation are to set premium rates by themselves then to release information to the public. They have to decide immediately whether to join a price war against other insurance companies. When we compare premiums for a typical model car, the data indicate that premiums of comprehensive vehicle damage insurance (Form A) range from NTD 60177, as the highest, to NTD 37655, as the lowest, and the spread is up to 38

percent. Many factors are counted for the result above, including different insurance providers, distribution channels, risk classification standards, and commission rates, which will certainly reflect each company's preference of managing strategies and its operating philosophy. Accordingly, there is a shared problem for all insurance companies: whether their performances under diverse pricing policies would significantly differ from their previous ones under rate regulations. Before deregulation, when the same insurance premium applied to all providers, premium income and underwriting profit were direct indicators of operating efficiency. But after deregulation, the pricing competitions will definitely lead to a decline of their premium income; thus, how to keep underwriting insurance rates becomes more important.

For a long time, the automobile insurance market in Taiwan lacked a competitive system because of rate regulations. Many companies failed to establish their own underwriting databases, which they could rely on to set insurance rates responding to various risk factors; they simply earned profits by using premium and standard insurance contract set by the government. On the occasion of deregulation, each insurance provider must face market mechanism, evaluate the new competitive environment, and make its own pricing strategies. If the behavior of insurance companies under regulation has established and reached equilibrium, the analyses in this research examine possible changes of such equilibrium in Taiwan's car insurance market after rate liberalization. The immediate effects of deregulation identified here may benefit all — insurance providers, insureds, and the administrations. Moreover, our research may serve as mirrors and contribute to future financial policies and further researches.

II. Hypotheses and Methodology

The subjects of this research paper are insurers and individuals who hold automobile physical damage policies. Our goal is to examine possible economic phenomena after rate liberalization by testing the following three hypotheses.

Hypothesis 1: Under rate competition, the market share of each insurance company is inverse proportional to its premium rate.

After rate liberalization, the premium rates of each insurance provider are publicly announced on internet, so anyone can receive complete information of premium rates for representative car types and insurance coverages. Therefore, under the presumption that all car insurance policies are homogenous, we expect that customers would prefer policies with lower premiums. Based on publicly released insurance data of representative car types and particular coverages, we examine the effect of price deduction on market share.

Hypothesis 2: After rate liberalization, the loadings of vehicle damage insurance among providers would be shrinked.

The loading mentioned above equates to $(\text{average premium} / \text{average net premium}) - 1$. Average premium is the result that the total of premiums is divided by the number of policies, and average net premium is the result that the total of claim amount is divided by the number of policies. Li et al. (2010) argued that the previous loading rate in Taiwan under rate regulations was too high, and deregulation has provided a chance to examine their viewpoints. Before rate liberalization took place, a possible explanation of high loading rate was the relatively high commission rate; particularly when it was common in Taiwan that car dealers related agents were the major channels to provide automobile insurance for new cars. Around that time,

the commission rate might be up to 30 percent. After rate liberalization, the authority allows insurance providers to set rates for their policies yet forbid their commission rates to reach 18.4 percent. This new measure forces insurance companies to significantly lower commission expenses and thus premiums become less as well. If policy holders' driving behaviors do not change drastically and average policy claim conditions remain the same, the actual loading rate will definitely drop.

For hypothesis 2, we apply the methods used by Li et al. (2010) to examine its validity. We first calculate the actual loading rate according to policy year and policy types. Then we run regression comparing data in order to see whether there are significant differences before and after deregulation.

Hypothesis 3: After rate liberalization, both the frequency and the range of vehicle damage insurance claims filed in the last policy month will be lower.

The previous researches on the vehicle damage insurance in Taiwan (Wang et al., 2008; and Li et al., 2013) found that there is an inclination to file unnecessary claims which intensifies in the last policy month. Of various possible explanations, one is that customers tend to accumulate several small losses and file claims altogether before insurances mature, another possibility is that the sale representatives in Taiwanese insurance industry habitually induce their clients to file unnecessary claims, and the other reason is that policyholders intend to recoup a part of their paid insurance premiums. Nevertheless, our research expects the deregulation in effect will ameliorate such situation, so both the frequency and the range of claims filed before policies expire will be lower. We propose this hypothesis based on two reasons: first, because the current commission rate is about half of its initial rate,

insurance agents become less likely to induce their clients to file unnecessary claims. If insurance providers sell implicit policies under a premise that they acknowledge and approve of certain amounts of typical claim reasons like new paint, the shrinkage of collected premiums will discourage them to sell this kind of policies. Second, the motive of recouping a part of paid premiums disappears when policyholders pay less for car insurance.

To examine hypothesis 3, we use regression analyses to test the frequency of the last policy month claims with models that control other variables in order to investigate the effects of deregulation. In addition, we also implement unconditional and conditional difference in differences approaches to examine the effects of deregulation.

III. Empirical analysis

1. Dynamic adjustment of automobile insurance premium

In Taiwan, after the automobile insurance rate liberation in April 2009, each insurance company has to pay close attention to competitors' moves; on the other hand, insurers are responsible for selecting their own pricing strategies. To satisfy customers' needs of understanding insurance plans and rates offered by each insurance company, the Taiwanese authority regulates that insurance providers must publicly release premium information on the Taiwan Insurance Institute website. Therefore, interested drivers can compare the premium rates among insurance providers at any time. This regulation lowers the search cost for customers who are concerned with premium rates; to put it in another way, customers no longer need to visit each insurance company's website to collect information, and if they want to know basic premiums, all they have to do is to download a file from the TII website.

Such availability of premium information further intensifies the competition among insurance companies.

Based on our observations of the insurance market over the years after rate liberation, Table 1 illustrates the premium adjustments from 2009 to 2013. Panel A shows the condition of Form A policy. Within the first year after deregulation, six companies reduced their basic premiums immediately. In the following two years, seven providers, which constitute 50 percent of insurers, continuously lowered premiums from the previous year. But from 2010 to 2012, one or two providers raised their premiums. The longer the deregulation period becomes, the fewer insurance providers reduce rates each year. In 2013, only four companies lower their premiums. The pricing trend indicates that a lot of companies were searching for their positions at the beginning and most have reached their estimated balance point as they gradually knew rivals' pricing strategies. It is worth further attention that most providers' premiums stuck to the rate level before deregulation in 2009 but such insurers steadily decreased each year. In the year 2013, there are still three companies maintain the rates before deregulation. This fact suggests that the rates under regulation hold steady base, serve as valuable references to insurance companies, and justify their existence.

Panel B contains the pricing adjustment of Form B policy. When rate liberation took place, six companies lowered their premiums; however, for each year afterwards, few companies reduced premiums, usually less than three providers in a year. In addition, several (up to three) insurers raised premiums in particular years while most companies maintained their premiums. Until 2013, a total of seven insurers stick to the rate level before deregulation. The basic premium for Form B policy is only half of Form A policy, and its insurance plan includes comprehensive coverage which

makes it a better choice than Form C policy, a plan merely provides two-car collision coverage. As a result, Form B remains the main product of automobile insurance and also the most popular plan for most providers. This may explain why every insurance company adjusted premiums for Form B with caution.

Panel C demonstrates how the price adjustment strategy for Form C entirely differs from the previous two. Most insurance companies, thirteen out of fourteen, lowered premiums right after deregulation, and this premium reducing trend continued for three years. It is not until 2013 that the premium reduction has finally become steady. What requires our further attention is that since rate liberation, no one maintained the rates before deregulation. It suggests that the premium rate for Form C was too high under regulation, and each insurer competed to reduce premiums once the regulation ended. In previous research by Li et al. (2010), the authors analyzed the premium loading among Form A, B, and C and they found that the premium loading for Form C policy is much heavier than the other two, indicating high profits from selling Form C policies. A possible explanation is Form C's insurance coverage. Because it merely offers two-car collision coverage, there is lesser moral hazard. If the official rate of Form C was too high, there was an urgent need to lower premiums as soon as rate liberation was in effect. Moreover, the Taiwanese authority contributed to premium reduction after deregulation as well. In order to prevent extreme high premiums under collusion, the authority proposed two additional regulations: First, the loading of each kind of insurance policy cannot exceed thirty-five percent. Second, insurers need to review loss ratio each June. If an insurance product whose actual loss ratio minus assumed loss ratio is greater than fifteen percent on average in the last three calendar years, its insurance provider must readjust premium rates. These two extra rules force insurers with better loss ratios to

reduce their premiums when their profits become too high. Thus, except for mutual price competitions, the most possible explanation for premium reduction phenomenon is the result of loss ratio amelioration as a whole.¹

In the competition among insurance companies, they consider whether to take pricing reduction or not, and they also compare their reduction ranges. Table 2 shows the premium change range for each provider in Taiwan's insurance market after rate deregulation. In regard of the three forms, each company takes different pricing strategies. For example, five providers lower premiums for all three and six providers reduce two forms' premiums. As for the reduction range of Form A policy, the greatest reduction is up to 27.3 percent in the case of Firm I12 while Firm I9 merely reduces 5.5 percent and other four firms maintain same rates. We are curious about whether reduction range would impact on insurer's market share or performance. Does Firm I12, which greatly reduces its premiums, perform better than Firm I9, which slightly lowers premiums or Firm I4, which holds to original rates? There is a similar price reducing situation for Form B policy, and the biggest reduction range is up to 26.1 percent for an insurer (Firm I5) while most rivals keep their initial rates. The reduction range for Form C policy demonstrates extreme decreasing margins, for a total of ten insurers reduce their premiums more than 20 percent. Among all insurers, Firm I12 is a particular case, whose reduction ranges for all three policies exceed 20 percent. In other words, this insurance company obviously uses pricing as its major competing strategy. We will investigate the effects of premium reduction in the following section.

¹ Based on the interviews with actuaries from several insurers, it was confirmed that insurers have received pressure from authority to reduce base premium when loss ratios greatly improved (compared to assumed loss ratio).

2. Descriptive statistics

In order to examine the hypotheses above, this paper targets on all insurance companies which sell automobile insurance in Taiwan and compares the data before and after deregulation. The data come from Taiwan Insurance Institute, a semi-official institute, and those data registered between 2007 and 2013 allow us to establish the complete insuring information of six policy years tracing back (from 2007 to 2012). We further divide the data period into three phases: the first phase is before deregulation, from 2007 to 2009Q1; the second phase includes the first two years after deregulation, starting from 2009Q2 and ending with 2010, to estimate short term effects; the last phase is about 2011 and 2012, representing intermediate and long term effects. In regard to the basis of comparison for each index, we calculate market share according to collected premiums and loadings according to accumulated collected premiums and claim settlements.

Table 3 shows the descriptive statistics of panel data from 2007 to 2012. After deregulation, the average asset of insurance companies as a whole slightly increases while the auto insurance ratio in all insurance lines slightly decreases. It suggests that insurance providers expand their business beyond auto insurance, and the lowered business line Herfindahl index can be taken as the same explanation for the expanding trend. As for the three kinds of car insurance policies, the data of both Form A and Form C policies indicate that the longer the deregulation period becomes, the more of the insurers firms that reduce premiums; and the greater their deducting ranges expand while those of Form B reflect a relatively steady reduction phenomenon. Our analysis of loading factors shows more interesting results: those of all three policies rise immediately following the deregulation, showing temporary profit gains, yet after four years, those loading factors decrease. More classification is required in

order to judge whether it is from severe competition or the escalating claims from policyholders. About last month policy claim, only the data of Form C reveal a trend that claim ratio decreases along with the ongoing deregulation period as the rest two fluctuate over time.

3. Regression Analysis

In our regression analysis, we examine the major hypotheses. First, we take on the relationship between market share and premium rate (See Table 4). To make it simple, Table 4 only lists major explanatory variables related to deregulation and price deduction. All models include control variables as follows: Asset, Auto Insurance Line Ratio, Business Line Herfindahl Index, Financial Holding Company, Foreign Capital and Dealer Related Agent. By using panel data, the results show that all coefficients of 'price deduction' are not significant, regardless in short term or long term, implying that market shares are not improved for those insurers reducing insurance premium. For Form C policy, price deduction itself hardly influences each insurer's market share because all companies have reduced their premiums, and what really matters is the price deduction percentage. The outcome shows the greater a provider's price deduction percentage becomes, the lower market share it will be, implying that price deduction is not a good strategy to improve business development for Form C policy. What worth attention is that both price deduction and price deduction percentage have no effect on Form A and Form B policies at all.

Table 5 illustrates the regression analysis of our second hypothesis for loading and deregulation. The deregulating measure generates both positive and negative impacts on the loading of each policy, but none of them are significant. As for Form A policy, price deduction would significantly increase its loading factor; and the

loading factor for insurer who reduces more premiums would be higher. Because our calculating formula of loading includes premium revenues and lost costs, as the price deduction percentage expands, it would contribute to lower revenues of premiums and the loading factor descends. If lost costs also reduce at the same time, the loading factor might ascend. From the examination of third hypothesis in Table 6, we find that the last policy month claims of Form A policy are significantly decrease for insurers who reduce more premiums. This could be a reasonable explanation. Such phenomenon of how price deduction percentage provides positive impacts on loading can also be traced from Form B policy, in models of both two and four years after deregulation. Nevertheless, deregulation has no significant effect on loading of Form C policy, which is highly related with the regulation mentioned in the previous section that the authority regularly review providers' loss ratio. Since insurers must lower premiums when their loss ratio situation is improved, it is impossible for loading factor to ascend or change significantly.

We report the results about the third hypothesis in Table 6, which analyzing last policy month claims in panel data. It demonstrates that simply rate liberation ameliorates the last policy month claim situations in both Form A and Form C policies. In other words, this kind of claims occurs less often, and we can identify significant effects only on two occasions: Form A Policy after four years of deregulation (in Model 2) and Form C policy within two years of deregulation (in Model 5). The new measure also brings positive effects to Form B policy; to put it in another way, rate liberation would increase the ratio of customers filing claims before insurance expiration. Competitions for the shares of Form B policy differ from the competitions for the other two policies, for last policy month claims often correlate with the rivalry among dealer-related agents. Also, the greater the price

deduction percentage turns out to be, the less will the ratio for policies with last policy month claim become. (Two year effects in Models 2 and 4; Four year effects in Models 4 and 6.)

4. Difference-in-differences Analysis

The above regression analysis uses firm-level data to test how individual provider's pricing strategy will correlate with our three hypotheses. Because the panel data for this research also contain details of individual policy from all insurers, it is possible to further investigate hypothesis three from the view of policyholders. We use Difference-in-differences (DD) approach to evaluate the phenomenon of last policy month claims after deregulation. In regard of the three forms of policies, the insurers of Form A that keep the rate level before deregulation are too few, and for Form C, all insurance companies reduce premiums; thus, DD approach is appropriate for Form B policy only. Table 7 illustrates the results of unconditional DD analysis, in which we compare insurers deducting premiums versus those keeping initial rates, tracing the differences of last policy month claim percentages before and after deregulation without controlling other variables. Our results suggest that regardless of price deduction, the last policy month claim ratios for all insurers will decrease after deregulation. But when compared with providers who stick to initial rates, those who take price deduction strategy will enjoy a significant lowered last policy month claim ratio under deregulation.

In addition, we run a conditional DD analysis based on the model of Li et al (2013), whose results are shown in Table 8. To simplify, we omit the number of estimate coefficients and non-major explanatory variables. The results indicate that the relationship between the intermediate term of deregulation and price deduction is

significantly negative, same as the above analysis, suggesting that the last policy month claim would decrease for any provider who reduces premiums after deregulation. Other explanatory variables such as New car, Imported car, New policy, any previous claim, previous claim less than premium remain their significant influences either before or after deregulation. Only the variable Renew changes from significantly negative to significantly positive under deregulation, signifying that deregulation will increase last policy month claim of renewed policies as other conditions are unchanged. Since the relationships between renewed clients and insurance companies are better than new clients, the significant ratio of last policy month claim may infer tacit agreement; but this part requires further examinations.

In sum, the analyses above highlight several unique aspects of deregulation in Taiwan's automobile insurance market. First of all, under "deregulation" there are still rules setting up the ceiling ratio for loading and regular reviews of loss ratio to avoid insurance providers' collusion in overcharge and excessive profits. This additional regulation of a profit cap force all insurance providers selling Form C policy must reduce premiums as long as their realized loss ratio is far lower than assumed loss ratio. Maybe we can name this measure managed-deregulation, with continuous profit controls under rate liberation. It can be considered as a second-best choice for the Taiwanese insurance market at the stage still emerging.

Second, although there are three standard forms of auto insurance policies, the strategies that each provider takes for each policy are not necessarily the same. The profitability of each policy and the goals that insurers set for expanding their business determine their price strategies. In Taiwan's car insurance market, the major product is Form B policy, which provides comprehensive coverage excluding unknown peril but requires only half premiums of Form A policy; therefore, most customers would

purchase Form B policy. Based on the previous analysis illustrated in Table 2, we observe that least insurance companies reduce Form B's premiums under rate liberation, only six out of fourteen providers do so. It seems that pricing is not what insurance providers concern while facing the majority of their clients. As Israel (2005) argues, long-term consumer-firm relationship and consumer's tenure are indeed important for insurers. If insurers can earn policyholders' trust and identification through their services, the role that price plays in attracting clients will be less crucial.

Third, last policy month claim is a unique phenomenon in Taiwan's auto insurance market, and Li et al. (2013) investigate many possible reasons behind this. Among them, there are two reasons in which agent's commission plays an important role: one is simultaneous sales of cars and insurance plans at automobile dealers' showroom, and the other is the existence of dealer-related agents. After rate liberation, on the one hand, insurance providers face severe competition; on the other hand, the official allowance of commission has deducted from over 30 percent to around 18 percent, and these changes lower the commission that agents may obtain. The chain reaction to this is that there is less maneuverability for agents to manipulate in claims filing and it leads to fewer last policy month claims. We can tell from the results that regulation changes can reduce man-induced factors, and deregulation in Taiwan provides such a valuable case of insurance market among emerging markets.

IV. Concluding remarks

Deregulation of insurance market is a generally developing trend. In the case of Taiwan, its auto insurance market has adopted rate liberation since 2009. Each insurance company becomes free to set its premiums, which intensifies the

competition among insurance providers and brings out a great impact on insurance market. This impact resulted from policy change provides a chance to conduct experimental analyses, comparing and analyzing the various differences before and after deregulation. This paper applies the data of automobile physical damage policies to examine three hypotheses that we propose on market share, loading, and last policy month claims under deregulation.

The quantitative analysis results show that rate liberation indeed makes insurance providers to lower their rates. The goal of market liberation is to guarantee policyholders benefits from premium deduction. As for insurers, the effects of deregulation are determined by not only whether or not to deduct premiums, their deduction percentages, but also policy kinds and the length of deregulation period. For instance, because the authority regularly reviews providers' loss ratio, premium reduction cannot help Form C policy to raise its market share. Conversely, when its deduction percentage becomes too great, Form C policy's market share decreases. Similarly, the trends about ratios of last policy month claims differ among three types of policies. Overall, it is necessary to target on each policy's characteristics to analyze data in order to understand the effects resulted from deregulation. Since the competition intensity for each policy is different, deregulation in Taiwan has offered a free competitive setting for all insurers. Through rate competition, insurers in Taiwan must set their own rates, which is a required step for any emerging market to transform into a developed market.

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Table 1 Basic premium adjustment behavior after price deregulation

	Unit: number of insurers				
	2009	2010	2011	2012	2013
Panel A: Form A Policy					
Compared to the previous year					
Fixed	8	6	6	7	10
Increase	0	1	1	2	0
Decrease	6	7	7	5	4
Same as regulated price	8	6	5	3	3
Panel B: Form B Policy					
Compared to the previous year					
Fixed	8	10	10	11	12
Increase	0	1	3	3	0
Decrease	6	3	1	0	2
Same as regulated price	8	8	8	7	7
Panel C: Form C Policy					
Compared to the previous year					
Fixed	1	0	3	5	8
Increase	0	1	0	1	0
Decrease	13	12	11	8	6
Same as regulated price	1	0	0	0	0

Table 2 Premium reduction in 2009-2013

Insurer	Form A	Form B	Form C
I1	-17.10%	-18.00%	-27.70%
I2	-27.30%	0%	-32.70%
I3	-6.00%	-2.10%	-22.00%
I4	0%	0%	-8.30%
I5	0%	-26.10%	-28.70%
I6	0%	0%	-22.80%
I7	-5.80%	-1.70%	-13.10%
I8	-12.90%	0%	-21.20%
I9	-5.50%	0%	-12.50%
I10	-11.80%	0%	-24.00%
I11	-10.00%	0%	-23.00%
I12	-26.50%	-23.90%	-22.70%
I13	-13.60%	-12.20%	-29.80%
I14	0%	0%	-13.10%

Table 3 Descriptive statistics of panel data (2007-2012)

Variable	Before		After (2 years)		After (4 years)	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Asset (NTD million)	7.0896	0.3226	7.1697	0.2982	7.1835	0.2907
Auto Insurance Ratio	0.5109	0.1040	0.4977	0.0903	0.4983	0.0891
Business Line Herfindahl Index	0.3309	0.0842	0.3165	0.0664	0.3175	0.0669
Price Deduction_Form A			0.5000	0.5092	0.5893	0.4964
Price Deduction_Form B			0.5000	0.5092	0.5000	0.5045
Price Deduction_Form C			0.9643	0.1890	0.9821	0.1336
Price Deduction %_Form A			0.0381	0.0489	0.0608	0.0680
Price Deduction %_Form B			0.0575	0.0932	0.0551	0.0896
Price Deduction %_Form C			0.1159	0.0695	0.1537	0.0804
Loading Factor_Form A	1.8202	2.3785	2.6946	2.4669	1.3362	2.2507
Loading Factor_Form B	1.2363	1.8635	4.6937	11.2332	2.6246	8.1617
Loading Factor_Form C	3.8046	4.0727	4.9437	9.9279	2.8956	7.2067
Claim12_Form A	0.3685	0.1214	0.3376	0.1011	0.3593	0.1058
Claim12_Form B	0.5250	0.0581	0.5461	0.0867	0.5387	0.0815
Claim12_Form C	0.1967	0.0938	0.1529	0.0989	0.1464	0.1094
N	28		28		56	

Table 4 The effect of price competition on market share

Market Share:						
Two years after deregulation						
	Form A		Form B		Form C	
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Price Deduction	0.0066 (0.0088)		-0.0095 (0.0071)		-0.0034 (0.0022)	
Price Deduction %		-0.0179 (0.1079)		-0.0573 (0.0498)		-0.0459 *** (0.0139)
Model	random effect	random effect	random effect	random effect	random effect	fixed effect
R ²	0.15	0.14	0.35	0.33	0.55	0.99
Market Share:						
Four years after deregulation						
Price Deduction	0.0168 (0.0103)		-0.0085 (0.0078)		-0.0047 (0.0066)	
Price Deduction %		0.1071 (0.0829)		-0.0500 (0.0566)		-0.0906 *** (0.0429)
Model	fixed effect	fixed effect	random effect	random effect	random effect	fixed effect
R ²	0.87	0.87	0.21	0.19	0.25	0.85

Note: All models include control variables as follows: Asset, Auto Insurance Line Ratio, Business Line Herfindahl Index, Financial Holding Company, Foreign Capital, Dealer Related Agent.

Table 5 The effect of price competition on realized loading factor

Loading factor:						
Two years after deregulation						
	Form A		Form B		Form C	
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
After Pricing Deregulation	-0.6263 (0.7554)	0.5831 (1.3521)	4.5108 (3.2605)	2.8568 (3.0329)	6.5482 (8.1044)	5.7254 (6.5158)
Price Deduction	1.6244 * (0.8445)		3.5273 (3.5522)		-1.2792 (5.9775)	
Price Deduction %		14.3413 * (7.2952)		49.2478 ** (22.4512)		-3.3939 (21.7617)
Model	fixed effect	random effect	fixed effect	fixed effect	random effect	random effect
R ²	0.70	0.23	0.52	0.37	0.37	0.37

Loading factor:

Four years after deregulation

After Pricing Deregulation	-0.0859 (1.3371)	0.1158 (1.3352)	0.0335 (3.1079)	-0.7159 (2.9008)	0.2663 (6.2415)	0.1095 (2.6998)
Price Deduction	0.2521 (0.5701)		2.5718 (2.0089)		-1.2340 (6.2622)	
Price Deduction %		-1.4244 (4.3766)		36.9916 *** (11.7340)		-6.4303 (12.8345)
Model	random effect	random effect	random effect	random effect	random effect	random effect
R ²	0.10	0.09	0.14	0.23	0.09	0.11

Table 6 The effect of price competition on last policy month claim

Last policy month claim: Two years after deregulation						
Variable	Form A		Form B		Form C	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
After Pricing Deregulation	-0.0678 (0.0619)	-0.0760 (0.0646)	0.0376 * (0.0201)	0.0507 *** (0.0168)	-0.0877 * (0.0450)	-0.0277 (0.0210)
Price Deduction	-0.0382 (0.0337)		-0.0299 (0.0248)		0.0524 (0.0455)	
Price Deduction %		-0.6753 * (0.3830)		-0.4773 *** (0.1403)		-0.0872 (0.1452)
Model	random effect	random effect	random effect	random effect	random effect	random effect
R ²	0.37	0.41	0.35	0.50	0.37	0.35
Last policy month claim: Four years after deregulation						
After Pricing Deregulation	-0.0503 (0.0371)	-0.0657 * (0.0345)	0.0256 (0.0163)	0.0409 *** (0.0146)	-0.0656 (0.0663)	0.0128 (0.0255)
Price Deduction	-0.0350 (0.0390)		-0.0189 (0.0174)		0.0204 (0.0664)	
Price Deduction %		0.0441 (0.2879)		-0.4407 *** (0.0996)		-0.3990 *** (0.1262)
Model	fixed effect	fixed effect	random effect	random effect	random effect	random effect
R ²	0.41	0.41	0.29	0.00	0.19	0.26

Table 7 Unconditional difference-in-difference analysis of Form B policy

	Company with price deduction	Company without price change	Difference between groups	N
N	337,384	762,284		1,099,668
After deregulation	0.2464 (0.0010)	0.2997 (0.0007)	-0.0533 (0.4497)	608,490
Before deregulation	0.2963 (0.0012)	0.3134 (0.0008)	-0.0171 (0.4617)	491,178
Difference within groups	-0.0499 (0.4421)	-0.0136 (0.4607)	-0.0362 (0.0012)	

Table 8 Conditional difference-in-difference analysis of Form B policy

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Deregulation	-	+ ***	- ***	+ ***	- ***	- ***	+ ***	- ***
Price Deduction	- ***	- ***	- ***	- ***	- ***	- ***	- ***	- ***
Deregulation*Price Deduction		- ***						
New car			+ ***					
Deregulation*New car			+ ***					
Imported car				- ***				
Deregulation*Imported car				- ***				
New policy					+ *			
Deregulation*New policy					+ ***			
Renew						- **		
Deregulation*Renew						+ ***		
Any previous claim							- ***	
Deregulation*Any previous claim							- ***	
Previous claim less than premium								+
Deregulation*Previous claim less than premium								+ ***
Other controls	Age, Gender and Marital status of policyholder, Claim coefficient, Exhaust, Insurer, Region, Car Brand, and Policy year							
Log Likelihood	-597555.4	-597025.4	-597488.2	-597332.4	-597496.2	-597527.2	-597374.3	-597442.8
N = 1,099,668								