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Life Insurance Consumer Behavior and Reclassification Risk: An Empirical Study of Surrender and Lapse Decisions

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PURPOSE OF THE STUDY

Life insurance underwriting assesses applicants' risk profiles and determines their eligibility for coverage. Taiwan's regulations allow lapsed policy reinstatement within six months without new underwriting, favoring policyholders, especially those with deteriorating health, avoid reclassification risk. In contrast, surrender requires full contract termination and re-exposure to underwriting. Retaining high-risk policies leads to adverse selection, concentrating risk among insurers and impacting financial stability.

The purpose of this study is to enhance that understanding by analyzing policyholder behavior under reclassification risk, introducing variables related to medical examinations and occupational risk. Specifically, it aims to test the Reclassification Risk Hypothesis (Hwang, Chan, & Tsai, 2022; hereafter RRH), which posits that high-risk policyholders tend to retain their policies but, if they choose to terminate, are more likely to lapse rather than surrender.

SUMMARY OF THE EMPIRICAL RESULTS

To test the RRH and further explore policyholder behavior under reclassification risk, **this study examines early surrender and lapse behavior** using policy-level data from a Taiwanese insurer, employing a multinomial logistic regression model. The findings provide partial empirical support for the RRH. In addition, the analysis reveals the differential effects of other factors—including medical examinations, occupational risk, product type, sales channels, premium features, gender, and age—on early surrender and lapse decisions.

CONTRIBUTIONS

This study is the first empirical study to incorporate medical examination variables and to separately model surrender and lapse behaviors in testing RRH in Taiwan's life insurance market. The results provide new evidence of adverse selection and highlight the importance of differentiated modeling for improved risk management, product design, and customer retention.

METHOD-1

Data

This study examines policy-level data from a mid-sized Taiwan's life insurer, which ranked 10th in asset size with USD 13.5 billion by 2013. The dataset consists of 267,700 individual life insurance policies issued by the insurer between January 1, 2000, and December 31, 2015. These policies were analyzed based on their status as of December 2017, classified into active policies, surrendered policies, and lapsed policies.

Four Models

Model 1 analyzes all three types of insurance products collectively, while Model 2 to Model 4 examine each product type separately: Term Life Insurance (TL), Whole Life Insurance (WL), and Whole Life with Survival Benefits (WLSB).

Methodology

This study applies a multinomial logistic regression model to separately examine the determinants of surrender and lapse decisions.

$$f(k, i) = \beta_{0,k} + \beta_{1,k}x_{1,i} + \beta_{2,k}x_{2,i} + \dots + \beta_{m,k}x_{m,i}$$

$$f(1, i) = \ln \left(\frac{\Pr(Y_i = \text{Surrender} | x_{1,i}, x_{2,i}, \dots, x_{m,i})}{\Pr(Y_i = \text{Active} | x_{1,i}, x_{2,i}, \dots, x_{m,i})} \right)$$

$$f(2, i) = \ln \left(\frac{\Pr(Y_i = \text{Lapse} | x_{1,i}, x_{2,i}, \dots, x_{m,i})}{\Pr(Y_i = \text{Active} | x_{1,i}, x_{2,i}, \dots, x_{m,i})} \right)$$

Where $\beta_{m,k}$ represents the regression coefficient for the m-th independent variable relative to the k-th outcome. $x_{m,i}$ denotes the m-th independent variable for the i-th observation.

METHOD-2

Three Product Types

To eliminate differences in insurance risk, this study examines the impact of reclassification risk on policyholder decisions regarding surrender and lapse across three types of life insurance products. These products provide the same insured event for death or total disability resulting from illness or accidents, with the insurance contract terminating upon the insurer's payment of benefits.

The key distinction lies in coverage duration and survival benefits, where **TL** offers temporary protection with no survival benefits, **WL** provides lifelong coverage without survival benefits, and **WLSB** includes lifetime protection with periodic payouts.

The proportion of nonforfeiture value relative to the insured amount varies among these products, ranked in ascending order as $TL < WL < WLSB$.

Dependent Variables

The dependent variable is early voluntary termination (surrender or lapse) within 27 months which follows Taiwan life insurers' practice for notification and premium reminder process. The independent variables listed in next page.

Independent Variables

Variable	Definition & Condition	Variable	Definition & Condition
Hth_Chk	The insured has completed a medical exam for underwriting	Mod_M	The premium is paid monthly.
Occu	The insured is classified as having a high-risk occupation.	Female	The policyholder is female.
CHNL_Excl	The policy sold through exclusive sales channel.	Prem_Disc	The premium includes a discount.
CHNL_Indep	The policy sold through independent sales channel.	Prem_App	The premium is paid manually.
CHNL_Bank	The policy sold through bank channel.	Ln_Prem	Natural logarithm of annualized premium (continuous variable)
Mod_SP	The policy is paid by a single premium.	IssAg	Insured's age at policy issuance (continuous variable)
Mod_A	The premium is paid annually.	IssAg_Sq/100	Square of IssAg divided by 100 (continuous variable)
Mod_S	The premium is paid semi-annually.	Iss_Yr	Year when the policy is issued
Mod_Q	The premium is paid quarterly.		

Note: Unless otherwise specified, all variables are binary dummy variables (coded as 1 if the stated condition is met, and 0 otherwise).

DESCRIPTIVE STATISTICS (Condensed)

Product type	TL	WL	WLSB	Total
Number of policies / status	19,431	57,172	191,097	267,700
Surrendered	1,245	4,136	22,816	28,197
<i>Surrender rate</i>	<i>6.4%</i>	<i>7.2%</i>	<i>11.9%</i>	<i>10.5%</i>
Lapsed	1,943	14,198	29,296	45,437
<i>Lapse rate</i>	<i>10.0%</i>	<i>24.8%</i>	<i>15.3%</i>	<i>17.0%</i>

- Early lapse rates surpass surrender rates across all life insurance products.
- Early Surrender Rate Comparison: TL < WL < WLSB
- Early Lapse Rate Comparison: TL < WLSB < WL

Results: Model 1 (Aggregate) - 1

Product	Model 1:	Aggregate	
Indep. Variable#	Surrender	Lapse	Significance Level
PD_WL	0.3854***	0.5606***	**
PD_WLSB	0.7114***	0.1056*	***
Hth_Chk	-0.2982*	0.1543	**
Occu	-0.1435***	-0.3374***	***
CHNL_Indep	-0.041	-0.0475*	
CHNL_Bank	-0.6746***	-2.7162***	***
Female	-0.2607***	-0.4741***	***
IssAg	0.0723***	0.0844***	***
IssAg_Sq/100	-0.1149***	-0.1384***	***

- 1. Medical Examination (Hth_Chk=1):** Medical exam reduces surrender but not lapse, suggesting policyholders may prefer lapse to avoid re-underwriting. *Partial support for RRH*, but limited by small sample size (1%).
- 2. High-Risk Occupation (Occu=1):** High-risk occupations reduce termination overall, *aligning with RRH*. However, surrender is preferred over lapse, contradicting RRH—possibly due to urgent cash needs, consistent with the Emergency Fund Hypothesis (Dar & Dodds, 1989; hereafter EMH).
- 3. Sales Channels:** Independent agents reduce lapse rates; bancassurance lowers both surrender and lapse; *consistent with Product Quality Hypothesis* (Anderson et al., 1998; Trigo-Gamarra, 2008; hereafter PQH).
- 4. Female:** Females less likely to terminate, supporting risk aversion. But when terminating, they prefer surrender—partially contradicting theory, possibly due to income uncertainty.
- 5. Age:** Nonlinear decrease in early terminations as age increases, *consistent with prior literature*

Note: · : Significant at 0.1 level; *: significant at 0.05 level; **: significant at 0.01 level; ***: significant at 0.001 level. Significance of the differences between surrender and lapse estimates is assessed via the Wald test.

#: Reference group of sales channel is CHNL_Excl.

Results: Model 1 (Aggregate) - 2

Product	Model 1:	Aggregate	
Indep. Variable#	Surrender	Lapse	Significance Level
Mod_SP	0.571***		
Mod_S	0.0445	0.5868***	***
Mod_Q	0.1431***	1.0765***	***
Mod_M	0.6685***	1.3659***	***
Prem_Disc	-0.581***	-1.1451***	***
Prem_App	0.9301***	1.1629***	***
Ln_Prem	0.0764***	-0.1131***	***

Reference group of premium frequency is Mod_A.

6. **Premium Payment Frequency:** Higher frequency increases voluntary terminations, *consistent with prior literature*.
7. **Premium Discount (Prem_Disc=1) :** Discounts reduce termination rates, maybe due to *the consumer psychology (Sunk Cost Effect)*.
8. **Manual Payment (Prem_App=1) :** Manual payment increases terminations. Lapses surpass surrender due to neglect.
9. **Annualized Premium:** Compared to lapse, higher premiums increase surrender likelihood for immediate cash value, *satisfies the EMH*.
10. **Surrender vs. Lapse Distinction:** Significant coefficient differences, supporting the necessity of separate modeling and analysis to avoid from misinterpreting results, *consistent with the study results of Hwang, Chan, and Tsai (2022)* .

Results: Model 2 to Model 4 (by Product)

- Test RRH -

Product	Model 2:	PD_TL		Model 3:	PD_WL		Model 4:	PD_WLSB	
Indep. Variable	Surrender	Lapse	Significance Level	Surrender	Lapse	Significance Level	Surrender	Lapse	Significance Level
Hth_Chk	-0.2744	0.8973***	**	-0.2655	-0.1645		-0.3639.	-0.5872*	
Occu	-0.1503*	-0.000004		-0.6463***	-0.7451***		-0.1294***	-0.3589***	***

•Medical Examination:

- ✓ TL : Significant for favoring lapse with a positive coefficient; partially support RRH.
- ✓ WL : Not significant for both lapse and surrender; no support RRH.
- ✓ WLSB : Significant for lapse and marginally significant for surrender but no significant difference; partially support RRH.

•Occupational Risk:

- ✓ TL : Significant for surrender but not lapse; partially support RRH.
- ✓ WL : Significant for both lapse and surrender but favoring surrender over lapse; partially support RRH.
- ✓ WLSB : The results are same as WL.

Results: Model 2 to Model 4 (by Product)

- Test PQH -

Product Independent Variable#	Model 2: PD_TL			Model 3: PD_WL			Model 4: PD_WLSB		
	Surrender	Lapse	Significance Level	Surrender	Lapse	Significance Level	Surrender	Lapse	Significance Level
CHNL_Indep	-0.0732	0.3613***	**	0.0501	0.0835*		-0.0063	-0.2338***	***
CHNL_Bank	0.6865**	0.7597		-0.0055	-2.053***	***	-1.306***	-2.7569***	***

#: Reference group of sales channel is CHNL_Excl.

•Sales Channel:

- ✓ Bancassurance lowers both termination types, especially for WLSB. PQH supported only in WLSB, not in TL or WL.
- ✓ This pattern aligns with PQH, especially for saving products, as bancassurance emphasizes financial management and client loyalty.

Results: Model 2 to Model 4 (by Product)

- Individual Characteristics of the Insured -

Product	Model 2: PD_TL			Model 3: PD_WL			Model 4: PD_WLSB		
	Surrender	Lapse	Significance Level	Surrender	Lapse	Significance Level	Surrender	Lapse	Significance Level
Female	-0.1672*	-0.4764***	**	-0.469***	-0.5627***	*	-0.1962***	-0.4424***	***
IssAg	-0.027	0.0133	.	0.0972***	0.0881***	.	0.0675***	0.0929***	***
IssAg_Sq/100	0.0493*	-0.0527*	***	-0.168***	-0.1412***	**	-0.104***	-0.1568***	***

•Female:

✓ The results are consistent with Model 1 for all product.

•Age:

✓ All age-related coefficients are significant across products, except for TL.

✓ For surrender in TL, the quadratic term indicates a nonlinear increasing relationship. This may reflect that older insureds are more likely to surrender term life policies as the demand for pure protection-oriented products declines with age and the corresponding increase in wealth.

Results: Model 2 to Model 4 (by Product) - Premium Characteristics-

Product Independent Variable#	Model 2: PD_TL			Model 3: PD_WL			Model 4: PD_WLSB		
	Surrender	Lapse	Significance Level	Surrender	Lapse	Significance Level	Surrender	Lapse	Significance Level
Mod_SP	-1.7365***								
Mod_S	0.3175	0.4714**		-0.3425***	-0.054	**	0.1347**	0.9181***	***
Mod_Q	0.2127	0.9664***	**	0.0029	0.5102***	***	0.1543***	1.3243***	***
Mod_M	1.7216***	0.8981***	***	0.6755***	0.6179***		0.5483***	1.5287***	***
Prem_Disc	-0.0528	-0.3517***	*	-0.7091***	-1.0773***	***	-0.5781***	-1.2534***	***
Prem_App	3.4677***	1.3588***	***	1.1631***	1.7484***	***	0.8046***	0.9863***	***
Ln_Prem	0.023	-0.1234**	**	0.3167***	0.0978***	***	-0.0602***	-0.2712***	***

Reference group of premium frequency is Mod_A.

- **Premium Payment Frequency:** Higher payment frequency increases termination rates as Model 1.
- **Premium Discounts:** Premium discount variables yield consistent results across all three insurance products, showing that policies with discounts have lower voluntary termination rates as Model 1.
- **Premium Approach:** Manual payment (Prem_App=1) increases termination rates across all products as Model 1.
- **Annualized Premium :** Higher premiums increase surrender likelihood across all products, consistent with Model 1.

CONCLUSION

This study reaffirms that early surrender and lapse behaviors among life insurance policyholders should be analyzed separately, as the decision-making logic and influencing factors differ significantly. Aggregating both behaviors in a single model may lead to underestimations of profitability for certain insurance products or misinterpretations of marketing and policy retention strategies.

The Reclassification Risk Hypothesis is partially supported by medical exam variable. However, occupational risk does not follow a consistent trend, likely due to Taiwan's occupational classification focusing on accident risk rather than overall health risks. Sales channels significantly impact policy retention. Bancassurance and independent agents reduce voluntary terminations compared to exclusive agents. Among females who voluntarily terminate, they are more likely to surrender rather than, deviating from conventional risk aversion theories. Age effects follow a nonlinear pattern, indicating life cycle influences termination behavior. Higher payment frequency, without premium discount, and manual payment methods increase termination rates.

Limitations include a small sample of policies requiring medical examinations, restricting broader analysis. Future research should incorporate more health-related variables.

APPENDIX: TERMINOLOGIES OF LIFE INSURANCE

Insurer & Policyholder

They are contract parties of an insurance contract. Policyholder is the consumer of insurance.

The insured is the subject of insurance in a life insurance contract. The policyholder must have an insurable interest in the insured.

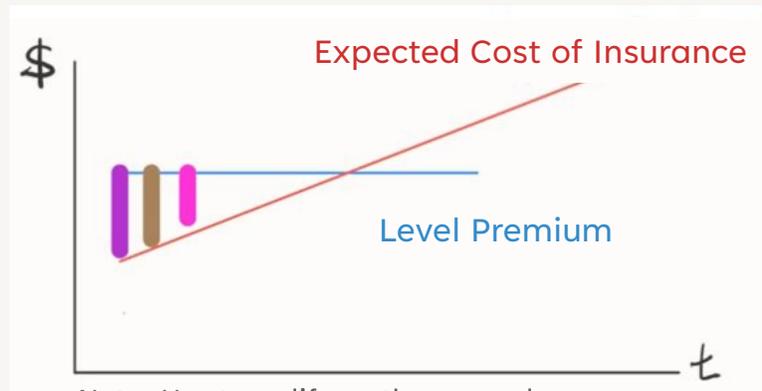
Surrender and Lapse

Surrender happens when a policyholder cancels their policy to receive its cash surrender value immediately.

Lapse happens when they stop paying premiums, leading to suspension and possible invalidation. Insurers need to pay policy value back to policyholder 2 years after suspension.

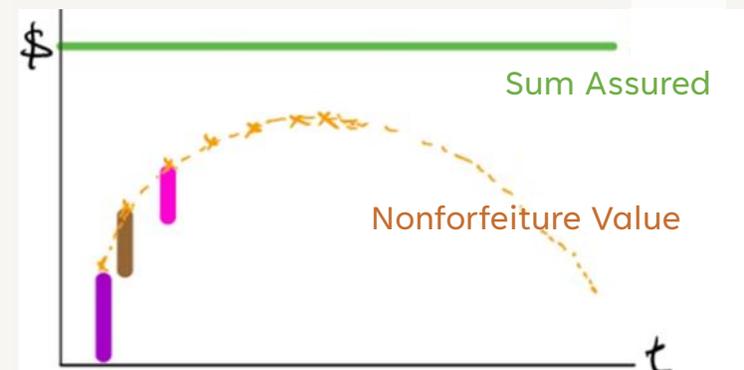
Together, surrender and lapse are categorized as “voluntary terminations” together.

Level Premium



Note: Use term life as the example.

Nonforfeiture Value



Note: Use term life as the example.



THANK YOU (Q/A)

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