REPORT OF RESEARCH RESULTS

A. Title

The Loss Experience of Auto Physical Damage Insurance Sold Through Internet in Taiwan

B. Primary Researcher: Name, Affiliation, official position

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C. Summary: Include the outline and conclusions of the research

This study examines differences in claim frequency and claim severity between automobile physical damage insurance policies sold through digital insurance channels and those sold through traditional distribution channels. The empirical analysis focuses on Type B and Type C automobile physical damage insurance policies for privately owned passenger vehicles that became effective in 2022, and investigates their loss experience.

The data are obtained from the policy and claims databases for private passenger vehicle physical damage insurance maintained by the Taiwan Insurance Institute, while vehicle replacement values are sourced from the Non-Life Insurance Association.

Within a two-part model framework, generalized linear models (GLMs) are employed to separately analyze claim frequency and claim severity. The empirical results indicate that, after controlling for insurer fixed effects, claim frequency in digital insurance channels is lower than that in independent agent/broker channels, but does not differ significantly from that in exclusive agent channels. Regarding claim severity, policies sold through independent agent/broker channels exhibit significantly higher claim severity for Type C coverage compared with other channels, whereas no significant differences across channels are found for Type B coverage.

D. Aim of Research

Previous studies classify insurance distribution channels into independent agent/broker channels (Independent Distribution System) and exclusive agent channels (Exclusive Distribution System). The former sell products from multiple insurers and retain ownership of customer lists, whereas the latter represent only a single insurer and do not own customer lists. A substantial body of literature (e.g., Joskow, 1973; Cummins and VanDerhei, 1979; Barrese and Nelson, 1992) finds that insurers operating through independent agent/broker channels exhibit higher expense ratios. This naturally raises the question of why independent agent/broker channels can coexist in the market with lower-cost exclusive channels.

Prior research has proposed several hypotheses to explain the continued survival of independent agent/broker channels, one of which is the Product Quality Hypothesis. This hypothesis argues that independent agent/broker channels can reduce insurers' agency costs (Kim, Mayers, and Smith, 1996) and provide superior services that compensate for their higher expenses. Such services include collecting detailed information on policyholders. Because independent agents and brokers can sell products from multiple insurers, they can use this information to more efficiently match insurers with consumers. As a result, independent agent/broker channels have a distinct advantage in more complex insurance products. Insurers further encourage information collection by paying contingent commissions, which link commissions to loss performance (Regan and Tennyson, 1996). Empirical evidence also shows that business generated through independent agent/broker channels is associated with lower complaint rates (Barrese, Doerpinghaus, and Nelson, 1995) and lower loss ratios (Barrese and Nelson, 1992; Berger, Cummins, and Weiss, 1997). Nevertheless, in insurance lines characterized by abundant statistical data and highly standardized coverage, exclusive agent channels continue to hold a competitive advantage (Barrese, Doerpinghaus, and Nelson, 1995).

With advances in technology, insurers have developed digital insurance distribution channels. Although digital channels share certain similarities with exclusive agent channels (see Regan, 1996), the practice of selling insurance online differs markedly from other channels in several respects. First, their cost structure differs. Establishing a digital channel requires substantial upfront investments in infrastructure, including system development and cybersecurity maintenance. However, aside from these higher fixed costs, digital channels do not pay commissions and issue electronic policies, resulting in lower variable costs. Second, digital channels tend to attract consumers with higher digital

literacy, who may purchase insurance online for convenience or speed. Moreover, under Item 4 of the *Guidelines for Insurance Enterprises Conducting Electronic Commerce*, insurers are required to reflect cost savings from online sales in policy charges; consequently, digitally savvy consumers may also choose online channels to obtain lower premiums. Finally, a key distinguishing feature of digital channels is the absence of intermediaries: there are no agents providing product explanations, no frontline underwriting, and, naturally, no claims services delivered through sales personnel.

E. Method of Research & Progression

Insurers have actively invested in the development of digital insurance distribution channels, whose potential may be substantial. Because this new channel may attract a different clientele and is not subject to the agency problems associated with insurance sales representatives, this study examines whether policies for Type B and Type C automobile physical damage insurance purchased through digital channels differ in claim frequency and claim severity from those sold through independent agent/broker and exclusive agent channels.

Within a two-part model framework, this study employs generalized linear models (GLMs) to separately analyze claim frequency and claim severity. The empirical analysis focuses on Type B and Type C automobile physical damage insurance policies for privately owned passenger vehicles that became effective in 2022, and examines their loss experience. The data are drawn from the policy and claims databases for private passenger vehicle physical damage insurance maintained by the Taiwan Insurance Institute, while vehicle replacement values are obtained from the Non-Life Insurance Association. After excluding policies with incomplete information, the final sample consists of 442,026 Type B policies and 980,062 Type C policies.

F. Results of Research

The empirical results show that for high-coverage products (Type B), when insurer effects are not controlled for, claim frequency in digital channels is significantly lower than in other channels, consistent with the findings of Murphy, Xu, and Xu (2024). Even after controlling for insurer effects, claim frequency in digital channels remains lower, although the difference relative to

exclusive agent channels is not statistically significant.

For low-coverage products (Type C), when insurer effects are not controlled for, claim frequency in digital channels does not differ significantly from that in other channels. However, after controlling for insurer effects, claim frequency in digital channels does not differ significantly from that in independent agent/broker channels, while both are higher than that in exclusive agent channels. These results suggest that insurers exhibit more effective risk selection for high-coverage products sold through digital channels. In other words, insurer-specific underwriting standards influence claim frequency across distribution channels.

With respect to claim severity, which may be more heavily influenced by random factors, differences across channels are generally not statistically significant. However, for Type C coverage, claim severity is significantly higher in the independent agent/broker channel than in other channels. This finding provides evidence of claims intervention by independent agents/brokers, and is also consistent with the arguments advanced by Murphy, Xu, and Xu (2024).

G. Future Areas to Take Note of, and Going Forward

Because vehicle owners can choose between high-coverage and low-coverage automobile physical damage insurance, the decision is subject to self-selection at the outset, followed by the choice of distribution channel. In other words, policyholders' risk characteristics are already revealed at the product selection stage. Consequently, self-selection with respect to coverage level may affect the estimated impact of distribution channels on losses, particularly for digital insurance channels, which operate without sales agents' intervention or persuasion.

In theory, this issue can be addressed using a two-stage endogenous switching model (Heckman, 1979). In the first stage, a Probit model is employed to estimate the determinants of choosing high- versus low-coverage products. In the second stage, a censored model is estimated to examine the effects of distribution channels on claim frequency and claim severity. In addition to controlling for factors that affect expected losses, the model also incorporates the Inverse Mills Ratio computed from the first stage.

However, implementing a two-stage endogenous switching model raises two important econometric issues. First, the first-stage model requires at least one variable that affects coverage choice but does not directly affect expected

loss amounts. Second, because the second-stage model is nonlinear, bootstrapping is required to compute marginal effects and their statistical significance.

H.   Means of Official Announcement of Research Results

This study is intended for submission to an academic journal.