

The Influence of Liberalization on Innovation, Performance, and Competition Level of Insurance Industry in Indonesia

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Abstract: This study aims to reveal the impact of liberalization on innovation, performance, and the level of competition for insurance industry players in Indonesia based on insurance data from 2006 to 2018. The research method used is quantitative with the support of panel data. The analysis technique to explain the findings uses an aggregate model and Threshold regression analysis. Descriptive and econometric research types chose to make it easier to explain the findings. From the results of data analysis using three experimental models, it shows three findings. First, in the aggregate, there is a significant negative relationship between liberalization and innovation. In the Threshold regression model, a negative impact occurs on companies with low premium income. Whereas in high premium income companies, the result is positive. Due to the availability of resources to large companies to optimize the adaptation of liberalization in terms of innovation. Second, the higher the liberalization can encourage insurance companies to perform more efficiently and increase net premium income. Third, the negative impact of liberalization on competition shows that the higher the deregulation, the lower the game. These findings indicate that in the aggregate, global insurance financial liberalization has had a significant impact on the development of the insurance industry sector in Indonesia. However, liberalization can be different for groups of small companies and groups of large companies. The expected implication is that the government needs to adopt a long-term policy strategy that can encourage the sustainability of insurance companies, both high-income companies and low-premium-income companies. Besides, it is hope that insurance companies pay more attention to innovation, significantly improving the quality of human resources as a competitive advantage in facing global competition.

Keywords: Competition; Innovation; Insurance; Liberalization; Performance

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1. Introduction

In terms of capital provisions, the Indonesian insurance industry is quite open to foreign investors. Based on the requirements of Government Regulation Number 14 of 2018 concerning Foreign Ownership in Insurance Companies. Which was later amended by Government Regulation Number 3 of 2020 regarding Amendments to Government Regulation Number 14 of 2018 relating to Foreign Ownership in Insurance Companies, the maximum limit of ownership of insurance companies by foreign parties is up to 80% of the paid-up capital. Also, this provision is exempt for public companies and insurance companies, which, at the time of stipulation, are owned by foreign parties with an ownership percentage of more than 80%. These provisions are still more lenient than similar conditions in other ASEAN countries such as Thailand and Malaysia. In this case, the two countries set the maximum foreign ownership requirement of 25% and 70%, respectively [1].

Insurance services have a central role in modern society. The empirical evaluation of competition among insurance companies also improved after deregulation [2]. After liberalization, the amount of insurance in the market began to increase, which led to a significant decrease in market concentration [3]. At the ideal level, liberalization adaptation can have a positive impact on the development of the insurance industry in a country [4],[5],[6],[7],[8]. The impact of liberalization is initially U-shaped during contraction and is linear, but in the second period, it seems that liberalization is superior to before it implemented [9].

Liberalization can provide benefits in supporting the special skills needed to encourage competency improvement of the insurance industry players whose development is still at an early stage [2]. The findings differ from previous studies, which revealed that financial liberalization has an inverse impact on the performance of insurance companies. The existence of liberalization has encouraged most insurance companies consisting of 1,324 companies registered with The Organization for Economic Co-operation and Development (OECD), to take more risks to survive [10]. The negative impact of liberalization is due to ineffective and inefficient ways of developing and government policies in the insurance sector [11]. The liberalization of policies in the insurance industry has increased the risk of using funds. And this is a significant difficulty facing the insurance industry [12].

In the insurance industry, board composition has a positive relationship with the overall risk-taking of a company [13]. Besides this, specific expertise support can obtain through the assignment of foreign workers with qualifications in actuarial and insurance management, which is possible due to foreign company owners who are more experienced in managing insurance companies in a relatively mature market [14]. Also, foreign participation can provide much-needed capital support for industry players to explore market potentials that have not optimal exploited.

Through technical support and capital capacity, liberalization expects to have a positive impact in the form of opportunities for innovation in the use of information technology aimed at increasing the effectiveness and efficiency of the insurance company's business processes. [7]. One example of innovation in information technology includes online marketing of insurance products, for example, by utilizing e-commerce platforms. Also, information technology can be used by insurance companies to provide convenience for consumers in the underwriting process and increase the speed of the claim process.

Meanwhile, from a customer perspective, liberalization can also provide benefits in developing a more competitive insurance market. The increase in the intensity of competition among insurance industry players expects a stimulus to increase the availability of quality insurance services to customers at affordable premium rates. Society wants an insurance liberalization that leads to continuous innovation and improvement [15].

However, the positive impact of liberalization on the development of the insurance industry in Indonesia is still not optimal. Insurance is currently not considered an essential

indicator of a market economy, a source of investment, and economic stability required for its development[11]. There are indications that the level of liberalization of the insurance industry in Indonesia is not directly proportional to the performance of the sector, especially when compared to other countries, especially in the ASEAN region. As an illustration, the estimated value of Indonesia's insurance premiums in 2018, amounting to USD 20,383 million, is still behind when compared to the estimated premium value of Thailand in the same period, which is USD. Twenty-six thousand six hundred twenty-two million (Swiss Re Institute, 2019)[16]. If the stakeholders do not respond wisely and with the right strategy, liberalization becomes a challenge for stakeholders [6].

The main challenge for the insurance industry is increasing market competition [17]. Apart from that, Indonesia is still lagging behind the two countries regarding density and insurance penetration. Based on Swiss Re data, Indonesia's insurance density is ranked 72 (seventy-two) globally with a value of USD. Seventy-six per capita, while Malaysia and Thailand were respectively ranked 39 (thirty-nine) and 47 (forty-seven), with a much higher density value of USD. 518 and USD. 385. When viewed based on insurance penetration indicators, Indonesia also lags behind the two countries and even ranks lower than Vietnam[16].

It is related to the Generalized System Preferences Review (GSP Review) process, the impact of the negotiation process with the United States and the United Kingdom. Indonesia is faced with a difficult choice to implement a broader liberalization of international trade by imposing relaxation on mandatory arrangements. The minimum limit of self-retention and placement of domestic reinsurance has been enacted for domestic insurance companies. Thus, the future policy direction will open up more expansive space for domestic insurance companies in terms of managing their risks and in terms of organizing reinsurance transactions with reinsurance partners abroad.

Indonesia to continue to liberalize the insurance industry sector. Financial Services Authority (OJK) and the insurance industry players in Indonesia need to formulate a regulatory framework and business management strategy that can optimize the benefits of this liberalization trend. And at the same time, anticipate potential negative impacts due to the liberalization of the insurance industry on domestic industry players and the national economy.

Previous research analyzed the impact of liberalization through indicators of the marketing mix, service quality, and insurance awareness [8]. Other findings were made to see the development of the insurance market and the liberalization of the financial system on bank performance [18],[19],[20]. Financial liberalization has resulted in the fragility of the banking sector with a strong institutional environment [21]. Most of the research on insurance liberalization has carried out in India [22],[23],[24]. For example, in the analysis of the performance of insurance companies during the liberalization period in India [25]. Research on the impact of liberalization is also in Korea, Bangladesh, Nepal, the Philippines, Taiwan, Malaysia, and Thailand [26],[27]. Liberalization and capacity building for insurance services in Africa, excluding South Africa, was found to have the lowest regional insurance penetration in the world [28]. Few literature reviews examine the impact of insurance liberalization in Indonesia. Unlike previous studies, the main objective of this study is to determine the effect of liberalization using a research model consisting of innovation, performance, and competition that focuses on the following: 1) Innovation in the use of information technology in the fields of sales, staffing, and education. carried out by insurance companies; 2) Performance of insurance companies; 3) the intensity of the performance of the insurance company, and 4) produce recommendations and/or business management strategies that can optimize the use of liberalization to encourage industrial growth in Indonesia.

2. Materials and Methods

Quantitatif Méthode: This research was conducted using quantitative research methods. The analysis strategy used to answer the problem formulation is descriptive and econometric analysis. Threshold Autoregressive (TAR) analysis uses time-series data with the support of panel data from all insurance companies in Indonesia. Threshold Autoregressive (TAR) aims to deepen the study for various regimes for certain economic variables using the dummy method [29]. In conducting the panel data estimation method, the rule of thumb method used [30]. Regression analysis uses to identify the relationship between insurance liberalization and innovation. In the form of technology use in the insurance company process, insurance company performance, and the level of competition in the insurance industry sector on liberalization. The proposed econometric model is an innovation model influenced by liberalization. And the internal variables of Insurance (IntInsVar) and macroeconomic variables (MacVar) as control variables. The insurance financial liberalization index represents the liberalization variable. The methods and experiments in modeling are as follows:

Model I: Innovation

$$Innovation_{jt} = f(\text{liberalization}_{jt}, \text{IntInsVar1}_t, \text{MacVar1}_{it})$$

Model II: Competition

$$Comp_{it} = f(\text{liberalization}_{it}, \text{IntInsVar2}_{it}, \text{MacVar2}_{it})$$

Model III: Performance

$$Performance_{it} = f(\text{liberalization}_{it}, \text{IntInsVar3}_{it}, \text{MacVar3}_{it})$$

*Variable IntInsVar_t consists of sales innovation, worker innovation, and educational innovation.

a. Variable MacVar_t consists of:

- 1) Variable INF_t Wear the price of goods as measured by changes in the consumer index that can reflect changes in the prices of goods and services from people's needs, which uses as parameters for changes in economic activity.
- 2) Variable $gPDB_t$ (Gross Domestic Product growth) is the increase in the amount of added value generated by all business units in a particular country, or is the total value of final goods and services produced by all economic companies used as a parameter of changes in economic activity.
- 3) Variable Credit interest rates (SB_t) Are a policy interest rate that reflects the monetary policy stance or stance set by Bank Indonesia. Which uses as a parameter that leads to volatility in money market interest rates. Which then leads to changes in premiums. Especially for tips.

b. Variable Lib_t is the Liberalization Insurance index measure liberalization (ILI).

Literature Search: This research is supported by survey activities that aim to obtain an overview of the extent to which insurance companies use technology to support their business processes.

Research data: Secondary data is the primary data obtained from Insurance data from 2006 to 2018. Types of data include a. data on marketing and other operating expenses obtained from the income statement; b. computer hardware investment data obtained from the financial position; c. Technology use data (insurance company individual data) obtain from non-investment recapitulation data. Insurance group consolidation data select according to its type, consisting of 1) reinsurance; 2) Life Insurance; and 3) General Insurance. Data can be panel data where i = insurance company, t = 2006-2018, and j = insurance group.

Data analysis technique: In an empirical study, researchers separate different impacts for specific financial criteria without using dummy variables. The aim is to see the difference in the effect of insurance companies according to the level of profit, the amount of net premium income, and the net premium using Threshold regression analysis techniques. Threshold regression use to select whether, at the high-profit level of the insurance company, the impact of LIB still shows the same direction as the company at a low-profit level likewise, whether a company with a high amount of net premium income will have the same impact as an insurance company with a low amount of net premium income.

- (a) **Variable $Innovation_{jt}$** is selected from table 1. to get the best and unbiased determinant variable. It needs to be done, considering the research must pay attention to adding variables and the omitted variable bias. It needs to be done considering that research must pay attention to adding variables and the omitted variable bias. Variable $Innovation_{jt}(Inn_{jt})$ consists of sales innovation, underwriter innovation, and Claims innovation. The notation j = insurance and t is 2015 to 2018 annual period.

$$InnSales_{jt} = \frac{Sales_{jt}}{Komp_{jt}}$$

$$InnPend_{jt} = \frac{Pend_{jt}}{Komp_{jt}}$$

$$InnPeg_{mt} = \frac{Peg_{jt}}{Komp_{jt}}$$

Table1.Variable Model I: Innovation

Label	List of Ratio Variables
RKP1	Premium adequacy ratio to claim payment Premium income (claims and benefits paid + unit redemption statement)
RKP2	The ratio of the premium adequacy to payment of claims and general expenses Premium income (claims and benefits paid + unit redemption claims + marketing expenses + personnel and management expenses + education and training expenses + education and training expenses + general and administrative expenses
RKP3	The ratio of the adequacy of premiums and investment returns to payment of claims and general expenses
RKP4	The ratio of the adequacy of premiums and investment returns to payment of claims and general expenses
RSA	Insurance session ratio
RI	The ratio of investment to technical reserves

- (b) **Variable $Comp_{it}$** is selected from table 2. to get the best and unbiased determining variable. HH measurement (Herfindahl-Hirschman index)

Table 2. Variable Model II: Competition

Label	Name
HH10	Competition based on 10 companies with dominant premium income
HH15	Competition based on 15 companies with dominant premium income
HH2	Competition based on 2 companies with dominant premium income
HH20	Competition based on 20 companies with dominant premium income
HH30	Competition based on 30 companies with dominant premium income
HH5	Competition based on 5 companies with dominant premium income

(c) Variable *Performance_{it}* is selected from table 3.

Table 3. Variable Model III: Performance

Label	Name
PendPremNett	The ratio of the amount of net premium income
PremiNet	Net Premium Amount
ROE	Return On Equity

(d) Variable *Lib_t* is selected from table 4. Liberalization is simplified based on 4 (four) modes of international trade according to the definition of the WTO (World Trade Organization), namely Mode 1: Cross-border, Mode 2: Consumption abroad, Mode 3: Commercial presence, and Mode 4: Movement of natural persons. The measurement result is a composite of all the components of the Mode variable.

Table 4. Variable Liberalization

Label	Name
Lib1	AIS11_2_Insurance indic_Density1_MODE3
Lib2	AIS9_1_Insurance business written abroad by brances Business written abroad_MODE1
Lib3	AIS8_1_Insurance business by domestic and foreign risks_MODE1
Lib4	AIS7_1_Gross operating expenses_MODE3
Lib5	AIS5_2_GIS_Insurance employees_MODE3
Lib6	AIS5_1_GIS_NumberofInsuranceUndertaking_MODE3
Lib7	BoP Business written in the reporting country_MODE3
Lib	Komposite

Review of Literature – Liberalization has resulted in the entry of the largest insurance companies in the insurance market and attracting more foreign companies, which has resulted in tighter competition with local industry players. The level of competition increases the number of insurance plans that are innovative and more attractive, better customer service, and increased awareness of the importance of insurance. The adaptation of insurance liberalization aims to regulate. And protect the interests of policyholders of the insurance industry [22]. Pope and Luen Ma (2008) explain that the interactive relationship divide by market concentration and liberalization related to profitability. In other words, the effect of market concentration on the profitability of the insurance market varies, and this depends on the degree of market liberalization. The high entry barrier for competitors facilitates the market's ability to concentrate on collusive behavior [31].

Innovation capability consists of four types of innovation: organizational innovation, process innovation, product and service innovation, and marketing innovation. By increasing innovation in the company, it can influence the innovation performance of the company itself [32]. Organizational innovation is implementing new organizational methods in company business practices, workplace organizations, or external relations. Corporate design can lead to improving business performance by reducing organizational management and transaction costs. Organizational innovation is related to administrative efforts. And including efforts to update systems, procedures, and routines to encourage team cohesiveness, coordination, collaboration, information, and knowledge sharing practices [33]. The innovation process can reduce the productivity, business growth, and profitability of an organization [34]. Product or service innovation activities are ways of adapting to policies and changes in consumer culture. Work and service innovation activities take into account changes inline structure, legacy systems, and business processes aimed at boosting revenue growth, financial stability, and improving customer experience and facing business competition [35]. Marketing innovation is a form of applying new marketing methods that involve significant changes in design or packaging, product placement, and promotions and prices [32].

The impact of liberalization varies considerably in each organization or company. Especially in company performance [36]. Large companies were initially more productive to gain more from financial liberalization [37]. Profits earn through the encouragement it provides to improve service quality [38]. In China, most had little impact on increasing and improving the productivity of enterprises, but still significant on improving social welfare after the liberalization of the insurance market [39]. Liberalization is promoted with competition [26].

The organization will seek to improve its annual performance and its ability to survive in the face of business competition. Also, the game creates organizational efforts to improve customer service. One of them is with effective advertising and relationship management. The existence of opportunities and potential is one of the driving factors for improving organizational performance and competition [22]. Whereas in the sales sector, company behavior leads to three levels of decisions that pursued, namely reinsurance, sales efforts, and price [2].

3. Results

3.1. Results of the analysis of model I: Innovation

The main models of the innovation equation are:

$$Inn_{jt} = \alpha_i + \beta_1 Lib_t + \sum_{p=1}^P \delta_p IntVar1_{pjt} + \sum_{k=1}^K \theta_k MacVar1_{kjt} + \varepsilon_{1jt}$$

An alternative to deepening the analysis for various high and low regime levels of specific economic variables (variable threshold), in this research will use Threshold Regression. In particular, Threshold Autoregressive (TAR) first developed by Tong (Tsay, 2010). This TAR calls Self Existing Threshold Autoregressive (SETAR) because the method uses a dummy, where this dummy is determined first by setting a Threshold, then develops in several ways: Movement between regimes/states uses observable data where the typical TAR model is: TAR model. Model I above is developed into a non-linear equation SETAR with the Maximum Likelihood estimator. The research model will change to (Example for Model I):

$$\begin{aligned} Inn_{jt} = & \alpha_i + \left[\beta_{11} Lib_{jt} + \sum_{p=1}^P \delta_{1p} IntVar1_{pjt} + \sum_{k=1}^K \theta_{1k} MacVar1_{kjt} \right] \Pi(k_t \leq \tilde{k}) \\ & + \left[\beta_{21} Lib_{jt} + \sum_{p=1}^P \delta_{2p} IntVar1_{pjt} + \sum_{k=1}^K \theta_{2k} MacVar1_{kjt} \right] \Pi(k_t > \tilde{k}) \\ & + \varepsilon_{1jt} \end{aligned}$$

Where through this regression we can get the threshold value ($\tilde{k}$) there is a change in the parameter values β_{11} , δ_{1p} , θ_{1k} , β_{21} , δ_{2p} , θ_{2k} for each equation. Models II and III follow the same way of analysis.

3.1.1 Sales innovation - The regression results of the equation below are arranged based on model I, where the dependent variable is innovation. The formation of innovation variables with employee innovation indicators carried out through a measure consisting of the ratio of the amount of net premium income to marketing costs. Sales innovation measures the achievement or achievement of the amount of Net Premium Income made by marketing. The use of applications and technology will increase the amount of net premium income. This ratio, if it gets smaller, indicates that there is an innovation made by marketing so that marketing costs are cheaper. Designs can be in the form of using supporting applications, implementing communication through applications, and implementing candidate surveys through applications.

Table 5. Regression results for model I: Sales innovation

VD: LOG(INNSALES1)			VD: LOG(INNSALES1)			VD: LOG(INNSALES1)			VD: LOG(INNSALES1)		
	Coeff	t-stat		Coeff	t-stat		Coeff	t-stat		Coeff	t-stat
LIB	-0.465	-3.622	LIB1	-0.25	-3.189	LIB2	-0.098	-2.096	LIB3	-0.857	-4.85
RKP1	31.354	3.099	RKP1	19.371	2.5	RKP1	22.366	2.119	RKP1	50.24	3.867
RKP2	-37.104	-3.229	RKP2	-24.04	-2.703	RKP2	-26.961	-2.239	RKP2	-57.792	-3.925
RKP3	-33.102	-3.449	RKP3	-21.789	-2.959	RKP3	-24.631	-2.464	RKP3	-50.896	-4.145
RKP4	39.162	3.587	RKP4	26.823	3.167	RKP4	29.566	2.588	RKP4	58.683	4.206
ROE	0.01	1.21	ROE	0.011	1.265	ROE	0.018	2.346	ROE	0.005	0.724
ER	0	-0.393	ER	0	-1.612	ER	0	-0.368	ER	0	1.531
SB	0.1	1.623	SB	0.074	1.351	SB	0.117	2.059	SB	0.049	0.545
SBINTL	-0.174	-1.732	SBINTL	-0.129	-1.169	SBINTL	-0.317	-2.684	SBINTL	-0.221	-2.673
C	50.571	3.97	C	30.795	3.674	C	14.226	3.032	C	87.301	5.16
Adjusted R-squared		0.965			0.973			0.959			0.964
F-statistic		118.95			116.015			102.032			116.56
Sum squared resid		42.549			40.745			42.127			44.249
Periods included: 16											
Cross-sections included: 3											

Table 5 is the observational data for the period 2015: Q1 to Q4 2018. The top row shows the dependent variable model I, namely, innovation. At the same time, the second column is a list of the independent variables of each equation. This section lists several equations with variations in the dependent variable to reveal the impact of each of the World Insurance Liberation Index (ILI) variables. The LIB variable is the ILI composite index, while the other LIB explains in the LIB Table. The bottom is the model identification row consisting of R2-Adj, F-stat, Sum square residual, and the amount of data available. A high LIB value indicates that the level of insurance liberalization is getting higher. The negative impact of liberalization on sales innovation shows that the higher the level of liberalization will encourage the use of sales innovations. It is thus reducing the insurance company's marketing costs.

Threshold Analysis – Sales Innovations. Following are the results of processing sales innovation data using Threshold analysis, which divided into three, namely high, medium, and low net premium income with a threshold value of 2. Dependent Variable: LOG (INNSALES1) with the Discrete Threshold Regression method. With the candidate Threshold variables, PENDPREMNETT PREMNET PROFIT, the most efficient PENDPREMNETT (net premium income) variable, is selected. Selection is made to determine the most appropriate variable as a threshold value for changes to occur.

Table 6. Threshold Analysis Results: Sales innovation

Variable	PENDPREMNETT < 1132305 (12 obs)		7530814 <= PREMINET < 3.490315E+07 -- 13 obs		3.490315E+07 <= PREMINET -- 11 obs	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
LIB	-0.478849	0.0388	-0.390940	0.0677	-0.143463	0.3242
RKP1	33.22161	0.1011	421.5120	0.0000	3.312859	0.7788
RKP2	-36.21030	0.0847	-465.3388	0.0000	-3.314343	0.8072
RKP3	-33.28669	0.0822	-403.7938	0.0000	-6.530953	0.5600
RKP4	36.52106	0.0657	445.6719	0.0000	7.356553	0.5691
C	49.54377	0.0326	42.84268	0.0466	16.45196	0.2604
Non-Threshold Variables						
DEFL	0.081016	0.0381				
ER	0.000120	0.2050				
SB	0.034954	0.6832				
R-squared	0.992663					
Adjusted R-squared	0.987229					
S.E. of regression	0.114199					
Sum squared resid	0.352117					
Log likelihood	49.85075					
F-statistic	182.6601					
Prob (F-statistic)	0.000000					

From table 6, it can be summarized as follows:

Table 7. Sales Innovations: Net Premium Income

No	Threshold variable	Threshold value	Total Data
1	Low net premium income	value< 1132305	12
2	Medium net premium income	1132305 <value<7224292	12
3	High net premium income	Value > 7224292	24

Table 7 shows that companies with low and moderate net premium income have a threshold value lower than 722492. While high net premium income has a threshold value greater than 7224292, a sales innovation threshold value that is lower than 722492 indicates that the premium income is low and moderate. Requires sales innovation to improve work efficiency and insurance services.

3.1.2Employee innovation – In model I, the employee innovation indicator uses a measure consisting of the ratio of net premiums and employee costs. Employee innovation

aims to measure the achievement or achievement of the net premium made by supporting or operational employees.

Table 8. Model I regression results: Employee innovation

VD: LOG(INNPEG2)			VD: LOG(INNPEG2)			VD: LOG(INNPEG2)			VD: LOG(INNPEG3)		
	Coeff	t-stat		Coeff	t-stat		Coeff	t-stat		Coeff	t-stat
LIB	-0.219	-2.691									
			LIB1	-0.118	-2.195						
						LIB2	-0.038	-1.551	LIB3	-0.106	-0.929
RKP1	-8.939	-1.965	RKP1	-13.01	-2.51	RKP1	-12.92	-2.488	RKP1	-14.263	-2.261
RKP2	9.121	1.715	RKP2	13.53	2.238	RKP2	13.599	2.242	RKP2	14.165	1.939
RKP3	5.921	1.391	RKP3	9.797	2.019	RKP3	9.707	2.002	RKP3	10.869	1.833
RKP4	-5.926	-1.184	RKP4	-10.12	-1.78	RKP4	-10.19	-1.792	RKP4	-10.607	-1.538
ROE	0.016	4.594	ROE	0.015	4.581	ROE	0.018	4.73	ROE	0.012	3.153
ER	0	2.218	ER	0	1.092	ER	0	2.07	ER	0	1.915
SB	0.175	5.514	SB	0.151	3.813	SB	0.175	5.04	SB	0.161	4.981
SBINTL	0.247	4.274	SBINTL	0.265	3.675	SBINTL	0.184	3.102	SBINTL	0.214	3.509
C	22.414	2.801	C	13.217	2.384	C	4.538	1.999	C	11.255	1.05
Adjusted R-squared	0.952			0.961			0.95			0.962	
F-statistic	84.973			81.425			82.189			108.095	
Sum squared resid	1.104			1.135			1.227			1.314	
Periods included:	16										
Cross-sections included:	3										

Based on table 8, the F-stat has a value above 81, which indicates that employee innovation statistically meets the criteria as a predictor in this model. R-2 values above 95% suggest that employee innovation can be explained by at least 95% by insurance liberalization. The negative impact of liberalization on employee innovation suggests that the higher the liberalization will encourage the use of employee innovation, which in turn can reduce employee costs.

Similarly, it needs to prove that threshold regression analysis is more efficient than linear Panel Data analysis. Table 8 shows the SSRs of various independent variables in columns 1 to 4, which are 1.104, 1.135, 1.227, and 1.31. In Table 9, it obtains that the SSR is 0.334822. It proves that threshold regression is more efficient. The next analysis focus on Thresholds analysis

Threshold Analysis – Employee Innovation. Following are the results of employee innovation data processing using threshold analysis, which is divided into three, namely high, medium, and low net premium income with a threshold value of 2. Dependent Variable: LOG (INNPEG1) with the Discrete Threshold Regression method. With the candidate Threshold variables PENDPREMNETT PREMINET PROFIT, the PREMINET variable (net premium)

is selected which is the most efficient. Selection is made to determine the most appropriate variable as a threshold value for changes to occur.

Table 9. Threshold Analysis Results: Employee Innovation

Variable	PREMINET < 7530814 -- 24 obs		7530814 <= PREMINET < 3.490315E+07 -- 13 obs		3.490315E+07 <= PREMINET -- 11 obs	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
LIB	-0.325254	0.0652	-0.356924	0.0422	-0.326304	0.0574
RKP1	57.97205	0	-34.03584	0.0526	5.279284	0.4432
RKP2	-61.3785	0	36.63726	0.0752	-6.019823	0.4618
RKP3	-57.41476	0	31.07446	0.0615	-8.058089	0.2109
RKP4	60.75688	0	-32.13764	0.0992	9.411641	0.2065
Non-Threshold Variables						
DEFL	0.064766	0.1655				
ER	-1.88E-05	0.7613				
SB	0.291417	0.0002				
C	34.11152	0.0541				
R-squared	0.979475					
Adjusted R-squared	0.966735					
S.E. of regression	0.10745					
Sum squared resid	0.334822					
Log likelihood	51.05951					
F-statistic	76.88236					
Prob (F-statistic)	0					

From table 9, it can be summarized as follows:

Table 10. Employee Innovations: Net Premium Income

No	Threshold Variable	Threshold value	Total Data
1	Low Net Premiums	value< 7530814	12
2	Medium Net Premium	7530814 < value<3.490315E+07	12
3	High Net Premium	value> 3.490315E+07	24

Based on table 10 shows that companies with low and moderate net premium income have a threshold value lower than 7530814. Meanwhile, high net premium income has a threshold value greater than 3.490315E + 07. A sales innovation threshold value that is lower than 7530814 indicates that premium income is low and needs employee innovation to improve work efficiency and insurance services.

3.1.3 Educational innovation – The regression results of the equation in Table 3 are measured based on two measures: 1) the ratio of the total net premium income to employee costs (InnPend1) and 2) the rate of the net premium to employee costs (InnPend2) and education (InnPend). Educational innovation aims to measure the achievement or achievement of net premiums made through education in supporting insurance company operations.

Table 11. Regression results for model I: Educational innovation

VD: LOG(INNPEND1)			VD: LOG(INNPEND2)			VD: LOG(INNPEND)		
	Coeff	t-stat		Coeff	t-stat		Coeff	t-stat
LIB	-0.088	-1.306	LIB	-0.147	-2.32	LIB	-1.247	-2.666
RKP1	-14.91	-2.582	RKP1	-9.999	-1.827	RKP1	-280.846	-5.265
RKP2	15.442	2.301	RKP2	9.85	1.552	RKP2	314.864	5.165
RKP3	11.55	2.126	RKP3	6.894	1.335	RKP3	267.509	5.301
RKP4	-11.889	-1.874	RKP4	-6.548	-1.088	RKP4	-301.074	-5.205
ROE	0.001	0.208	ROE	-0.001	-0.258	ROE	0.043	1.184
ER	0	1.707	ER	0	1.674	ER	-0.002	-3
SB	0.106	1.41	SB	0.104	1.937	SB	-0.386	-0.739
SBINTL	0.313	8.638	SBINTL	0.316	9.294	SBINTL	1.509	4.01
C	12.4	1.788	C	18.593	2.974	C	150.265	3.493
R-squared		0.954			0.96			0.896
F-statistic		88.405			101.887			37.936
Sum squared resid		1.151			1.115			40.586
Periods included:		16						
Cross-sections included:		3						

Based on table 11 explains that the F-stat has a value above 37. It shows that statistical educational innovation can use as a predictor in the model. R-2 values above 89% indicate that educational invention can be explained by at least 89% by insurance liberalization. The negative impact of liberalization on educational innovation shows that the higher the liberalization can encourage the use of educational innovations, which in turn reduce the cost of education. Similarly, it needs to prove that threshold regression analysis is more efficient than linear Panel Data analysis. Table 11 shows the SSRs of various independent variables in columns 1 to 3, 1,151, 1,115, and 40,586. In Table 9, it obtained that the SSR is 0.938711. It proves that threshold regression is more efficient. The next analysis focus on Thresholds analysis

Threshold Analysis – Educational Innovation. The following are the results of processing education innovation data using threshold analysis, which is divided into three, namely high, medium, and low net premium income with a threshold value of 2. Dependent Variable: LOG (INNPEND) with the Discrete Threshold Regression method. With the candidate Threshold variables PENDPREMNETT PREMINET PROFIT, the PREMINET

variable (the net premium) selected, which is the most efficient. Selection made to determine the most appropriate variable as a threshold value for changes to occur.

Table 12. Threshold Analysis Results: Educational Innovation

Variable	PREMINET < 1404683 -- 12 obs		1404683 <= PREMINET -- 36 obs	
	Coefficient	Prob.	Coefficient	Prob.
LIB	-2.62477	0	1.751394	0
RKP1	-11.7625	0.4139	15.70121	0.3849
RKP2	12.90081	0.3688	-22.1608	0.2868
RKP3	11.49344	0.3959	-13.0462	0.4443
RKP4	-12.9953	0.3343	16.77967	0.392
C	311.6062	0	-114.66	0.0129
Non-Threshold Variables				
DEFL	-0.12384	0.2303		
LOG(ER)	-4.49045	0.1631		
SB	-0.64214	0.0001		
R-squared	0.994602			
Adjusted R-squared	0.992312			
S.E. of regression	0.298416			
Sum squared resid	0.938711			
Log likelihood	-1.07153			
F-statistic	434.3275			
Prob (F-statistic)	0			

From table 12, it can be summarized as follows:

Table 13. Educational Innovation: Net Premium Income

No	Threshold Variable	Threshold Value	Total Data
1	Low Net Premiums	value< 1404683	12
2	Medium Net Premium	Value >= 1404683	
3	High Net Premium	value> 1404683	24

From the summary of the Threshold analysis for educational innovation in table 10, it shows that companies with low and moderate net premium income have a threshold value lower than 1404683. While high net premium income has a threshold value greater than 1404683, the sales innovation threshold value is lower than 1404683, indicates that premium income is low and needs educational innovation to improve work efficiency and insurance services.

3.2. Results of Model II Analysis: Competition

The main model of the competition equation is:

$$Comp_{jt} = \alpha_i + \beta_1 Lib_t + \sum_{p=1}^P \delta_p IntVar2_{pjt} + \sum_{k=1}^K \theta_k MacVar2_{kjt} + \varepsilon_{2jt}$$

Model II is developed into a non-linear equation SETAR with the Maximum Likelihood estimator.

$$Comp_{jt} = \alpha_i + \left[\beta_{11} Lib_{jt} + \sum_{p=1}^P \delta_{1p} IntVar1_{pjt} + \sum_{k=1}^K \theta_{1k} MacVar1_{kjt} \right] \Pi(k_t \leq \tilde{k}) \\ + \left[\beta_{21} Lib_{jt} + \sum_{p=1}^P \delta_{2p} IntVar1_{pjt} + \sum_{k=1}^K \theta_{2k} MacVar1_{kjt} \right] \Pi(k_t > \tilde{k}) \\ + \varepsilon_{1jt}$$

Competition based on 15 (HH15) Dominant Net Premium Income companies - The regression results of the equation table 11 are arranged based on model II where the dependent variable is competition measured by Herfindahl Hirschman. The data obtained from a group of companies that are members of the Life Insurance, General Insurance, and Reinsurance Companies.

Table 14. Results of Herfindahl Hirschman Analysis Model II: HH15

VD: HH10			VD: HH10			VD: HH10		
	Coeff	t-stat		Coeff	t-stat		Coeff	t-stat
LIB1	-2.888	-0.873						
LIB2			LIB2	8.262	4.665			
LIB3						LIB3	-47.821	-5.109
RKP1	-1988.52	-4.314	RKP1	-1659.9	-3.821	RKP1	-903.437	-2.783
RKP2	2228.043	4.224	RKP2	1857.177	3.756	RKP2	1033.753	2.835
RKP3	1875.89	4.311	RKP3	1568.917	3.809	RKP3	854.361	2.735
RKP4	-2107.86	-4.219	RKP4	-1760.35	-3.74	RKP4	-980.243	-2.788
ROE	1.306	3.719	ROE	0.857	2.537	ROE	1.021	3.731
DEFL	8.717	6.31	DEFL	2.661	1.084	DEFL	14.533	7.937
ER	0.005	0.75	ER	0.019	2.408	ER	0.014	2.903
SB	1.846	0.292	SB	0.455	0.081	SB	-2.572	-0.619
SBINTL	-0.717	-0.228	SBINTL	-2.182	-0.64	SBINTL	-6.885	-1.628
R-squared		0.873			0			0.925
Sum Squared Reside.		1.079			1.131			1.088
S.D. dependent var		65.723			20.9			62.025
Periods included:		16						
Cross-sections included:		3						

In table 14, the analysis results show that the F-stat has a value above 102, indicating that the insurance liberalization variable is statistically sufficient to use as a predictor in the model, and other variables are considered constant. The R-2 value above 90% indicates that the performance variable can be explained at least 90% by the variation of the insurance liberalization variable. Similarly, it needs to prove that threshold regression analysis is more efficient than linear Panel Data analysis. Table 8 shows the SSRs of various independent variables in columns 1 to 3, 1,079, 1,131, and 1,088. In Table 9, it obtained that the SSR is 0.002020. It proves that threshold regression is more efficient. The next analysis focuses on Thresholds analysis

Threshold Analysis – Competition based on 15 companies (HH15) Net Premium Income. The following are the results of processing education innovation data using threshold analysis, which is divided into three, namely high, medium, and low net premium income with a threshold value of 2. Dependent Variable: LOG (HH15) with the Discrete Threshold Regression method. With the candidate Threshold variables, PENDPREMNETT, PREMINET, PROFIT, the most efficient PENDPREMNET (net premium income) variable is selected. Selection made to determine the most appropriate variable as a threshold value for changes to occur.

Table 15. Threshold Analysis Results: HH15

Variable	PENDPREMNETT < 1641387 (13 obs)		1641387 <= PENDPREMNETT (35 obs)	
	Coefficient	Prob.	Coefficient	Prob.
LIB	-0.049896	0.0000	-0.001502	0.9156
RKP1	-0.480382	0.2423	0.539049	0.3778
RKP2	0.483563	0.2546	-0.640068	0.3653
RKP3	0.451161	0.2434	-0.508845	0.3794
RKP4	-0.452533	0.2569	0.608799	0.3624
C	11.72585	0.0000	6.942042	0.0000
Non-Threshold Variables				
DEFL	0.010260	0.0002		
ER	3.91E-07	0.9002		
SB	-0.007457	0.0536		
R-squared	0.906736			
Adjusted R-squared	0.867169			
S.E. of regression	0.007825			
Sum squared resid	0.002020			
Log likelihood	173.7073			
F-statistic	22.91667			
Prob (F-statistic)	0.000000			

From table 14, it can be summarized as follows:

Table 15. HH15 Competition: Net Premium Income

No	Threshold Variable	Threshold Value	Total Data
1	Low Net Premiums	value<1641387	12
2	Medium Net Premium	value>= 1641387	
3	High Net Premium	value>1641387	24

From the summary of the Threshold analysis for HH15 competition in table 11, it shows that companies with low and moderate net premium income have a threshold value lower than 1641387. While high net premium income has a threshold value greater than 1641367. The sales innovation threshold value is lower than 1641387 indicate that premium income is low and moderate need to increase competition to improve work efficiency and insurance services.

3.3. Model III: Performance

The main model used:

$$Kinerja_{jt} = \alpha_i + \beta_1 Lib_t + \sum_{p=1}^P \delta_p IntVar3_{pjt} + \sum_{k=1}^K \theta_k MacVar3_{kjt} + \varepsilon_{3jt}$$

Model III above is developed into a non-linear equation SETAR with the Maximum Likelihood estimator.

$$\begin{aligned}
Kinerja_{jt} = & \alpha_i \\
& + \left[\beta_{11} Lib_{jt} + \sum_{p=1}^P \delta_{1p} IntVar1_{pjt} + \sum_{k=1}^K \theta_{1k} MacVar1_{kjt} \right] \Pi(k_t \leq \tilde{k}) \\
& + \left[\beta_{21} Lib_{jt} + \sum_{p=1}^P \delta_{2p} IntVar1_{pjt} + \sum_{k=1}^K \theta_{2k} MacVar1_{kjt} \right] \Pi(k_t > \tilde{k}) \\
& + \varepsilon_{1jt}
\end{aligned}$$

Performance: Net Premium Income - The regression results of the equation below are compiled based on model III, where the dependent variable is performance. The formation of Performance variables carries out through several measures. This model uses the size of the total net premium income and ROE.

Table 16. Regression Results Model III: Performance

VD: LOG(PENDPREMNETT)			VD: LOG(PENDPREMNETT)		
	Coeff	t-stat		Coeff	t-stat
LIB1	0.671	2.485			
LIB2			LIB2	0.259	2.394
LIB3					
RKP1	-245.825	-4.207	RKP1	-246.872	-4.419
RKP2	273.289	4.089	RKP2	274.185	4.294
RKP3	232.358	4.211	RKP3	233.29	4.422
RKP4	-259.432	-4.101	RKP4	-260.201	-4.304
DEFL	-0.576	-5.534	DEFL	-0.663	-4.332
ER	-0.001	-1.584	ER	-0.001	-1.605
SB	0.277	0.83	SB	0.214	0.56
SBINTL	0.891	2.447	SBINTL	1.474	6.291
C	-44.345	-1.628	C	-2.312	-0.194
Adjusted R2		0.93			0.935
F-statistic		58.105			47.362
Sum squared resid		40.119			42.242
Periods included: 16					
Cross-sections included: 3					

Based on table 16, it explained that the F-stat has a value above 47, indicating that all independent variables are statistically sufficient to be used as predictors in the model. The R-2 value above 93% means that the variation in performance can be explained by at least 93% by insurance liberalization. The impact of positive liberalization on Net Premium Income shows that the higher the liberalization can encourage insurance companies to increase business efficiency and increase net premium income.

ROE performance - The following Performance Measures are ROE. The results show agreement with the theory that increased liberalization will expand the business and increase profits.

Table 17. ROE Performance Analysis Results

VD: ROE			VD: ROE			VD: ROE		
	Coeff	t-stat		Coeff	t-stat		Coeff	t-stat
LIB2	2.809	4.252						
LIB2			LIB2	2.809	4.252			
LIB3						LIB2	2.809	4.252
RKP1	-16.926	-2.88	RKP1	-16.926	-2.88	RKP1	-16.926	-2.88
RKP2	-2.661	-0.906	RKP2	-2.661	-0.906	RKP2	-2.661	-0.906
RKP3	18.727	4.292	RKP3	18.727	4.292	RKP3	18.727	4.292
DEFL	-1.733	-2.367	DEFL	-1.733	-2.367	DEFL	-1.733	-2.367
ER	-0.005	-2.308	ER	-0.005	-2.308	ER	-0.005	-2.308
SB	-2.492	-1.288	SB	-2.492	-1.288	SB	-2.492	-1.288
C	-210.101	-3.101	C	-210.101	-3.101	C	-210.101	-3.101
R-squared		0.632			0.6259	R-squared		0.632
F-statistic		7.245			1.578	F-statistic		7.245
Sum squared resid		658.748			658.748			658.748
Periods included: 16								
Cross-sections included: 3								

From table 13 can be seen that the results of the analysis reveal that the F-stat value is above 1.578, indicating that the statistical performance variable is sufficient to be used as a predictor in the model. Apart from that, other variables are considered constant. The R-2 value above 63% indicates that the variation in the performance variable can be explained by at least 63% by the interpretation of the insurance liberalization variable

4. Discussion

Based on the results of the Model I analysis, it revealed that liberalization had brought changes to the innovation strategy in the insurance industry in Indonesia. Unfortunately, in the Threshold model, the impact of liberalization has a negative and significant effect on the development of innovation in low-premium companies. Market liberalization encourages innovation in sales, employees, and education has decreased. Similar findings were states by Lee and Lin (2016) that liberalization hurt insurance companies. Furthermore, this creates more risks that must be faced by insurance companies, especially in facing business competition and the global economy [10]. One reasonable strategy is to design contract agreements, determine fair pricing, and expand the market for insurance companies and the trend of changes in the insurance industry to be more efficient after liberalization so that industry players increase innovation, especially substantially positive technological changes. With market consolidation, increasing the scale of results resulting from the ability to innovate can increase company efficiency [4].

These findings complement the previous results which state that liberalization affects financial innovation [40]. In other words, not only financial innovation is affected by liberalization, but also sales innovation, employee innovation, and educational innovation.

It is essential to create innovative capabilities in insurance companies. With the right business strategy, companies can improve their innovation capabilities, be it sales innovation, employee innovation, or educational innovation. Design can carry out through influence in

business [41]. It is due to the transformation of knowledge, employee ideas into practical innovation depending on the level of delegation, willingness to provide resources and support from the leadership. Liberalization has an impact on innovation capabilities. Therefore, there is a need for encouragement to change stuff and resources into competitive advantages. through the influence and practice of types of innovation in the company. Previous studies that support these findings reveal that business intelligence has a positive effect on knowledge sharing, innovation, and gaining competitive advantage [7].

The challenge for implementing innovation lies in training staff, integrating insurance products, and ensuring the best quality of service for customers. Apart from that, an insurance agent is also essential to achieve success and gain a competitive advantage [42]. Qualified and professional individuals are needed but interestingly, retaining an agent is a challenge in today's competitive insurance business. Furthermore, previous researchers stated that a market-oriented culture should lead to superior performance [43]. By strengthening liberalization, it hopes that a market-oriented culture will increase innovation and success for insurance companies, especially domestic insurance.

The future of insurance determines by the improved performance of protection products, a refreshing display of innovation, the launch of packages tailored to competition and market needs, and maximum service levels [42]. In facing various challenges of liberalization, a long-term policy strategy needs to develop markets. Pope and Luen Ma (2008) explain that after a shift in market structure due to the impact of liberalization, the market is institutionalized and is short-term due to the disruption of costs absorbed by the market [31]. What is clear, liberalization has made market changes where the market is difficult to predict but can still anticipate the future by developing appropriate strategic plans.

On the other hand, the findings reveal that liberalization has a positive impact on performance and competition, as shown in the aggregate models II and III. It indicates that liberalization is an essential indicator of the sustainability of the insurance industry. Insurance companies in the broad category have a positive and significant impact. Meanwhile, insurance companies in the small group category have a negative effect. This finding is in line with the research conducted by Almajali, Alamto, and Al-Soub (2012), which suggests that size has a significant impact on the financial performance of insurance companies. The giant company gets more profit. Therefore, large companies have more resources, more professional accounting staff, and have more sophisticated information systems capable of producing high performance [14].

If the liberalization is significant, then performance and competition will increase [44]. And vice versa, if the adaptation of liberalization does poorly, then the performance and competence will decrease. Also, can be exacerbated if companies in developing countries have limited access to international capital markets [45]. Not only liberalization but also the opportunity to improve better performance and healthier competition is to be in the competitive behavior in the growing insurance market [46].

The results of the study are consistent with the view that regulations to promote welfare improvement will be minimal if not followed by increased significant liberalization [47]. Liberalization increases economic activity in all sectors and increases the real returns to both capital and labor [48]. Although the impact will be different for each company with high, low, and medium premium income, globally, liberalization can encourage increased productivity [26],[49]. Taylor (2000) argues that in the future, the liberalization strategy needs to seriously rethought [50]. It is did consider that external liberalization, economic performance, and distribution are still not optimal. We Ge (1999) explains that the establishment of special economic zones can support economic liberalization. The designation of special economic zones, as carried out by the Chinese economy, serves to provide trade facilities and financial liberalization, increase resources, and promote economic growth and structural change [51].

The risks and benefits of liberalization are issues that continue to be debated today [52]. Liberalization must be approached with care where an organization is needed to ensure law and enforcement of contracts as well as effective regulation and prudential oversight [21]. As an adaptation effort to liberalization, innovation, performance, and competition in the development of the insurance sector made one of the priorities in Indonesia.

It is essential to design policy changes that can have a positive impact, namely: 1) creating the same market conditions for both private and state-owned insurance companies that lead to expanding market competition, growth in performance efficiency, and growth in the insurance market as a whole; 2) removing restrictions on state organizations to purchase state insurance products; 3) the choice of the insurance company must be made based on economic factors, not the type of ownership; expansion of the list of the kinds of voluntary insurance can include in the company's production costs; 4) creating a stimulus for capitalization growth in the insurance sector; 5) removing regulatory restrictions that delay the entry of foreign capital into the industry; 6) there is the integration of the insurance industry into the international market, and 7) democracy the national reinsurance system and give local insurance companies the right to choose reinsurance freely based on market factors [11]. What needs to be agreed upon is that the liberalization policy should lead to fair business competition, social justice, and protect local insurance companies from prospering the community as the values of Pancasila and the 1945 Constitution.

5. Conclusions

Based on the results of data analysis and discussion, it can be concluded that three subjects. First that the aggregate model has a negative and significant relationship between liberalization and innovation. However, in the Threshold regression model, the impact of liberalization on design differs between low-premium firms and high-premium firms. In this case, the positive effects of adaptation liberalization are influenced by the availability of resources to large companies that are higher in optimizing innovation. Second, in the aggregate model, there is a negative and significant relationship between liberalization and competition.

Meanwhile, in the Threshold model, the relationship between the two is significant. It indicates that liberalization can create healthy business competition between domestic and global companies. Third, insurance liberalization has a positive impact on company performance. It means that liberalization contributes to the effectiveness of better company performance.

In general, these findings reveal that the liberalization of global insurance finance can have a positive and significant impact on the development of the industrial sector in Indonesia. However, liberalization can be different for groups of small companies and groups of large companies.

From the findings, the expected implication is that the Indonesian government can consider taking policies that focus on building a more effective and efficient adaptation of liberalization by prioritizing three indicators of the insurance industry, namely: innovation, competition, and the performance of insurance companies. Not only encouraging progress for large companies but also low-income insurance companies. By knowing that these three variables can boost the company's survival and competitive advantage, insurance companies pay more attention to innovation by improving the quality of human resources. In the future, further research can be carried out by adding other variables and with a broader scope. So that the weaknesses of liberalization can be identified and solutions found.

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