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ULTIMATE CONTROL RIGHTS AS MODERATORS OF THE RELATIONSHIP BETWEEN MARKET POWER AND EFFICIENCY: THE CASE OF THE TAIWANESE LIFE INSURANCE INDUSTRY

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Abstract. *The corporate governance mechanism can help balance the expansion of market power and the maximization of efficiency. This study utilizes the stochastic frontier approach to measure efficiency, and the doubly censored Tobit regression to investigate the relationships among market power, ultimate control rights, and efficiency in the Taiwanese life insurance industry. The empirical results show that the market power negatively affects efficiency. As the component of ultimate control rights is a moderating variable, the control right weakens the negative effect of market power on efficiency but cash flow right enhances the negative effect of market power on efficiency. Thus, the findings of this study can serve as a reference for determining resource allocation, formulating marketing strategy and corporate governance policies.*
Keywords: Corporate governance, Market power, Efficiency, Ultimate control rights

1. **Introduction.** Taiwan's life insurance industry plays a key role in the nation's financial system. From 2002 to 2013, the premium income of Taiwan's life insurance industry as a proportion of gross domestic product (GDP) rose from 8.54% to 17.25%, a growth rate of 101%. Furthermore, the penetration index of Taiwan was ranked first in global life insurance in 2006, 2008, 2009, 2012, and 2013.

The Taiwanese life insurance industry characterizes complex cross-shareholdings between families. In pursuing market power expansion, many top managements neglect the fact that shareholders wish for long-term efficiency, which is often due to the agency problem. Therefore, the importance of corporate governance has attracted much interest among academics [1].

[2] proposed the efficiency structure (ES) hypothesis, suggesting that the competitiveness and operational structure of a company depend on whether efficiency is optimized. In addition, according to the market power and efficiency structure hypothesis by [3], market share can accurately reflect the market power of a company. Several studies have also shown that market power has a direct and positive influence on efficiency [4], whereas [5] has argued that with limited market resources, market power has a direct and negative influence on company performance.

This study adopted the stochastic frontier approach (SFA) to calculate the absolute efficiency value, which is a proxy of company performance. However, since the efficiency data ranged between 0 and 1, Tobit regression was used to explore the relationship between market power and efficiency [4,6,7].

To maximize the balance between the pursuit of market power and efficiency, this study also included corporate governance as a moderator variable, which was emphasized in several previous studies [8]. However, the variables used to determine corporate governance have varied from study to study. [9] proposed the concepts of "ultimate control rights" and "pyramid structure", whereby ultimate control rights are comprised of control right, cash flow right, and wedge; control right refers to the right to vote during decision making in a company. [10] adopted the concept of the "weakest", whereby the smallest value in the chain of control was selected in order to consider all possible influences exerted by all parties in the chain of control who are not the ultimate owner. Cash flow right is a right to distribute dividends; this is not limited to cash but is essentially the "right to dividend distribution". It is used to balance the cash flow right of the controlling family flowing from their investment in it. A wedge is the discrepancy between control right and cash flow right. [10] found that in countries such as Canada, Japan, and Taiwan, many controlling shareholders of listed companies control their companies via methods such as the pyramid structure and cross-shareholdings. A wedge can trigger an agency problem between the controlling shareholder and the small shareholder.

Ultimate control rights affect company performance through decision-making power over company policies [9-12]. [13] pointed out that ultimate control rights do not significantly influence the efficiency of life insurance companies, while [11] found that control right had a positive influence on company performance in Taiwan's life insurance market but a negative influence on company performance. Since most life insurance companies in Taiwan are family-owned businesses, their controlling shareholders often control other companies through pyramidal structures or cross-shareholdings. Therefore, the relationships among market power, ultimate control rights, and efficiency in the Taiwanese life insurance market need to be examined.

This study offers three main contributions to the literature. First, the SFA and doubly censored Tobit regression were combined to explore the direct effect of market power on efficiency. The moderating effect of ultimate control rights was also investigated, which can serve as a reference for solving the agency problem between shareholders and management. Second, in addition to showing the negative influence of market power on the efficiency of Taiwanese life insurance companies, we have also found that control right strengthened the effect of market power on efficiency, while cash flow right weakened it. The wedge between control right and cash flow right did not influence the effect of market power on efficiency, possibly due to the mutually restraining effect between the two variables. Finally, the empirical results can provide life insurance companies with a reference for the formulation of marketing strategies and a new perspective on corporate governance.

The rest of this paper is organized as follows. The next section discusses the data and empirical model. The third section presents the results. Finally, the fourth section presents the conclusion and suggestion.

2. **Data and Empirical Model.**

2.1. **Data.** This study examined 18 Taiwanese life insurance companies from 1996 to 2013. Data used to calculate the efficiency were obtained from the Taiwan Insurance Institute, and data on ultimate control rights were obtained from the Taiwan Economic Journal. After 131 samples lacking data on ultimate control rights were removed, 193 samples were left for analysis.

2.1.1. *Dependent variable.* Efficiency was treated as a proxy variable for performance in this study. As proposed by [7,14], this study used the value added method to select factors of input and output, while efficiency (EFF) was measured using the SFA. Table

Table 1. Definitions of output factors

Output Factor	Definition	References
Revenue	Income from the past year, including interest and dividends.	[14]
Claim settlement	The amount of paid claim settlement promised by insurance company.	[7]
Insurance premium	Income from personal premium, including life insurance, injury insurance, accident insurance, and annuities.	[7,15]

Table 2. Definitions of input factors and their costs

Input Factor	Definition and Assessment	References
Price of financial assets	1) Net income gained from investments, including revenue from assets. 2) Total investment income divided by amount of investment assets.	[7,15]
Price of business services	1) Operational costs of insurance policy. 2) Insurance policy-related costs divided by number of insurance policies.	[7,15]
Price of labor	1) Salary of office and field work. 2) Average annual salary.	[7,15]

1 presents the definitions of the output factors, and Table 2 shows the definitions of the input factors.

This study used the SFA, proposed by [16], to measure the efficiency of each sample. The related prices of input factors were used to measure efficiency. Following [7], the cost function is specified as:

$$\ln TC_{it} = \ln TC^*_{it}(\boldsymbol{y}_i, \boldsymbol{p}_i) + \varepsilon_{it}, \quad \varepsilon_{it} = v_{it} + u_{it}, \tag{1}$$

where TC_{it} is the observable total costs of company i in period t. $TC^*_{it}(.)$ is the total cost function of company i in period t; $\boldsymbol{y}_i$ is the output factor vector, and $\boldsymbol{p}_i$ is the input factor price vector. Moreover, ε_{it} can be divided into two parts. [15] proposed that the first random error term v_{it} can be used to assess the error caused by other factors that have not been considered. This random error term is generally assumed to be an independent, normally distributed random variable; the mean is 0, and the variance is a constant. The second term is the non-negative inefficiency term u_{it} including the expanded error of the translog function, which is assumed to follow a half-normal distribution or a truncated normal distribution, and its variance equals σ_u^2. The assumptions of fitting likelihood function are $\sigma_s^2 = \sigma_v^2 + \sigma_u^2$ and $\gamma = \sigma_u^2/\sigma_s^2$, and the formula for calculating the efficiency is

$$EFF_i = E\left(TC_i^*|u_{it} = 0, \beta_i\right) / E\left(TC_i^*|u_{it}, \beta_i\right). \tag{2}$$

To determine the frontier and flexibility of the function, this study adopted the methods of [4,17]. The cost function of company i in period t was defined as the following translog cost function:

$$\ln TC_{it} = \alpha_0 + \sum_{k=1}^{2} \beta_k \times \ln P_{kit} + \sum_{m=1}^{3} \gamma_m \times \ln Y_{mit} + 0.5 \sum_{k=1}^{2} \sum_{l=1}^{2} \beta_{kl} \times \ln P_{kit} \times \ln P_{lit}$$
$$+0.5 \sum_{m=1}^{3} \sum_{n=1}^{3} \gamma_{mn} \times \ln Y_{mit} \times \ln Y_{nit} + \sum_{k=1}^{2} \sum_{m=1}^{3} \rho_{mk} \times \ln P_{kit} \times \ln Y_{mit}$$

$$+0.5\varphi_1 \times t^2 + \sum_{k=1}^{2} \lambda_k \times t \times \ln P_{kit} + \sum_{m=1}^{3} \phi_m \times t \times \ln Y_{mit} + v_{it} + u_{it}, \tag{3}$$

where Y_{mit}, Y_{nit} represent the output factors m, n of company i in period t separately, P_{kit}, P_{lit} represent the input factor prices k, l of company i in period t separately, and α_0, β_k, β_{kl}, γ_m, γ_{mn}, ρ_{mk}, φ_1, λ_k and ϕ_m are parameters to be estimated in the cost function and satisfy the homogeneity assumptions $\beta_{kl} = \beta_{lk}$ and $\gamma_{mn} = \gamma_{nm}$ [7].

2.1.2. *Independent variable.* The independent variable was based on the market power hypothesis of [3], which states that market share can accurately reflect market power (MP) and that market power determines a company's ability to dominate a market. Based on the suggestions of [3,18], market share was treated as a proxy variable for market power. Market power was calculated as the annual premium income divided by the total annual premium income of the industry in the article.

2.1.3. *Moderator variables.* Taiwan's life insurance market is dominated by family-owned businesses, as corporate governance plays a crucial role in a company's decision making. This study adopts the concept of ultimate control rights from the literature and treats them as a moderating variable [9,10,12]. Ultimate control rights consist of control right (CR), cash flow right (CFR), and the discrepancy between the CR and CFR (Wedge); the definitions of ultimate control rights are presented in Table 3.

Table 3. Definition of variables for ultimate control rights

Variable	Definition	References
Control right (CR)	The proportion of direct shares held by the ultimate owner adds to the summation of the shareholding proportion of the last links in the chain of voting rights.	[9]
Cash flow right (CFR)	The proportion of total direct shareholdings of the ultimate owner adds to summation of product of the indirect shareholding proportion in the chain of voting rights.	[9,10,12]
Degree of discrepancy (Wedge)	Cash flow right divided by control right.	[10]

2.1.4. *Control variables.* Following [19,20], this study used return on assets (ROA) and debt ratios (DR) as control variables. Return on assets is the net profit divided by total assets, and DR is total debt divided by total assets.

2.2. **Empirical model.** When the data character of the dependent variable in the regression equation is interval data, a doubly censored Tobit model can be used to perform regression analysis [6]. The model indicates the effects of market power and ultimate control rights on efficiency. The dependent variable is efficiency, ranging between 0 and 1, and thus, the empirical model is specified below:

$$\begin{aligned} EFF_i^* &= \boldsymbol{x}_i'\boldsymbol{\beta} + \varepsilon_i \\ &= c + \beta_1 MP_i + \beta_2 MP_i \times CR_i + \beta_3 MP_i \times CFR_i \\ &\quad + \beta_4 MP_i \times Wedge_i + \beta_5 ROA_i + \beta_6 DR_i + \varepsilon_i, \\ EFF_i &= \begin{cases} 0 & \text{if} \quad EFF_i^* \le 0 \\ EFF_i^* & \text{if} \quad 0 < EFF_i^* < 1 \\ 1 & \text{if} \quad EFF_i^* \ge 1, \end{cases} \end{aligned} \tag{4}$$

where EFF_i^* is efficiency of company i, an unobservable variable; c is a constant; $\boldsymbol{x}_i$ is the independent variable vector; $\boldsymbol{\beta}$ is the parameter vector to be estimated; EFF_i is the dependent variable, ranging between 0 and 1; ε_i follows a normal distribution with zero mean and constant variance. The log-likelihood function for the maximum likelihood estimation is

$$\begin{aligned}\log L = \sum_{i=1}^{N} \Bigg[& I_i^0 \log \Phi\left(\frac{0-\boldsymbol{x}_i'\boldsymbol{\beta}}{\sigma}\right) + I_i^1 \log \Phi\left(\frac{\boldsymbol{x}_i'\boldsymbol{\beta}-1}{\sigma}\right) \\ & + \left(1-I_i^0-I_i^1\right)\left(\log \phi\left(\frac{EFF_i-\boldsymbol{x}_i'\boldsymbol{\beta}}{\sigma}\right) - \log \sigma\right)\Bigg], \end{aligned} \tag{5}$$

where N is the sample size. $\phi(.)$ and $\Phi(.)$ represent the standard normal density function and the cumulative standard normal distribution function. I_i^0 and I_i^1 are the indicator functions and defined as

$$I_i^0 = \begin{cases} 1 & \text{if } \dfrac{0-\boldsymbol{x}_i'\boldsymbol{\beta}}{\sigma} = 0 \\ 0 & \text{if } \dfrac{0-\boldsymbol{x}_i'\boldsymbol{\beta}}{\sigma} > 0 \end{cases} \quad \text{and } I_i^1 = \begin{cases} 1 & \text{if } \dfrac{\boldsymbol{x}_i'\boldsymbol{\beta}-1}{\sigma} = 1 \\ 0 & \text{if } \dfrac{\boldsymbol{x}_i'\boldsymbol{\beta}-1}{\sigma} < 1 \end{cases}. \tag{6}$$

3. **Empirical Results.** The results of the estimation and testing are presented in Table 4. The estimated parameter of market power was -0.141, which was significant at a 5% level, indicating that market power has a significantly negative effect on efficiency. Thus, seeking to expand market power will reduce a company's efficiency. This result might be attributable to the use of input and output resources, in which only the maximization of premium income is considered, while the suitability of inputs is neglected. This could be attributed to the policy reserve system. Since the ratio of expenses to policy premium might be high in the first year, due to commissions or publicity fees, the issued fee increased immensely through the addition of short-term surcharges. In addition, effective management structures and the pursuit of market power expansion led to managing resource professionally, which resulted in sound long-term efficiency. By contrast, market power expansion with suboptimal structures leads to a downward in company's efficiency and was taken over by insurance bureau due to operation difficulties. Therefore, neglecting the relationship between input and output will result in company's inefficiency which occurs in the cases of two Taiwanese life insurance companies, Global Life Insurance and

Table 4. Doubly censored regression of efficiency on market power and ultimate control rights

Variable	Parameter	S.E.	T-test
Intercept	0.835***	0.003	294.701
MP	−0.141*	0.069	−2.024
MP×CR	0.002*	0.001	2.165
MP×CFR	−0.002*	0.001	−1.965
MP×Wedge	0.001	0.001	1.598
ROA	0.001**	0.001	3.025
DR	−0.006*	0.003	−2.026
Logsigma	−4.158	0.042	−99.264

Note: (1) ** (*) indicates significance at a level of 1% (5%).

(2) Logsigma denotes the logarithm of variance of errors.

(3) S.E. is Newey-West standard errors.

(4) Log-likelihood value = −525.852

SingFor Life Insurance Co., Ltd., in which the continuous pursuit of market power expansion impeded efficiency improvements and caused a vicious cycle that rescue their market power. Moreover, this finding is consistent with the result in [5] concerning the limited amount of market resources.

Furthermore, when the control right was used as a moderator variable, which was significant at a 5% level, the estimated parameter for the interaction of market power and control right was 0.002. This indicates that control right positively moderated the effect of market power on efficiency and thus that an increased control right weakened negative the effect of market power on efficiency. This increase in control right would effectively confer control over the decision-making power in a company. When the cash flow right was a moderator variable, which was significant at a 5% level, the estimate parameter for the interaction market power and cash flow right was -0.002, showing that cash flow right negatively moderated the effect of market power on efficiency. This result indicates that an increased cash flow right would enhance negative the effect of market power on efficiency, perhaps because cash dividend or stock dividend is over-emphasized, and resource utilization is de-emphasized. Hence, expanding market power lowers a company's efficiency. These results are consistent with [12] that the company has lower company's value as the interests consolidation effect is greater than the incentive effect. Thus, it will increase cash flow right, which enhances the negative effect of market power on efficiency. The wedge estimated parameter for the interaction of market power and wedge was 0.001, the wedge did not moderate the effect of market power on efficiency, perhaps because the effects of control right and cash flow right cancelled each other out. When the controlling shareholders do not have enough cash flow right, the wedge will indicate the inconsistency in the shareholders' interests, which will affect market power, and in turn, company efficiency.

4. **Conclusion and Suggestion.** The effect of market power on efficiency is negative and can be illustrated by the takeover of the Global Life and SingFor Life Insurance Co., Ltd. by Taiwanese authorities. The findings demonstrate that, when life insurance companies in Taiwan pursue market power, strengthening control right facilitates the expansion of market power and increases efficiency. Life insurance companies seeking market power should also consider cash flow right. Cash flow right will worsen the agency problem, because the greater control right will weaken the negative effects of market power on efficiency. Therefore, life insurance companies aiming to expand market power should strengthen the combined functions of control right and market power. Meanwhile, a decrease in cash flow right can help increase efficiency during the pursuit of expansion of market power. These findings show that emphasizing ultimate control rights not only achieves the goal of expanding market power but also affects efficiency. Life insurance companies should focus on formulating marketing strategies and implementing ultimate control rights mechanisms in business management.

Corporate governance will be further discussed in future. Particularly, focus will be on the effects of equity structure and characteristics of the board on efficiency. Meanwhile, the moderator effects of institutional investors and external directors' monitoring of the relationship between market power and efficiency can also be investigated.

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