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Speed of Adjustment and Leverage Deviation - Cost of Equity Nexus: Evidence from Emerging Markets and Crisis

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A B S T R A C T

Purpose: This study investigates the impact of leverage deviation on the cost of equity under the specifically mentioned condition in ASEAN-5 considering the global financial crisis and the sensitivity of the cost of equity on leverage deviation.
Design/methodology/approach: This study employs the Generalized Least Square (GLS) model and the dynamic panel estimation based on the two-step difference GMM to analyze the data.
Findings: The regression analysis found deviated from the target leverage impact unfavorably on the firm's cost of equity. The results also show that the more sensitive the cost of equity is to the leverage deviation from the target, the faster the adjustment. However, firms will adjust their capital structure for a lower cost during the crisis. Additionally, it shows a compelling behavior in the relation between the sensitivity of the cost of equity to leverage deviation on the leverage speed of adjustments.
Research limitations/implications: The higher sensitivity of the cost of equity is to the leverage deviation from the target, the faster the adjustment. It implies that the disregard of heterogeneity in SOA will mislead the adjustment period to the target leverage.
Originality/value: Using manually collected data, this study provides empirical evidence on the importance of leverage deviation and the sensitivity of the cost of equity and the speed of adjustment to the target debt level to analyze capital structure decision in an enormous leverage usage in ASEAN. Second, this paper presents new evidence of the effect both in normal economic conditions and crisis periods, which is rarely examined in the ASEAN emerging market.

Keywords: Dynamic Trade-off Theory, Leverage Deviation, Cost of Equity, Speed of Adjustment, Emerging Markets, Crisis

I. Introduction

The capital structure still becomes an interesting topic for further investigation. Initiated by Modigliani and Miller (1958), they found that the firms' capital structure is irrelevant to evaluate a firm's value. Furthermore, the company's weighted average cost does not depend on its debt level with assumptions without considering bankruptcy costs, tax and agent charges. Traditional capital structure theories describe the option between debt and equity; however, they do not explain the use of various debt sources linked to the need, access and borrowing capacity (Orlova, Harper, and Sun, 2020).

The trade-off theory explains that when a company

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should decide its financial structure, it should scrutinize the benefit and cost of using debt (Marinsek, 2015). The static trade-off theory suggests that the company will have an optimal capital structure when marginal cost of debt financing equals to its benefits. This trade-off implies that the benefit s of using debt is equal to its deadweight-cost of bankruptcy (Frank and Goyal, 2008). This static trade-off theory focuses on corporate taxes and bankruptcy consequences in determining capital structure (Kraus and Litzenberger, 1973). However, this static theory ignores the potential for a mean reversion of debt and financial structure change over time due to recapitalization costs. In contrast, the dynamic capital structure theory considers the debt ratio variation over time (Myers, 1984).

The dynamic trade-off theory introduced how to deal with the mean reversion problem in the static trade-off model. Thus, the company can follow and apply dynamic trade-off theory if it exhibits behavior that adjusts to the target leverage and if its deviation can be changed and gradually eliminated. Thus, the target adjustment hypothesis gets more empirical research support than the static trade-off theory or pecking order hypothesis (Frank and Goyal, 2008). The dynamic trade-off theory suggests that companies have a target of leverage and the level of debt held by each company trying to approach the expected debt target (Marinsek, 2015). However, the level of debt in the company is not always following the expected debt target. Zhou et al. (2016) classified the debt level as overleveraged and under-leveraged for a company with a debt level above the expected target and below the target, respectively. Therefore, there is a deviation from each company by reducing the actual leverage level ratio with the expected target leverage.

Previous studies found that leverage deviation has a positive and significant impact on the cost of equity. Then, for over-leveraged firms, the more sensitive the cost of equity capital, the lower the leverage deviation from the company's target leverage. Moreover, they also found that companies with a more sensitive cost of equity to leverage deviation will experience a faster adjustment towards the optimal capital structure. Using data from North America, Zhou et al. (2016) found that leverage deviation positively impacts the cost of equity in overleveraged samples. This finding implies that increasing debt will bear high credit risk. Furthermore, Aflatooni and Khazaei (2020) find that leverage deviation is positively affected by asymmetry information.

Many previous studies examined the relationship between debt and equity, such as George and Hwang (2010). They found a negative relationship between debt and stock returns. Fama and French (1992) found the same conclusion that financial debt has a negative relationship with stock returns, but Dhaliwal (2006) found contradictory results. A study by Tulcana-Prieto and Lee (2019) examines internal and external determinants of the capital structure of large Korean firms. They found that the use of debt will decrease as increasing firm's profitability and liquidity. Additionally, Tao et al. (2017) found that the companies have a specific debt level ratio and a leverage target, Furthermore, An et al. (2021) found that foreign institutional firms positively affect the speed of adjustment to their leverage target. Thus, target leverage is a factor that must also be taken into account in researching capital structure to reduce the presence of cross-sectional heterogeneity.

Over time companies face financial surpluses or deficits. Thus, they need to adjust their capital structure with low transaction costs (Byoun, 2008). The speed of adjustment defines how quickly the company adjusts its current leverage level with optimal leverage. (Zhou et al., 2016). Adjustments that occur in this capital structure depend on direct transaction costs and company incentives to access the capital market for other reasons (Faulkender et al., 2012). Previous research found that the speed of adjusting the capital structure of companies that are in above-target debt conditions with a financial surplus is around 33%, the speed of adjusting the capital structure of companies that are in below-target debt conditions with financial deficits is around 20% (Byoun, 2008). According to Huang and Ritter (2009), Lemmon et al. (2008), and Welch (2004), the speed of adjustment (SOA) to target leverage varies significantly (Huang and Ritter, 2009; Lemmon et al., 2008; Welch, 2004). Although the theories can explain this phenomenon, it fails to explain cross-sectional heterogeneity in its observations regarding capital structure, even though explaining heterogeneity in capital structure is still crucial (Welch, 2013). This study considers include speed of adjustment as a result of the sensitivity of the cost of equity.

The characteristics of the owner of the company also affect the capital structure that must be considered for use by the company (Dimitris Margaritis, Maria Psillaki, 2008). Most of the companies in East Asia have concentrated ownership (Clessens et al., 2002). In contrast to Canada and the US, most firms in East Asia are controlled by single ownership (Djankov and Lang, 2000; La Porta et al., 1999). So, the complexity of the companies in each country is also different. Companies with more concentrated ownership characteristics usually use higher debt in their capital structure (Margaritis and Psillaki, 2008).

The tremendous level of debt of firms in ASEAN makes this market an interesting place to examine its debt policy. They continuously increase their debt exposure, affecting the firms' capital structure and its impact on the cost of equity. Overall, corporate debt owned by ASEAN firms has a positive trend from 2010 to June 2018. This condition reflected by the ratio of external debt per Gross National Income (GNI) owned by ASEAN firms which exceeded the average of developing countries in 2016, which was 26%, except for the Philippines and Myanmar. The highest leverage poses by firms in Laos with an external debt to GNI ratio of 93.1%, followed by Malaysia in the second position at 69.6%, and Cambodia in the third position at 54.4%.

The discussion of capital structure cannot be separated from macroeconomic conditions, especially the threat of crisis. Goh et al. (2005) found the effect of the 1998 global financial crisis on Asian countries and the rest of the world (Dungey et al., 2015). Additionally, Jermias and Yigit (2019) found that companies must adjust their leverage to meet their need for financing during and after the financial crisis. Thus, it supposed that the crisis could create market uncertainty, impacting the capital structure (Balios et al., 2016; Proenca et al., 2014).

This paper extends Zhou et al. (2016) with particular attention to corporate debt level in ASEAN countries. The unique condition of companies' debt composition in ASEAN countries makes this study different from previous studies on leverage. In line with Berger and Turtle (2011), this study also considers the influence of the global financial crisis on corporate debt and its impact on the cost of equity and leverage deviation from the target. Nevertheless, Zhou et al. (2016), only considered the pre-crisis period. Furthermore, the crisis also caused the share price to decline (Trunk and Stubelj, 2013). This condition enforces the firms to adjust their leverage to meet the need for debt and equity financing (Jermias and Yigit, 2019). Thus, this study incorporates the effect leverage deviation on the cost of equity and the effect of the sensitivity of the cost of equity on leverage deviation during the crisis periods. Thus, it will describe the company's behaviour in facing the global financial crisis. Considering the debt level of firms in ASEAN and the effect of the global financial crisis, this study would like to explore the leverage related issues of the firms in ASEAN by answering the below research objectives.

Motivated by the recent study by Zhou et al. (2016) on the effect of leverage deviation on the cost of equity, the purpose of this study is to examines the effect of leverage deviation on the cost of equity. Furthermore, this study evaluates the impact of the sensitivity of the cost of equity on leverage deviation. Both consider the normal condition and the effect of the financial crisis. Lastly, this study investigates the impact of the sensitivity of the cost of equity on the speed of leverage adjustment. This study found that leverage deviation positively affects the cost of equity in normal condition, but different results found in the period of the financial crisis. Furthermore, this study also found that the cost of equity's sensitivity to leverage deviation harms leverage deviation in reasonable condition. In contrast, the inverse effect found in the crisis period. Lastly, this study reveals that the more sensitive the cost of equity to leverage deviation, the faster adjustment to the target leverage.

This study contributes to the extant literature in two folds. First, it provides empirical evidence on the importance of leverage deviation and the sensitivity of the cost of equity and the speed of adjustment to the target debt level to analyze capital structure decision in an enormous leverage usage in ASEAN. Second, this paper presents new evidence of the effect both in normal economic conditions and crisis periods, which is rarely examined in the ASEAN emerging market.

The reminder of this paper is structured as follows. Section 2 presents a brief review of the literature and hypothesis development, while Section 3 describes the research methodology, consist of sources of the data and empirical model development. Section 4 present results and discussion, and Section 5 conclude the paper.

II. Literature Review and Hypotheses Development

A. Leverage Deviation, Crisis, and the Cost of Equity

Leverage deviation stated as the difference between the level of debt and the target leverage of a company. A positive value indicates a level of debt that exceeds the target leverage, and a negative value indicates a level of debt that is lower than the company's target leverage (Zhou et al., 2016). Under the dynamic trade-off theory, each firm tried to obey its target capital structure. However, occasionally they cannot reach the target nor goes beyond the target. Earlier studies such as Zhou et al. (2016) confirmed a positive relation between leverage deviation and the cost of equity in an overleveraged firm. A positive relation between leverage and the cost of equity also proven by Dhaliwal et al. (2006) and Ippolito et al. (2012).

George and Hwang in 2010 found a negative relationship between debt and stock returns. This finding aligned with Fama and French's previous study in 1992, which found that stock returns and debt have a negative relationship. In contrast, Dhaliwal et al. (2006) and Ipplolito (2012) found a positive relationship between debt and the cost of equity. It is undeniable that there is no empirical evidence to explain the relationship between debt and stock returns with certainty (Gomes and Schmid, 2010). Adjustment of capital and other costs can prevent companies from reaching the capital structure's target level (Leary and Robert, 2005). Thus, companies are likely to experience a deviation from the optimal capital structure. This condition can result in heterogeneity of debts that are cross-sectionally observed (Korteweg, 2010). The intended heterogeneity incorporates using the difference in debt level approach with the target leverage (Ippolito et al., 2012). Therefore, the hypothesis is as follow.

H1: Leverage deviation has a positive effect on the cost of equity.

Furthermore, a study by Berger and Turtle (2011) found a mixed effect of the Asian Financial crisis on the US stock return. The crisis has a negative influence on the return of small stocks and vice versa. According to the agency theory by Jensen and Meckling (1976), there is a higher uncertainty in the crisis period, which cause lower stock returns. Thus, firms tend to adjust their debt to a lower ratio. Furthermore, Vo, et al. (2022) also found that firms adjusting to their target leverage is faster during a crisis. This situation puts the capital market as a provider as an alternative source of external capital, such as equity (Levine et al.,2016). Thus, the second hypothesis derived as follows.

H2: Leverage Deviation has a negative effect on the cost of equity during the financial crisis

B. The Sensitivity of the Cost of Equity, Crisis and Leverage Deviation

Further analysis through a mathematical method by Zhou et al. (2016) suggest that the sensitivity of the cost of equity will change along with its changes in the company's level of debt. They also confirmed that the more sensitive the cost of equity, the smaller the leverage deviation from the debt target for companies with overleveraged conditions. However, there is no indication of an association between the sensitivity of the cost of equity capital and the leverage deviation of firms underleveraged conditions. Albanez (2015) also found that companies tend to utilize more debt rather than equity under the condition of the high cost of equity. It is in line with the pecking order theory. So, the hypothesis is derived as follows.

H3: The sensitivity of the cost of equity affects leverage deviation.

Previous studies indicate that the financial crisis can create market uncertainty, which will affect the company's capital structure (Balios et al., 2016; Proenca et al., 2014, and Trinh and Phuong, 2016). Uncertain conditions and an increase in risk and decreased return expectations make borrowers reluctant to use long-term investment funding sources (Demirgunc-Kunt et al., 2015). Considering that debt usage in a financial crisis may affect the company's capital structure decision (Proenca et al., 2014), a crisis may affect the sensitivity of equity cost to leverage deviation differently. Thus, we proposed the fourth hypothesis as follows.

H4: The sensitivity of the cost of equity affect leverage deviation during the financial crisis.

C. The Sensitivity of the Cost of Equity and Speed of Adjustment

Modigliani and Miller (1958) suggested a positive association between the cost of equity and leverage. Moreover, Zhou et al. (2016) expand the theory. They determined the effect of the sensitivity of the cost of equity to the speed of adjustment towards the target capital structure. The earlier study found that companies only make adjustments to the capital structure if the benefits obtained are higher than the costs incurred to balance the capital structure (Altinkilic and Hansen, 2000). The previous study also concluded that the more sensitive the cost of equity capital to leverage deviation, the smaller the leverage deviation of the target leverage for companies with over-leveraged conditions. Thus, the hypothesis is as follows.

H5: The more sensitive the cost of equity, the faster the speed of adjustment.

III. Methodology

A. Sample Selection and Variable Definition

The sample consists of 950 publicly traded ASEAN-5 (Indonesia, Malaysia, Singapore, Thailand, and the Philippines) non-financial firms. The dependent variable is the cost of equity, leverage (recorded debt), and leverage deviation. The cost of equity is measured by using the Capital Asset Pricing Model method, following Da et al. (2012).

$$Cost\ of\ Equity = Rf + \beta(E(Rm) - Rf) \qquad (1)$$

Furthermore, since leverage deviation is defined as the difference between recorded debt and target leverage, finding the value of leverage deviation, the actual debt value, and the target leverage must be determined in advance. Therefore, to find the value of leverage deviation, we deducted target leverage from the recorded debt (Zhou et al., 2016, and Ippolito, et al., 2012). If the value is positive, then the company is called in an overleveraged condition. In contrast, if the result is negative, the company is in an underleveraged condition (Zhou et al., 2016. Ippolito et al., 2012). At the same time, recorded debt calculates as the ratio of total debt to total assets. We follow Zhou et al. (2016) to predict the target leverage for predicting the target leverage, which can be obtained by finding the fitted value of the annual cross-sectional regression of recorded debt with the determinant of capital structure with the following formula.

$$TL_{i,t} = \beta X_{i,t-1} + \epsilon_{i,t} \qquad (2)$$

The independent variable used in this study is the levered the cost of equity. The formula is as follows.

$$Levered\ K_e = K_e + (K_e - K_d) * (1 - T_x) * TDebt$$

where K_e is the cost of equity, K_d is the cost of debt, and T_x is the corporate tax rate.

The independent variable includes the crisis period from 6th August 2007 to 14th May 2009 (Dungey et al. 2015) and the sensitivity of the cost of equity. Furthermore, some control variables are used to incorporate the firm-specific and macro-economic variables that may affect the cost of equity and leverage deviation. The variables definition and the formula are presented in Table 1.

To consider the different level of debt used by a firm, we separate the data into two sub-samples into over-leveraged and under-leveraged firms. These sub-samples are used to test model 1 and 2. Furthermore, we add a financial crisis in every model, represented in hypotheses 2 and 4, since the financial crisis may affect the capital structure (Balios et al., 2016; Proenca et al., 2014, and Truong and Nguyen, 2016). Thus, it would capture the heterogeneity of capital structure, leading to a more precise result. In addition, to test the third model, we divide the sample into two groups based on high and low levels of the sensitivity of the cost of equity concerning the differences in speed of adjustment when the sensitivity of the cost of equity was higher (Zhou et al., 2016).

The analysis is divided into three sections. In the first part, we examine the impact of leverage deviation and leverage deviation in crisis period on the cost of equity. Second, we estimate the impact of the sensitivity of the cost of equity and the sensitivity of the cost of equity during the crisis on leverage deviation. Lastly, we investigate the effect of the sensitivity of the cost of equity on the speed of adjustment.

To obtain the best model, we conducted the Chow and Hausman tests to determine the sufficient model. We found that the GLS model is suitable for testing the first and second hypotheses and the fixed-effect model for testing hypotheses three and four. We also use the dynamic panel estimators based on a two-step difference Generalized Method of Moment (GMM) method developed by Arellano and Bond (1991) to avoid the endogenous effect that will lead to potential biases estimated coefficients. Table 1 describes the variables used in this study.

Table 1. Variables

No	Variables	Definition	Formula	Source
1	*Cost of Equity*	Cost of equity financing	Rf+ β(E(Rm)-Rf)	Zhi, et al, 2012
2	*Levered Cost of Equity*	Cost of equity which has been adjusted by leverage and tax	Ke+(Ke-Kd)*(1-Tx)*Leverage Level	Zhou, et al, 2016
3	Leverage Level	Ratio of leverage financing	Debt/(Total Asset)	Frank and Goyal, 2009
4	Target *Leverage*	Fitted Value from the target leverage estimation	TLi,t = βXi,t-1 + εi,t	Frank and Goyal, 2009
5	Sensitivity of *Cost of equity*	Sensitivity of changes in cost of equity because of changes in leverage deviation	(Unlevered Ke-Kd) * (1-Tx)	Zhou, et al, 2016
6	*Firm Risk*	Past 1-year stock liquidity	(Std Dev of Daily Returns)/ (Daily Returns Average)	Attig, et al, 2008
7	*Ln Asset*	Natural Logarithm in Total Asset adjusted by GDP Level	Ln ((Total Assets)/ (GDP Deflator 2007))	Frank and Goyal, 2009
8	*Total Asset*	Total Asset adjusted by GDP Level	(Total Assets)/ (GDP Deflator 2007)	Frank and Goyal, 2009
9	*Stock Liquidity*	Daily stock liquidity	(Amount of non-missing value daily returns)/ (Period Number)	Chen, et al, 2009
10	*Tangibility*	Firm's Expenditure for expansion	(Net PPE)/ (Total Assets)	Frank and Goyal, 2009
11	*Profitability*	Operating income in every asset used	(Operating Income before Depreciation)/ (Total Assets)	Frank and Goyal, 2009
12	*Inflation*	Growth of CPI Indices	(CPI - CPIt-1)/ CPIt-1	Frank and Goyal, 2009
13	*Leverage Deviation*	The difference of Leverage Level and Leverage Target	Leverage Level - Leverage Target	Zhou, et al, 2016

B. Empirical Model

To test H1 and H2 we use the following model.

$$r^L_{E_{i,t}} = v + \rho r^L_{E_{i,t-1}} + \varnothing \underset{\text{(H1)}}{L^{Dev}_{i,t}} + \pi \underset{\text{(H2)}}{Crisisdummy_t * L^{Dev}_{i,t}} + \tau Controls_{i,t} + \epsilon_{i,t} \quad (1)$$

Where $r^L_{E_{i,t}}$ is the cost of equity in year t, and $L^{Dev}_{i,t}$ is leverage deviation in year t. In this study, control variables are a firm risk, firm size, and stock liquidity variables. The initial model (1) used in this study has not included the dynamic factor of cost of equity, so this study includes the lag of cost of equity in the independent variable because there may be a relationship of cost of equity in the past to the next period (Zhou et al., 2016). In addition, $\pi Crisisdummy_t * L^{Dev}_{i,t}$ is used to examine the effect of leverage deviation on the cost of equity during a period of the financial crisis.

The test of H3 and H4 use the following model.

$$L^{Dev}_{i,t} = v + \underset{\text{(H3)}}{\rho L^{Dev}_{i,t-1}} + \chi \delta_{i,t} + \omega Crisisdummy_t * \underset{\text{(H4)}}{\delta_{i,t}} + \psi Controls_{i,t} + \epsilon_{i,t} \quad (2)$$

The second model is established to test the third and fourth hypotheses. The second hypothesis's main focus lies in the value of κ, and the lag leverage variable deviation. κ shows the relationship between the sensitivity of the cost of equity to leverage deviation. A positive value is predicted to be obtained for sub-samples with underleveraged conditions. In contrast, negative value is expected to be obtained for sub-samples with overleveraged conditions (Zhou et al., 2016). Also, $(\omega Crisisdummy)_t$ is used to consider the effect of the financial crisis on leverage deviation, and $(\omega Crisisdummy)_t * \delta_{i,t}$ is used to examine the effect of cost of equity sensitivity on leverage deviation. The control variables used in model 2 are including tangibility, profitability, firm size, and inflation. To analyze the dynamic effect of the leverage, the model includes the lag leverage variable deviation.

This study examines how quickly the company adjusts the level of its capital structure. Furthermore, to deal with heterogeneity issue, this study divided the regression estimate into a total sample, low sensitivity (50% of the sample with the lowest cost of equity sensitivity), and high sensitivity of the cost of equity (50% of the sample with the highest cost of equity sensitivity). The cost of equity, which is more sensitive to leverage deviation, will have a faster adjustment speed. So, the hypothesis to be tested is whether the higher sensitivity of the cost of equity will cause a faster speed of adjustment. The previous study found that a firm will adjust the capital structure only if the benefits obtained are higher than the costs incurred to balance the capital structure (Altinkilic and Hansen, 2000). The previous study concluded that the more sensitive the cost of equity, the smaller the leverage deviation to the overleveraged companies' target leverage (Zhou et al., 2016).

To test hypothesis 5 we use the following model.

$$L_{i,t} = (1 - \underset{\text{(H5)}}{\lambda}) L_{i,t-1} + \beta Controls_{i,t} + \eta_{i,t} \quad (3)$$

The third model aims to test the fifth hypothesis. Thus, we would like to examine how the speed of adjustment heterogeneity occurs in firms with different conditions of equity capital cost. The speed of adjustment is obtained from (1- Lag Debt coefficient). The study will be divided into four quartiles from the quartile with the highest to lowest sensitivity and uses the partial adjustment model to control the endogeneity issue.

IV. Results and Discussion

This section is focusing on descriptive statistics, the regression results and discussion. Table 2 shows the mean value, the dispersion and other statistical data of the sample. The leverage measures the firm's ability to pay off the debt so that the negative value of leverage shows a small exposure of debt in the firm. The cost of equity is measured using the CAPM method. Because of the negative market return in 2009 as an impact of the Global Financial Crisis, the value of the cost of equity can be detrimental. This condition also documented by Da et al. (2012). the data is winsorized at 5% and 95% to exclude the outliers.

Table 2 shows that the debt level has an average value of 0.1, with a minimum value of -0.389 and a maximum of 0.615. This debt level variable has a standard deviation of 0.242. A minimum negative value indicates a low level of debt from the sample used in this study, like Delta Electronics, a company from Thailand with the lowest debt level. It indicates that the primary source of capital is equity—the highest value of 0.615 owned by Holcim Indonesia, which prefers debt to equity financing.

Furthermore, Leverage deviation, which is the independent variable in model 1 and the dependent variable in model 2, has an average of 0.099. The leverage deviation variable has a minimum value of -0.460 and has a maximum value of 0.640. The minimum value indicates the firm is underleveraged or below its optimal targets. A maximum value of 0.640 indicates there are companies with overleveraged conditions or above their optimal levels. This Leverage deviation variable is obtained from the reduction of the current leverage level with the target leverage resulting from the fitted value of the regression estimation results of the Inflation, Tangibility, Profitability, and size for the leverage level of firms in ASEAN 5 (Indonesia, Malaysia, Singapore, Thailand, and the Philippines).

The mean value of the equity cost was 0.095, indicating that most of the ASEAN -5 used debt as their primary capital source. This variable is measured by considering the market return value. The minimum value of the cost of equity was -1.040. The cost of equity is measured as the stock return that is profoundly affected by the crisis, resulting in negative values. The third primary variable in this study is the sensitivity of the cost of equity. This variable has an average value of 0.041 and has a minimum value of -0.980 and a maximum value of 0.990. The standard deviation formed from the distribution of data on this variable is 0.25.

A. The Effect of Leverage Deviation and Leverage deviation during the Crisis on the Cost of Equity

Table 3 presents the regression results for hypothesis 1 and hypothesis 2. The estimation is conducted in two parts—the first part analyses subsample of overleveraged firms. The second part investigates underleveraged

Table 2. Descriptive statistics

Variable	Observation	Mean	Std. Dev.	Min	Max
Leverage Deviation	12.350	0,099	0,256	-0,46	0,64
Cost of Equity	12.350	0,095	0,292	-1,04	1,28
Sensitivity of *Cost of Equity*	12.350	0,041	0,25	-0,98	0,99
Leverage Level	12.350	0,1	0,242	-0,389	0,615
Firm Risk	12.350	0,162	0,105	0,02	0,51
Ln Firm Size	12.350	7,312	1,498	4,77	10,82
Liquidity	12.350	0,529	0,316	0,01	0,97
Tangibility	12.350	0,343	0,22	0,01	0,82
Profitability	12.350	0,104	0,084	-0,07	0,32
Leverage Deviation x Crisis	12.350	0,026	0,131	-0,4	0,62
Sensitivity of *Cost of Equity x Crisis*	12.350	-0,002	0,178	-0,98	0,63
Inflation	12.350	0,032	0,024	-0,01	0,13
Total	950				

firms. We found that the model using the GMM method is a valid model as indicated by the probability AR (2) and Probability (J-Statistics) value, which indicates no serial autocorrelation in the model.

The regression results in Table 3 show a positive and significant effect of the leverage deviation on equity costs. The effect is similar in the overleveraged and the underleveraged sub-samples using GLS. Besides, the result also similar in the under-leveraged firm using the GMM method. These results indicate that if the debt deviates from the target leverage, then the cost of equity will increase. These findings are consistent with the previous study by Zhou et al. (2016). The result implies that if there is an increase in the deviation of corporate debt, the firm must make adjustments to its investors by increasing the cost of equity. However, there is a different result between the GLS method and the GMM method in the underleveraged sub-sample. We apply the GMM method due to its advantages of handling unobserved endogeneity and heterogeneity. We conclude that there is no influence of leverage deviation on the cost of equity for the underleveraged sub-sample. This finding indicates that when the level of debt decreases, the cost of equity decreases, and vice versa. This result aligns with studies previously conducted by Dhaliwal (2006) and Ippolito et al. (2012). It is also consistent with Yoo and Wu (2019), that found a negative correlation between leverage and capital stock because the cost of equity must increase to capture the risk of higher leverage.

We also found that in overleverage firms, the effect of leverage deviation on the cost of the equity is negative during the crisis period. This finding indicates that firms will adjust their capital structure for a lower cost. This finding is aligned with Howe and Jain (2010). They identify that when firms increase their use of debt during the crisis, it will reduce the returns for the shareholders. This condition can occur because

Table 3. The effect of leverage deviation and leverage deviation during the crisis on the cost of equity

Variables (dep: *Cost of Equity*)	*Sub sample Overleveraged Firms*		*Sub sample Underleveraged Firms*	
	Baseline (GLS)	GMM Estimation	Baseline (GLS)	GMM Estimation
Lag Cost of Equity		-0.9245*** (0.0812)		-1.2926*** (0.1604)
Leverage Deviation	0.0622*** (0.01630)	3.5218*** -11.684	0.0619*** (0.01850)	4,690277778 (0.6074)
Leverage Deviation x Crisis	-0.0828** (0.03310)	-20.010*** -71.953	0.03000 (0.0394)	-10.380 -37.047
Firm Risk	0,227083333 (0.02900)	-1.0745* (0.6260)	0,253472222 (0.0337)	-35.826 -24.244
Firm Size	0.00575*** (0.00194)	-1.0218*** (0.2837)	0.00557** (0.0022)	-1.9951* -10.900
Liquidity	-0.0764*** (0.00930)	-0.2921*** (0.1616)	-0.0419*** (0.0108)	0.3174* (0.1667)
Observation	8333	8333	4017	4017
Firms number	641	641	309	309
Cons	0.0532*** (0.0182)		0.0528*** (0.0199)	
Prob AR (1)		0.0011		1,008333333
Prob AR (2)		0,304861111		0,151388889
J-Statistics		210.800		85.565
Prob(J-Statistics)		0,495138889		0,507638889

when there is an increase in the level of corporate debt in times of crisis, there will be an increased risk of bankruptcy so that stock returns obtained investors will decrease.

This result implies that companies with debt levels below their optimal targets have higher pressures during crisis conditions, so that company conditions are more uncertain than companies with debt above their optimal targets George and Hwang (2010). Thus, it makes the relationship between debt levels and the cost of the equity measures by stock return is negative. In terms of control variables, the study found a negative and significant effect of company risk on the cost of equity. The results are similar in both over and under-leveraged firms. This finding indicates that if the liquidity risk increases, the company will increase the debt, thereby reducing the return for the owner. Furthermore, this study also found a negative effect of firm size on the cost of equity. This finding implies that large firms generally have a lower level of risk, so the rate of return to investors is lower (Banz, 1981; Ibhagui and Okoloyo, 2018). Besides, the effect of liquidity on the cost of equity is negative in overleveraged firms. This finding demonstrates that firms with higher liquidity do not need additional equity. Therefore, it will reduce the cost of equity, especially in over-leveraged firms. In contrast, under-leveraged firms will need more debt. Therefore, it will increase firm risk and the cost of equity.

B. The Effect of the Sensitivity of the Cost of Equity and the Sensitivity of the Cost of Equity during the Crisis on Leverage Deviation

Table 4 shows that firms with overleveraged conditions experienced a negative and significant effect of the sensitivity of the cost of equity on leverage deviation both for the fixed-effect model and GMM estimation. This result indicates that the more sensitive the cost of equity, the deviation from the optimal debt use will decrease. The result implies that when there is an increase in the sensitivity of the cost of equity, the firm will adjust its debt to minimize the conflict of interest between shareholders and debt holders.

Theoretically, a potential conflict occurs between debt holders and equity holders (Jensen and Meckling, 1976). The conflict can occur since an increase in debt will increase agency costs from debt. After all, profits

Table 4. The effect of the sensitivity of the cost of equity and the sensitivity of the cost of equity during the crisis on leverage deviation

Variable (Dependent variable: *Leverage Deviation*)	*Sub sample Overleveraged Firms*		*Sub sample Underleveraged Firms*	
	Baseline (Fixed Effect)	GMM Estimation	Baseline (Fixed Effect)	GMM Estimation
Lag L Dev		0.5334***		0.4580***
		(0.0644)		(0.0448)
Sensitivity Cost of Equity	-0.0478***	-0.2925**	-0.0827***	0.028
	(0.0140)	(0.0935)	(0.0189)	(0.1042)
Sensitivity Cost of Equity x Crisis	0.0394**	0.3716**	0.0753***	-0.054
	(0.0153)	(0.1262)	(0.0222)	(0.1446)
Profitability	-0.546***	-0.8026**	-0.475***	-0.4232
	(0.0591)	(0.3213)	(0.0669)	(0.3115)
Tangibility	0.218***	0.1852***	0.454***	0.4982***
	(0.0357)	(0.0446)	(0.0561)	(0.0455)
Inflation	0.486**	18.019	0.913**	16.424
	(0.2090)	-15.226	(0.3650)	-16.055
Firm Size	0.0714***	0.1838**	0.0872***	0.2885***
	(0.0146)	(0.0735)	(0.0186)	(0.0464)
Observation	8333	8333	4017	4017

are borne by equity holders, while debt holders bear losses. Therefore, the firm will adjust the use of debt to minimize the conflict. The finding confirms the third hypothesis, that sensitivity of the cost of equity affects leverage deviation. The result is similar for the firm in underleveraged condition for the fixed effect model. However, we found a positive effect using the GMM estimation but insignificant. Thus, we can conclude that there is no significant effect of the sensitivity of the cost of the equity on leverage deviation in underleveraged firms.

This finding indicates that when overleveraged firms cost of equity is adjusted to alter the leverage deviation during the crisis, it will increase leverage deviation. The effect is similar for the underleveraged firms using the fixed effect model. However, there is a flipping effect when we use GMM estimation. The result indicates that although not significant, the effect of the sensitivity of the cost of the equity on leverage deviation is negative in the short run. Firms tend to choose a cheaper and optimal level of debt. The tendency is also relevant during crises, where the influence of leverage deviation on the cost of equity is negative. Thus, when companies increase debt, the cost of equity will be lower (George and Hwang, 2010). This condition occurs because companies with debt above the target have less systematic risk exposure than companies with smaller debts.

In a crisis, the capital structure becomes an important issue for the company (Yildiz, 2018). Boulton et al. (2014) suggest, a crisis is a very dynamic situation and high uncertainty, so there is a tendency for investors to secure their assets. Thus, as a precaution, the firm will try to make the investors feel safe by reducing debt and using equity to avoid the risk of default (Niemczak, 2013). Therefore, when the sensitivity of the cost of equity increases, it means that the increase in debt has an impact on the lower costs that the company must incur, so the company will increase the level of debt because it is cheaper than using lower debt (George and Hwang, 2010). This result implies that when underleveraged firms diverge their debt from the optimum level in the crisis period, the change of the equity cost will reduce the deviation in the short run.

In terms of the effect of control variables on the leverage deviation, this study finds that profitability harms leverage deviation. This result indicates that firms with higher profits have less possibility of being distress (Frank and Goyal, 2009). This finding proof of the dynamic trade-off model, where profitability has a negative relationship with debt. Furthermore, the lower the likelihood of distress, and the fewer agency problems regarding debt, making a positive relation between tangibility and debt. This result indicates that firms with high business expansion will need more debt. Furthermore, we found that inflation has a positive effect on leverage deviation. This evidence shows that the more sensitive the cost of equity in conditions of high inflation, the company will add more debt.

C. The Effect of the Sensitivity of the Cost of Equity and the Speed of Adjustment

The firm will adjust the existing conditions with the target capital structure to obtain the optimal capital structure. A regression estimation results show that a firm with a higher sensitivity of the cost of equity will adjust faster to the target level.

Table 5 presents the effect of the sensitivity of the cost of equity and the speed of adjustment. Results in Table 5 show the regression results of the relation between the sensitivity of the cost of equity to leverage deviation with the speed of adjustments. Column 1 reports the results of the entire sample. In contrast, column 2 and 3, respectively, present the lower 50th percentile sample with a lower sensitivity of the cost of the equity to leverage deviation and the high 50th percentile. The coefficient of interest is related to the lagged leveraged variable (1-SOA). It means that the higher the estimated coefficient, the lower the SOA.

The results show that the firms in the higher percentile adjust faster than firms in the lower percentile. Specifically, the higher percentile's average SOA value was 0.3732 (1-0.6268), while the average value of SOA of the lower percentile was 0.3324 (1-0.6676). These

Table 5. The sensitivity of the cost of equity and speed of adjustment

Variables	*Full Sample*	*Low Sensitive Cost of Equity*	*High Sensitive Cost of Equity*
	Leverage Level	*Leverage Level*	*Leverage Level*
Lag Leverage Level	0.9093***	0.6676***	0.6268***
	(0.1052)	(0.0460)	(0.0363)
Lag Profitability	0.2273***	0,2958	-0.0925
	(0.0482)	(0.0448)	(0.0637)
Lag Tangibility	-0.1105	-0.0113	0,1597
	(0.0720)	(0.0341)	(0.0412)
Lag Inflation	0.0354	0.1487	0.5904
	(1.8133)	(0.4002)	(0.7996)
Lag Firm Size	0.1682	0.0715***	0.0783*
	(0.1214)	(0.0229)	(0.0287)
Prob AR (1)	0.0000	0.0000	0.0000
Prob AR (2)	0.0343	0.6481	0.3832
J-Statistics	10.832	59.8938	47.3454
Prob(J-Statistics)	0.6991	0.5877	0.2295

results indicate that the more sensitive the cost of equity is to the leverage deviation from the target, the faster the adjustment. In contrast, the estimated average SOA of the whole sample is the first column, which implies a slower adjustment than the lower and higher percentiles. It shows that the disregard of heterogeneity in SOA will mislead the adjustment period to the target leverage.

Lemmon et al. (2008) find that the firm's level of speed of adjustment depends on the debt distribution in cross-sectional terms. This study's findings are in line with the results of previous studies regarding the application of dynamic trade-off theory to speed of adjustment. They found that firm with a high cost of equity sensitivity had a greater degree of capital structure adjustment (Zhou et al., 2016). This condition has implications for corporate decision making; that is, the firm must have a contingency plan to keep the company stable. Besides, it is essential to include heterogeneity in assessing the speed of adjustment because companies with different characteristics have different adjustments (Fitzgerald and Ryan, 2019).

V. Conclusion and Implication

The fact that ASEAN's debt exposure increased from 2010 to 2017 (S&P global ratings, 2017) motivates this study as debt has a vital role in a firm's capital structure (Balios et al., 2016; Proenca et al., 2014, and Truong and Nguyen, 2016). This study's main objectives are to determine the impact of leverage deviation of target leverage on the cost of equity in the ASEAN-5 region. Specifically, this study examines the sensitivity of the cost of equity to leverage deviation and the leverage speed of adjustment. This study also considers the effect of the global financial crisis in 2008, when most of the firm experienced financial difficulties.

We found that the leverage deviation is positively and significantly affect the cost of equity. Furthermore, the more sensitive the cost of equity, the deviation from the optimal debt use will decrease. This finding indicates that firms will adjust their debt to minimize the conflict of interest between shareholders and debt holders, supporting research conducted by Yoo and Wu (2019) that showed a negative correlation between leverage and capital stock. However, we find an inverse relationship in the underleveraged sub-sample. These findings imply a different level of importance of the cost of equity across the firms.

The effect of leverage deviation on the cost of the equity is negative during the crisis period. This finding indicates that firms will adjust their capital structure for a lower cost. It indicates that when firms increase their use of debt during the crisis, it will reduce the shareholders' returns. Moreover, this study finds a positive and significant effect of the sensitivity of the cost of equity on leverage deviation in overleveraged sub-sample. This finding indicates that when overleveraged firms cost of equity is adjusted to alter the leverage deviation during the crisis, it will increase leverage deviation. In contrast, although insignificant, the effect is negative in the underleveraged sub-sample, which implies that firms tend to choose a cheaper and optimal debt level.

We found compelling behaviour in the relation between the sensitivity of the cost of equity to leverage deviation on the leverage speed of adjustments. The result shows that the higher percentile firms adjust faster than firms in the lower percentile, indicating the higher sensitivity of the cost of equity is to the leverage deviation from the target, the faster the adjustment. In contrast, the estimated average SOA of the whole sample indicates a slower adjustment compared to both the firms in the lower and higher percentiles. It implies that the disregard of heterogeneity in SOA will mislead the adjustment period to the target leverage.

Our results also showed that trade-off theory would be more meaningful to be tested in more specific conditions. We found different results between the impact of leverage deviation on the cost of equity during normal conditions and financial crisis. Thus, future studies might consider the firm's leverage behavior during the COVID-19 pandemic. In addition, based on the research findings, it is expected that the related regulator provides such a standard of the company's debt structure and the sensitivity of cost equity. Thus, it will allow firms to realize whether in high or low-cost equity sensitivity conditions and establish contingency plans regarding the company's ability to adjust the level of capital structure. Thus, it is also beneficial for the regulator to adjust the regulation for the crisis and non-crisis conditions.

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The Bounce-Back Effect: Checkmating Competitors with the Cold Hand

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A B S T R A C T

Purpose: The paper investigates the effect of winning performance streaks (the hot hand) and losing performance streaks (the cold hand) on future performance. Performance streaks have many implications in business settings, such as selecting stocks, hedge fund performance, employee performance, introducing new products, and business strategy.
Design/methodology/approach: The paper empirically analyzes the effects of performance steaks. It uses data from world blitz chess championships.
Findings: Contrary to some studies in competitive sports, the empirical analysis supports neither the hot hand nor the cold hand hypothesis. Instead, a new effect is discovered; performance increases following a loss. We term this effect to be the bounce-back effect.
Research limitation/implications: Future research may conduct field experiments to investigate which business environments are likely to generate this effect. Similar to other studies on performance streaks, the analysis does not control for motivation. Future research may also analyze the role of motivation for performance.
Originality/value: The paper identifies a new effect previously not investigated in the literature. In addition, the paper contributes to this literature by looking into competitive blitz chess, where psychological factors are more important than physiological factors. If the bounce-back effect holds more generally in other settings, it might have implications for predicting the performance of employees in competitive business environments.

Keywords: Performance Streaks, Bounce-back Effect

I. Introduction

The effect of performance streaks on future performance has fascinated behavioral economics for decades. While performance streaks are mostly discussed in sports, they have many implications in business (selecting stocks, hedge fund performance, employee performance, introducing new products, business strategy, etc.). With a few exceptions where researchers looked into performance streaks of mutual funds in terms of excess returns (Hendricks et al. 1993; Kosowski et al. 2006; Mauboussin and Arbesman 2011), previous research mostly uses data from competitive sports with winning performance streaks known as the hot hand phenomenon and losing performance streaks known as the cold hand phenomenon. Generally, sports data is used due to fan interest as well as interest in sports betting, and it readily lends itself to econometric analysis (Lee and Smith 2002; Kochman et al. 2017; Lyócsa and Výrost 2018). Using sports data creates

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a controlled experiment, which may not be easily implemented in business settings. Surprisingly, the effect of performance streaks has not been investigated in chess by researchers, which this paper remedies. Furthermore, the decision-making process in chess, rather than in traditional sports, is more closely related to the decision-making in business because sports emphasize physical strength and physical skills, whereas chess emphasizes cognitive skills. This paper finds neither a hot hand nor a cold hand in chess. Instead, it finds a new effect, which this paper calls "the bounce-back effect," since a loss appears to provide more of an incentive to win the next game.

There is a link between chess and business. Playing chess creates some positive externalities, which can help form judgment and decision-making, which are the hallmarks of behavioral economics. According to Chess.com, some of the benefits include the teaching of consequences, how to win and lose, developing logic and problem-solving skills, and pattern recognition.[1)] As noted in *Harvard Business Review* article, games can improve the strategic thinking skills of business managers (Reeves and Wittenburg 2015). Judgment and strategic decision-making skills in chess are closely related to cognitive skills necessary in business, economics, politics, social interactions, and everyday life decisions (Kasparov 2008). Bob Rice, a managing partner of Tangent Capital and Bloomberg Television's alternative investment editor, highlights that chess mirrors the business world. His book provides specific examples and case studies of how chess strategies can be applied in business (Rice 2008). Unsurprisingly, some business strategy books illustrate chess pieces on their covers (David 2021; Gamble et al. 2018; David et al. 2019).

When studying performance streaks using data from traditional sports, one of the drawbacks is that it is hard to differentiate between psychological and physiological factors affecting players' performance. Since chess is a game of intellect and not brawn, chess controls for the physiological factors, which more easily permits the focus to be on incentives and decision-making. Another drawback is that it is hard to control for opposing teams or opposing player(s)' defensive physical responses when analyzing sports data.[2)] Chess also removes this hurdle. An indicator of strength and performance for chess players is the Elo rating system.

The Elo rating system has been adopted by the International Chess Federation (FIDE) and national chess federations such as the United States Chess Federation. Each competitive chess player is assigned a rating that describes the player's strength. Elo ratings vary from 0 to 3000 (Glickman and Jones 1999). While novice players have ratings under 1200, international masters and grandmasters are rated above 2400 (Elo 1986). The difference in players' Elo ratings is a good predictor of performance, and it is widely used to detect above-normal and below-normal performances. Therefore, the players' rating differences are used to detect unusual player performances.

To understand how the effects of performance streaks may influence economic decision-making situations, one needs to look into an activity where the role of psychological/cognitive factors is more important than the role of physiological factors. Chess most certainly fits this description. The data in this paper is gathered from world blitz championship tournaments. World blitz chess championships are exciting events for chess aficionados due to the tournaments' fast pace. While each chess player usually has two hours for the first forty moves in a regular chess tournament, the time control for the blitz tournament is three minutes per player per game with two seconds of time added after each move.[3)] The whole blitz tournament is played within two days, compared to regular/classic chess tournaments, which can last up to several weeks. Blitz chess championships are appropriate for our study because the shorter time between the matches

1) For more information on the benefits of chess, please refer to the following website: https://www.chess.com/article/view/benefits-of-hess#:~:text=Chess%20helps%20develop%20problem%2Dsolving,and%20minuses%20of%20your%20choices.

2) Performance streaks have been analyzed in single-player sports such as tennis, table tennis, swimming, etc., but in all these sports, there is still a physicality involved.

3) FIDE. *Regulations for the FIDE Open World Rapid & Blitz Championships 2023*. Available at https://handbook.fide.com/files/handbook/wrbc_regulations_2023_open.pdf, accessed August 4, 2022.

minimizes the effects of other factors on player performance such as prolonged additional coaching opportunities, mental fatigue, or potential loss of momentum caused by long lapses in play, mind games, i.e., psychological tactics to distract opponent, etc. In addition, many more games are played daily in blitz chess competitions due to shorter time controls as each player may play up to twenty-one games in an open world blitz chess championship.

This paper finds that having a winning streak does not improve performance and having a losing streak does not decrease performance. Instead, a new effect, which has not yet been identified in the empirical behavioral economics literature, has been found. This paper finds that a player's performance increases, by a small margin, following a loss, which is referred to as the bounce-back effect. The effect is so named since a loss provides a boost or an incentive for the player to perform better in the next game and hence, "bounces back" after a loss.[4] The ability to mentally rebound from a loss or bad news has important implications in the field of behavioral economics since it can lead to more favorable economic outcomes for the individual and society at large.

Regarding the organization of this paper, Section 2 summarizes the previous literature on the topic, Section 3 presents the data, Section 4 presents and analyzes the empirical results, and Section 5 concludes.

II. Literature Review

A brief literature survey of performance streaks in various sports, such as American football, baseball, basketball, bowling, darts, golf, table tennis, tennis, swimming, soccer (football), and volleyball, is offered in the Appendix 1. Some of the literature finds very little or no evidence supporting the existence of the hot hand in sports (Gilovich et al. 1985; Tversky and Gilovich 1989; Stins et al. 2018). Alternatively, some studies do confirm the existence of the hot hand in sports data (Taylor and Demick 1994; Gilden and Wilson 1995; Abrevaya 2002; Green and Zwiebel 2017). In the finance literature, performance streaks of mutual funds are attributed either to luck, skill, or a combination of luck and skill (Kosowski et al. 2006; Hendricks et al. 1993; Mauboussin and Arbesman 2011).[5]

Furthermore, some researchers argue that the hot hand exists, but it is masked by only looking at short samples rather than at longer samples (Livingston 2012; Waggoner et al. 2014). Others argue that the studies, which find no evidence of the hot hand in sports, fail to properly account for offensive and defensive responses when players or teams experience performance streaks or that the framing of the hot hand analysis changes the results (Shea 2014; Raab and MacMahon 2015).

Regarding the cold hand phenomenon, Arkes (2016) finds a cold hand in golf while Jordet, Hartman, and Vuijk (2011) find one in soccer, and Taylor and Demick (1994) find that losing players have a higher probability of a negative outcome.

There is also a regression to the mean effect in the literature, which refers to a player's uncharacteristically good or bad performances that ultimately revert to their mean performance. Attali (2013) and Shea (2014) find some evidence for the regression to the mean effect concerning basketball data as does Abrevaya (2002) concerning bowling in the long run.

Some of the other research into winning performance streaks is mixed. For instance, Malueg and Yates (2010) find that the second set's winner in a three-set tennis match has a higher probability of winning the third set. Den Hartigh and Gernigon's (2018) findings are mixed for a cold hand. They find that calling a time-out can diminish a winning streak, and it can help to reverse a losing streak as well.

4) The regression to the mean effect refers to a player's extraordinary performance reverting back to their average performance (Abrevaya 2002; Barnett et al. 2005), which is different from the bounce-back effect. The bounce-back effect refers to a one-time boost after a loss. It should be noted that the Gambler's Fallacy refers to the expectation of an opposite of an event occurring if said event occurs more frequently than it should (Huber et al. 2010).

5) According to Phung and Khuong (2017), personality traits can also affect investment decisions.

III. Data

The data is obtained from Chess-Results.com website.[6] In particular, the match results from the 2014 to 2018 Open World Blitz Chess Championship and Women's World Blitz Chess Championship tournaments, as organized by FIDE, are analyzed.[7] The open chess tournaments are open to both men and women, while women's chess tournaments are open only to women. Only a few women participate in the open tournament at the highest level of play, even though the FIDE does not directly restrict any chess tournaments to be for men only.[8]

The data sample precedes a sudden rise in popularity of chess, especially online chess, which has occurred due to the Covid-19 pandemic and the airing of Netflix's "The Queen's Gambit."[9] Having new players attracted to chess further ensures the longevity of this ancient sport, but the lack of experience in chess players would add some noise to the dataset, which could skew the findings. Hence, the dataset is limited to the 2014 to 2018 Open World Blitz Championship and Women's World Blitz Chess Championship tournaments.

Open blitz tournaments are played for 21 rounds using the Swiss chess pairing system. In contrast, women's blitz tournaments are played with either 17 or 21 Swiss pairing rounds, depending on the year of the tournament.[10] The Swiss pairing system is the most commonly used tournament format in competitive chess, which essentially pairs players with similar cumulative running total scores in the tournament. Blitz chess games are limited to three minutes per game per player, with two seconds added to the player's clock after each move.

Games played by players, who do not play the whole tournament, and games against opponents with unrated blitz ratings are not included in the dataset.[11] This yields 18,530 observations from 647 players. The summary statistics for the data are presented in Table 1.

The players' average FIDE Elo rating, which describes the relative skill levels of players, is 2590.9 in the open tournaments and 2299.1 in the women's tournaments. In both the open and women's tournaments, the highest number of winning streaks is eight games, while the highest number of losing streaks is seven games. The variable *WHITE* is included in the summary statistics since players playing with the white chess pieces make the first move, and therefore, have a first-move advantage.

Players' FIDE Elo ratings are used to calculate the expected score from each game. The expected score is calculated as follows:[12]

$$Expected\ Score = \frac{1}{\left[1+10^{\left(\frac{R(B)-R(A)}{400}\right)}\right]} \qquad (1)$$

In the above equation, R(A) represents a given player's Elo rating, while R(B) represents the given player's opponent's Elo rating. The expected score is a continuous variable between 0 (loss) and 1 (win). When players have equal ratings, the expected score equals ½, which is considered a draw in terms of

6) chess-results.com. Accessed October 20, 2019.

7) The Open World Blitz Championship generally takes place each year. The 2015 Women's World Blitz Championship is not included in the dataset due to the event being canceled. Furthermore, the data from the 2014 Women's World Blitz Championship is not included since the tournament organizers experimented with different chess rules that permitted a game to end with one of five possible outcomes instead of the traditional three-game outcomes of win, loss, or draw.

8) In this data sample, only two female chess grandmasters can be identified as having played in the open blitz tournaments.

9) Due to its popularity, the live streaming of chess quadrupled its number of viewing hours on Twitch between March 2020 and August 2020 when compared to the previous six months (Browning 2020). In the aftermath of the airing of Netflix's "The Queen's Gambit", the sale of chess sets has increased by 125%, and Chess.com, a popular online game website, has been registering 100,000 new players a day while hosting more than 1 million games per day (Fazio 2020; Dean 2020).

10) Women's World Blitz Chess Championship tournaments are played for fewer rounds due to the fewer number of participants.

11) It should be noted that FIDE Elo ratings include a time control category, and some titled players may not have a blitz chess rating even though they have a chess performance rating under classical time control.

12) Equation (1) is appropriate to use in our analysis because this is the actual formula that forms the base of Elo rating calculations (Glickman and Jones 1999). A detailed discussion of Elo rating derivation and its statistical properties are presented in Elo (1986).

Table 1. Summary statistics

Variable	Combined		Open		Women's	
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
SCORE	0.5144	0.4453	0.5167	0.4422	0.5070	0.4550
RATING	2520.9	212.0	2590.9	174.9	2299.1	160.1
WIN_1	0.3968	0.4892	0.3918	0.4882	0.4123	0.4923
WIN_2	0.1371	0.3439	0.1313	0.3378	0.1552	0.3621
WIN_3	0.0454	0.2083	0.0418	0.2001	0.0570	0.2318
WIN_4	0.0142	0.1183	0.0128	0.1124	0.0186	0.1352
WIN_5	0.0039	0.0622	0.0032	0.0565	0.0061	0.0776
WIN_6	0.0011	0.0336	0.0009	0.0292	0.0020	0.0449
WIN_7	0.0004	0.0194	0.0003	0.0169	0.0007	0.0259
WIN_8	0.0002	0.0127	0.0001	0.0119	0.0002	0.0150
LOSS_1	0.3600	0.4800	0.3569	0.4791	0.3700	0.4828
LOSS_2	0.1241	0.3297	0.1202	0.3252	0.1365	0.3434
LOSS_3	0.0420	0.2007	0.0399	0.1958	0.0487	0.2152
LOSS_4	0.0138	0.1165	0.0119	0.1086	0.0195	0.1383
LOSS_5	0.0045	0.0672	0.0033	0.0571	0.0085	0.0919
LOSS_6	0.0017	0.0409	0.0009	0.0304	0.0040	0.0634
LOSS_7	0.0008	0.0275	0.0002	0.0146	0.0025	0.0496
WHITE	0.4999	0.5000	0.5001	0.5000	0.4996	0.5001
N	18,530		14,070		4,460	

skill. As noted earlier, an Elo difference of paired players is deemed a reliable predictor of a match.

IV. Empirical Results

A fixed effects regression model is estimated with the actual score from a game being used as the dependent variable. The objective is to analyze how winning and losing streaks affect performance relative to the expected performance given player strengths.

The independent variables include the players' expected score from the game, winning or losing streaks, and a dummy variable indicating whether a player is playing with the white chess pieces. The winning streaks are denoted as *WIN_i* where $i = \{1, \cdots, 7\}$ and the losing streak are denoted as *LOSS_j* where $j = \{1, \cdots, 7\}$. For example, *WIN_i* indicates that the player has won the last *i-number* of games; alternatively, *LOSS_j* indicates that the player has lost the last *j-number* of games. The fixed effects control for the time-invariant, player-specific factors that could be correlated with the other independent variables. Table 2 presents the estimated regression results.

Regressions are estimated using (i.) combined data from the open and women's tournaments; (ii.) data from the Open World Blitz Championship; (iii.) data from the Women's World Blitz Chess Championship; (iv.) players with Elo ratings below 2700 from both the open and women's tournaments, and (v.) players with Elo ratings greater than or equal to 2700 from both the open and women's tournaments. In chess, players rated 2,700 or higher are considered very highly ranked players and are frequently referred to as super grandmasters.[13)]

As predicted, the expected score calculated from the players' ratings difference has a statistically significant positive effect on the actual score at a 1% significance level in all regressions. Thus, players' ratings are the main predictor of the game's outcome. The expected score has the largest estimated coefficient for players rated at and above 2700 Elo points. One plausible explanation is that the performance levels are more consistent for the higher-rated players, and therefore, are more closely aligned with the rating differences.

In addition, as predicted, the players, who played

13) Super grandmaster is not an official FIDE chess title, but it is one commonly used in the chess community.

Table 2. Regression results from the fixed effects model

Variable	Combined	Open	Women's	Rating < 2700	Rating >= 2700
EXP_SCORE	0.8458***	0.8825***	0.7325***	0.8564***	0.9753***
WIN_1	-0.0026	-0.0049	0.0039	-0.0072	0.0175
WIN_2	0.0115	0.0089	0.0189	0.0112	0.0181
WIN_3	0.0087	0.0255	-0.0375	0.0151	-0.0101
WIN_4	-0.0169	-0.0497	0.0591	-0.0251	0.0150
WIN_5	0.0167	0.0183	-0.0055	0.0406	-0.0313
WIN_6	0.0992	0.0580	0.1338	0.1284	0.0355
WIN_7	0.3084	0.5644*	0.0478	0.2611	
WIN_8	-0.6743**	-0.7737*	-0.6671	-0.6737**	
LOSS_1	0.0263***	0.0342***	-0.0016	0.0184*	0.0619***
LOSS_2	0.0077	-0.0035	0.0432*	0.0067	0.0302
LOSS_3	-0.0022	-0.0011	-0.0090	-0.0029	0.0301
LOSS_4	0.0245	0.0123	0.0504	0.0288	-0.2637
LOSS_5	-0.0145	-0.0170	-0.0208	-0.0167	
LOSS_6	0.1476	0.2984**	-0.0853	0.1473	
LOSS_7	0.0271	0.0480	0.1773	0.0286	
WHITE	0.0598***	0.0658***	0.0406***	0.0580***	0.0675***
Constant	0.0935	-0.0951	0.1699***	0.0927	0.0974
N	18,530	14,070	4,460	15,590	2,940
R2	0.1573	0.1665	0.1360	0.1592	0.10892
F	5.03***	5.48***	3.62***	4.69***	3.51***

* Significant at 10% level, ** significant at 5% level, ***significant at 1% level.

white, had higher scores. The effect is statistically significant at the 1% significance level in all regressions. The magnitude of the effect is between 0.04 and 0.068. This corresponds to approximately one additional win in every 15 to 25 games, or a rating improvement of 28 to 47 points for a player playing white against an opponent with an equal Elo rating.

Looking at the pattern of winning and losing streaks, the data supports neither the hot hand nor the cold hand hypotheses. The hot hand hypothesis implies that wins improve performance in the next game. The estimated coefficients of the winning streak variables are either statistically insignificant or have a negative sign with one exception. The exception regards the estimated coefficient of the *WIN_7* variable, which is positive and statistically significant at the 10% significance level when using data from the Open World Blitz Championship. Hence, the hot hand hypothesis is not supported.

Symmetrical to the hot hand, the cold hand hypothesis implies that losses lower performance in the next game, and therefore, the estimated coefficients should be negative for losing streaks. The coefficients of these variables from the regressions are either positive or statistically insignificant. Therefore, the data does not support the cold hand hypothesis.

The estimated regression results show evidence of a performance reversal following a loss. The variable, *LOSS_1*, is statistically significant at the 1% significance level in three regressions (combined data, open tournament data, and rated 2700 and above data) and at a 10 percent level in one regression (rated below 2700 data). The estimated coefficient of the variable is positive. This indicates that losing a game improves a player's performance relative to their rating in the next game. The magnitudes of the estimated coefficients range between 0.018 and 0.062, corresponding to approximately a 13 to 43 rating points improvement when a player faces an opponent with an equal rating level. With a couple of exceptions, the estimated coefficients of the losing streak variables, i.e., *LOSS_j* for $j > 1$, are not statistically significant. This implies that losing more than one game in a row is unlikely to influence subsequent performance; the performance-enhancing effect is from losing the last game and not from a cumulative loss of games.

In women's tournaments, *LOSS_1* is statistically insignificant. *LOSS_2* is statistically significant (at the

10% level) with a positive coefficient in women's tournaments. The coefficients of *WIN_8* are also statistically significant in three regressions. However, clear conclusions regarding the latter result cannot be made because only three players in the dataset had an eight-win streak. Further analysis using an expanded data set is needed to investigate the effects of longer winning streaks.

We note that F-tests are significant, while R-squared values are between 10-20% in our regressions. One of the explanations for this result is the nature of blitz games. Chess fans find blitz chess tournaments exciting because a fewer percentage of games end in draws, and it is not uncommon for a strong player to lose to a much weaker player. This, however, makes it harder to predict the outcome of individual games and yields lower R-squared values for our estimated models.

V. Conclusion

The effect of performance streaks on subsequent performance is of interest in behavioral economics. The paper contributes to this literature by looking into competitive blitz chess, where psychological factors are more important than physiological factors. The data does not support either the hot hand or the cold hand hypotheses. However, the analysis identifies a bounce-back effect, which has not yet previously been investigated in the empirical literature. The regression results show a statistically significant improvement in a player's performance levels after losing a game. It is hypothesized that this effect is due to either increased player motivation or concentration after losing a game. Future research on this issue could be warranted. It is important to note that the bounce back-effect differs from the regression to the mean effect, which is also a part of this literature in behavioral economics (Gilovich 1991). Regression to the mean assumes that performance fluctuates around a specific mean, while these results show a statistically significant improvement above a player's average performance level. Looking into the differences between open and women's tournaments, the bounce-back effect from losing the last game is observed in open tournaments but not in the women's tournaments. Future research may shed light on the reasons for this difference.

It might be tempting to amalgamate the bounce-back effect to the predictions of Learning Theory, which has three main branches, which are Behaviorism, Cognitive Constructivism, and Social Constructivism, but this would not be accurate. In general, a broad definition of learning is that practice or experience leads to a permanent change, according to Lachlan (1997), which is not aligned with the bounce-back effect.

The bounce-back effect does not fit into Behaviorism and Thorndike's Law of Effect, which states that a behavior has a higher probability of being repeated if the stimuli are positive in nature (Bélanger 2011, De Houwer et al., 2013). This, indeed, differs from the bounce-back effect, which states that a loss in Blitz chess motivates the losing player to "bounce back" and win the next match. Regarding Cognitive Constructivism, which is tied to Gestalt Theory, a learner through the process of trial and error is able to move to the answers, and thereby, gain that Eureka moment, which is very similar to Rational Expectations. With Rational Expectations, a person is able to update their information set so that their future forecasts are optimal (Muth 1961). With the bounce-back effect and the speed of blitz chess, there is no process of trial and error that permits the player to sequentially move towards a win. For the third branch of Learning Theory, Jonassen (1991) states that (Social) Constructivism regards the learner creating reality or knowledge based on the person's own experiences with there being no universal reality or knowledge. With blitz chess, there is consensus on what constitutes a win and a loss, so Social Constructivism is not applicable to blitz chess or the bounce-back effect. Hence, the bounce-back effect, which states that a losing player has a slightly higher probability of winning the next match is not aligned with the three main Learning Theories of Behaviorism, Cognitive Constructivism, and Social Constructivism.

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Appendix 1. Literature review summary

Author	Data/Seasons	Hot or Cold Hand Outcome (Yes/No/Mixed)
American Football		
Badarinathi & Kochman (1994)	1983-92 NFL Seasons	Yes for hot hand. Finds that betting against teams with winning streaks to be profitable.
Paul, Weinbach, & Humpreys (2014)	2005-2006 and 2009-2010 NFL Seasons	Yes for hot hand. Teams with 3 or 4 game-winning streaks increases betting and the reverse is found to be true as well.
Baseball		
Albert & Williamson (2001)	Simulated Data	No for hot hand. Uses a Bayesian model to detect baseball hitting streaks.
Shea (2014)	2004-2012 MLB's Home Run Derby	Yes for hot hand. When there is no defense with respect to the MLB's Home Run Derby since there is very limited defense.
Green & Zwiebel (2017)	2000-2011 MLB Seasons	Yes for hot hand. In 5 statistical categories in baseball for hitters and 5 statistical categories pitchers.
Basketball		
Taylor & Demick (1994)	Five games from the 1990 NCAA Men's Basketball Championships	Yes for Hot Hand. Winning teams have higher probability of favorable outcomes.
Albert & Williamson (2001)	Simulated Data	No. Uses simulated data in a Bayesian model to detect basketball shooting streaks.
Attali (2013)	2010-2011 NBA Season	Mixed. A win by a player makes a player take riskier shots with a great probability of a loss but a win makes a coach less likely to replace the player. Also has possible regression to the mean.
Camerer (1989)	1983-1983 NBA Season	Yes for hot hand. Finds that betting on teams with winning streaks to not be profitable the reverse is found to be true as well.
Castel, Rossi, & McGillivray (2012)	Survey of 455 people with 22-90 age range.	Mixed. Older people more likely to believe in hot hand when compared to younger people.
Gilovich, Vallone, & Tversky (1985)	1987-1988 NBA Season (Selected Players)	No for Hot Hand. Finds that subsequent shots are independent of previous shots.
Shea (2014)	2009-2012 NBA's 3-point Shootout.	Yes for hot hand. Given there is no defense with respect to the NBA's 3-point Shootout. Also has possible regression to the mean.
Waggoner, Wines, Soebbing, Seifried, & Martinez (2014)	1979-2013 NBA Seasons	Yes for hot hand. Finds seasonal variation in how winning and losing streaks affect point spreads for betting but not game outcomes. Also have Gambler's Fallacy with respect to betting.
Bowling		
Yaari & David (2012)	2002-2011 PBA Seasons	Mixed. Do not seem to have a hot hand in individual games, but have hot hand when examining games in aggregate.
Abrevaya (2002)	1991-1997 PBA	Yes for hot hand. Previous wins for underdogs, impacts performance and creates winning streaks in the short-run but have regression to the mean in the long-run.
Darts		
Gilden & Wilson (1995)	8 paid recruits with previous dart-throwing experience with each set consisting of 300 dart throws. 4 Paid recruits to throw darts and to putt golf balls.	Mixed. Does not find Hot Hand in Darts alone but finds moderate evidence of winning streaks in tournaments consisting of both golf and darts.

Appendix 1. Continued

Author	Data/Seasons	Hot or Cold Hand Outcome (Yes/No/Mixed)
Darts		
Stins, Yaari, Wijmer, Burger, & Beek (2018)	Examines 8 official matches between 2012-2015 for each of the 10 best ranked dart throwers	No for hot hand. Finds some sequential dependence and non-stationarity, which is contrary to the hot hand, which refers to a stationary random independent process.
Golf		
Gilden & Wilson (1995)	Paid recruits for a session consisting of 300 putts—1st Group consisted of 40 players and 2nd group consisted of 5 players and the distance varied.	Yes for hot hand. Winning streaks could be due to no interruption provided by experiment design.
Livingston (2012)	4 golf tournaments in 2006: Nationwide; PGA; LPGA; and Champions Tour.	Mixed. Only have hot hand in Nationwide Tour, which has younger, more inexperienced golfers. Short winning or losing streaks are incorrectly attributed to the hot or cold hand.
Arkes (2016)	Top 200 golfers of the PGA Tour from 2003-2013.	Mixed. No hot hand effect but does find large cold hand effect.
Soccer		
Parsons & Rodhe (2015)	20 teams for 3 seasons of the English Premier League (EPL) from 2010-2013.	Mixed. Have negative momentum (cold hand) effect following winning streaks. Robust causal momentum of hot hand cannot be determined. No hot hand for individual players within games.
Jordet, Hartman, & Vuijk (2011)	Penalty shootouts for World Cup and European Championships from 1976 to 2006	Yes for cold hand. Teams with preceding loses performed worse in penalty shootouts.
Table Tennis		
Briki, Den Hartigh, Hauw, & Gernigon (2012)	**(Table Tennis and Swimming)** 4 table tennis players and 4 Swimmers with national and international experience from clubs in the south of France. Have average of 3.9 years of experience	Mixed but favoring hot hand. More ways to trigger negative psychological momentum (PM) than positive PM with "mastery orientation" boosted positive PM and helps to lessen negative PM.
Den Hartigh & Gernigon (2018)	**(Table Tennis Only)** 80 competitive table tennis players from the Netherlands in structured experiment	Mixed for cold hand. Calling time-out can diminish a winning streak but it can help to reverse a losing streak. A losing streak at the beginning of a game has less of an impact than a losing streak at the end of the game.
Tennis		
Taylor & Demick (1994)	1990 Men's and Women's U.S. Open Tennis Championships -5 matches from the quarterfinal and semifinal rounds	Hot Hand and Cold Hand. Winning players have higher probability of favorable outcomes than negative outcomes. Losing players have a higher probability of negative outcome.
Malueg & Yates (2010)	ATP tennis matches from 2002 to 2006-over 14,000 matches with players of differing abilities.	Mixed. Reject null of tennis matches ending in two sets. Winner of 1st set not able to capitalize on 1st win and take the second set (No hot hand). When match goes to 3 sets, winner of the 2nd has high probability of winning the 3rd set (Have hot hand).
Volleyball		
Raab, Gula, & Gigerenzer (2012)	26 male players in Germany's first-division volleyball league and 16 coaches from Berlin with a B- or C-level coaching license in volleyball	Yes for hot hand. Finds winning streaks for about 50% of the players. Both coaches and players are able to detect winning streaks and use them advantageously.
Raab & MacMahon (2015)	Twenty-nine students who majored in sport at a university where of the participants are 15 male and 14 female)	No for hot hand. Results depended on how the winning streak was framed.

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Managing Sustainability of Energy Transition among Expert Engineers: Co-creating Technopreneurial Orientation

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A B S T R A C T

Purpose: Research to improve co-creation in engineering and technopreneurial orientation is required to support the energy transition toward sustainability. This challenge is aimed at power system expert engineers, whose central role in the electricity sector is becoming increasingly complicated by the possibility of stranded assets, intermittency paradigms, and new patterns of energy flow. This research explains the importance of the co-creation process as a mediator to enable the utilization of the technopreneurial orientation among expert engineers in supporting the sustainability of the electricity sector.
Design/methodology/approach: The survey method was carried out to collect data from expert power system engineers with more than ten years of experience in the national electricity sector. The quantitative method with structural equation modeling analysis and a partial least square approach was used in this research.
Findings: Empowering expert engineers in a technopreneurial orientation can encourage them to co-create by prioritizing dialogue that allows for accessibility and transparency when taking risks, which is an important aspect that boosts the co-creation effect in the energy transition to sustainability. The strong behavior of experts in utilizing technopreneurial orientation and the co-creation process has been demonstrated to be capability of adopting the three aspects contained in the energy trilemma index, energy security, energy equity, and environmental sustainability, which are modified to reflect a strong tendency to achieve sustainability in the electricity sector.
Research limitations/implications: Although this study's respondents are limited to expert engineers in the electricity sector, the findings have implications for the management of experts in other strategic and large-scale sectors. The limited number of respondents to expert engineers with more than ten years of work experience makes millennials excluded.
Originality/value: The measurement indicator becomes novelty in this study. Sustainability was adopted and modified from the energy trilemma index. Technopreneurial orientation adopted from Lumpkin & Dess (1996) was modified by the addition of technological expertise. Then, co-creation as a mediator is taken from the DART of value co-creation.

Keywords: Sustainability, Co-creation, Technopreneurial Orientation, Energy Transition, Expert Engineer

I. Introduction

The Covid-19 pandemic could serve as a catalyst for the greater use of new and renewable energy

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(NRE). Massive activity restrictions have resulted in a downward trend in global carbon emissions as a result of reduced energy consumption. Even so, developing NRE is a difficult task. Social restrictions during a pandemic are a challenge from the supply chain perspective, as is the interaction of workers, to the financial situation. Meanwhile, the competitive situation caused by fluctuating global fossil-fuel prices, which makes them more economically profitable, is a challenge in and of itself. Similarly, coal-fired power plants remain stalled due to investment contracts. Therefore, it is an important priority for the formation of a renewable energy framework (energy transition) towards electricity sustainability in the new world after the COVID-19 pandemic.

Indonesia, which has pledged to reduce global CO2 emissions as part of the Paris Agreement, is also a part of the energy transition. By 2025, Indonesia wants to achieve a 23 percent NRE utilization rate in its national energy mix. Indonesia's commitment to reduce emissions by 29 percent by 2030 is seen as a step toward a cleaner and more sustainable energy system, despite the fact that it is not ambitious enough. Until 2020, the country's total installed power generation capacity was 71 GW. Coal-fired power plants, on the other hand, continue to dominate, with NRE plants accounting for only 14.69 percent of total installed capacity (MEMR, 2021).

The next consideration for the formation of a renewable energy framework in the new world after the pandemic is the changing pattern of electrical energy consumption. The shift in the burden of electrical energy to the residential sector is also a separate consideration. As is known, the characteristics of household electricity consumption are very unique, depending on the activities of the occupants and the unique behavior of the occupants (Zohar, Parag, & Ayalon, 2020). Also as a consideration, the characteristics of the load (consumption) of electricity, it is not fully in accordance with the characteristics that supply (production) it, namely the majority of types of coal-fired power plants with a population of around 63.9% (Mulyana & Rahmawati, 2020).

The energy transition towards the use of renewable energy also needs to consider the characteristics of renewable energy plants, the majority of which have a strong dependence on the natural conditions in which they are located. This causes the operation of renewable energy power plants to be influenced by natural activities (Harjanne & Korhonen, 2019). Moreover, Indonesia, which is in a tropical climate, is currently experiencing uncertain natural conditions due to global climate change (Djalante & Thomalla, 2012; Sugiawan & Managi, 2016). Therefore, the above will be very complicated if it has to meet the target of reliability of electricity production.

Another consideration is the emergence of the use of micro-scale power plants used in housing. Roof-top Solar power generation can indeed help achieve the energy transition towards the use of renewable energy. However, the characteristics of this type of generator also require separate considerations. Intermittency due to dependence on nature, the potential for its scattered location, unique household consumption patterns, coupled with the emergence of small household-based industries, all of which must be important points that must be taken into account.

All these complexities require the active role of power system experts to engineer the solution. Since the electricity sector relies on high technology in almost all areas, this role must be increasing. The factors that must be faced include technological developments that are challenged from an economic perspective, the intermittency of NRE power plants which are strongly influenced by changes in weather and climate, the dependence of NRE power plants on the state of local natural resources as well as environmental changes and the dynamics of the local community which has a variety of characteristics as well. It is a challenge for power system experts in planning a reliable electricity system. Thus, to accommodate the energy transition towards electricity sustainability, the power system experts must be able to overcome these complexities.

Since sustainability is the main goal of the energy transition and everything is based on three basic aspects: people, profit, planet, harmonization will be needed to make it happen. Harmonization is needed so that other parties also take an active role in realizing overall sustainability through the energy transition in the electricity sector (Buana, Mursitama, Abdinagoro, & Pradipto, 2021). Therefore, the various complexities that occur above become the starting point of this research, namely the management of engineering activities carried out by power system experts in the field of electricity to new horizons.

The article continues with a literature review on energy sector sustainability as the main framework by modifying the Energy Trilemma Index as an indicator. Then, co-creation will be a means to accommodate the forms and characteristics of cooperation between parties. Meanwhile, technopreneurship orientation will drive the tendency of power system experts to utilize their expertise. The results of the analysis of the quantitative method will discuss trends that will have implications for the management of engineering activities that prioritize sustainability, as well as include them in future research.

II. Literature Reviews

A. Sustainability in a Value of Energy Trilemma

Sustainability performance as measured through the three-pillar approach to sustainability (triple bottom line/TBL) has become a widely accepted perspective (Lacy, Gupta, & Hayward, 2019). Measurement of sustainability performance has become the basis for control processes in business, one of which is used to measure organizational performance, whether sustainability-oriented or not, using three indicators, namely, economic, social, and environmental (Hourneaux Jr, Gabriel, & Gallardo-Vázquez, 2018). In support of that, the measurement will be carried out on electrical energy, which is the final form of energy that is best suited to achieving the energy transition to sustainability (Henbest, 2020). Therefore, the sustainability of electricity cannot be separated from the sustainability of energy as a whole (Goldrath, Ayalon, & Shechter, 2015).

According to the World Energy Council, sustainability in the energy context can be evaluated in the form of a more general sustainability index (WEC, 2018). The World Energy Council defines energy sustainability in the form of the Energy Trilemma Index, which includes three dimensions, namely energy security, energy equity, and environmental sustainability at the national level (WEC, 2017). The Energy Trilemma Index is an official indicator to measure energy sustainability performance in terms of a country's ability to provide a sustainable energy system through three balanced dimensions, namely, energy security, energy equity (accessibility and affordability), and environmental sustainability (Song, Fu, Zhou, & Lai, 2017).

B. Co-creation in Generating Value

Harmonization of various roles in creating sustainability requires an embodied process. Harmonizing various complexities in an engineering activity requires a good orchestration process. Departing from previous research which says that the complexity in the energy transition to sustainability comes from economic, social, and environmental factors (Grubb, McDowall, & Drummond, 2017). There is another statement about the complexity of the energy transition that actually comes from a non-technical side (Tainter, 2011). Until the finding that the complexity of the energy transition stems from the difficulty of the process to participate, participate and cooperate effectively among the experts involved (Johnson, 2007). So this study uses a value co-creation approach where a collaboration process that is more than just an interaction relationship between interested parties can jointly create a strategic function (Prahalad & Ramaswamy, 2004).

The conceptual journey of value co-creation has progressed in all directions. One of them is used to reduce information asymmetry between parties who have mutual interests (Prahalad & Ramaswamy, 2001). For this reason, indicators that are in the concept of dialogue, accessibility, risk, and transparency become a means of approach to assessing its success (Taghizadeh, Jayaraman, Ismail, & Rahman, 2016). Dialogue is a flow of information that requires deep involvement in lively interactivity with an empathic understanding and is based on the desire of both parties to act on the information received. Accessibility is formulated as freedom (right) to use facilities for dialogue, active participation, or joint use of resources in the value creation process. Meanwhile, risk has the meaning of being dependent between parties who have an interest in creating value together by upholding the values of honor and trust. Transparency is implemented as the availability of reliable, up-to-date information, and can facilitate and empower users to create quality value (Albinsson, Perera, & Sautter, 2016).

C. Technopreneurial Orientation

Since this study uses expert engineers as survey objects, a combination of technology-based expertise and entrepreneurial-based skill utilization is used in this study. Therefore, the term technopreneurship is used since it is still latent and has not been condensed by this term (Fowosire, Idris, & Elijah, 2017). The use of this term suggests the existence of innovative technology mastery skills, individual scientific insight, and technical knowledge, followed by the ability to create and manage businesses and take financial risks to achieve their goals and perspectives (Dolatabadi & Meigounpoory, 2013). So that it is felt to be compatible with the relationship of influence on the innovation ecosystem variable in this study. The concept of entrepreneurial orientation which contains elements of aggressiveness towards competitors and a tendency to act independently refers to the processes, practices, and decision-making activities that lead to a desire to innovate, take risks, and a tendency to be proactive towards market opportunities (Lumpkin & Dess, 1996).

The argument for using the technopreneurship variable here also departs from the assumption that not all people who are technically intelligent (engineers) and have high technical skills have skills in managing opportunities in entrepreneurial thinking. It is also emphasized that there are engineers who have high technical skills but few skills in business and entrepreneurial thinking (Prodan, 2007). Therefore, this study proposes the concept of technopreneurial orientation as a combination of entrepreneurial and tech-savvy orientation. So that there are three aspects, namely innovativeness, proactiveness, the courage to take constructive risks (Miller, 2011), two aspects of namely independence and competitive aggressiveness (Lumpkin, Brigham, & Moss, 2010), and added tech-savvy aspects, namely understanding modern technology and using their expertise to take advantage of the technology (Fowosire et al., 2017).

III. Development of Research Hypothesis

The energy transition opens up opportunities for the involvement of various parties to bring about changes for the better and more harmonious among electricity people (Szulecki, 2018). The co-creation process can improve sustainability performance that prioritizes togetherness in sustainability. Social, economic, and environmental harmonization as the foundation for collectively shaping the future, is shaped by togetherness in value creation (Ma et al., 2019). The increase in sustainability caused by the increase in co-creation behavior stems from the balance between the provider and beneficiary components in a harmonious environment (Kuenkel & Gruen, 2018). That the sustainability performance of the energy transition can be jointly directed to renewable energy, requires greater togetherness in making it happen (Jenkins, 2019). The increase in co-creation behavior which will be followed by an increase in sustainability is also supported by the statement that the creation of shared value affects the high joint success to realize sustainable development (Kruger, Caiado, França, & Quelhas, 2018). Based on that, that sustainability is a value that is embodied in the balance of the three main social, economic and environmental pillars that can be created jointly by interested parties, the proposed hypothesis is:

H1: The co-creation has a significant effect on the achievement of sustainability performance.

Technopreneurship can increase company growth because of the role of the actors who are good at empowering technology as a company resource (Dolatabadi & Meigounpoory, 2013). This is because technopreneurs can create new values that can sustain economic growth (Nurdiyanto, 2018). Because technology can drive the market to transform into a network that allows the process of creating shared value (Breidbach & Maglio, 2016). The interaction process for value creation is facilitated by the expertise of the actors in mastering the technology (De Silva & Wright, 2019). Due to technology is only a tool, so an entrepreneurial perspective and initiative are still needed to proactively and productively co-create value (Shams & Kaufmann, 2016). If entrepreneurs have personal characteristics that can involve themselves in every social and cultural structure (Gbadamosi, 2019), then value co-creation emphasizes mutually beneficial collaboration among stakeholders (Kohtamäki & Rajala, 2016). So the argument is following the opinion that the co-creation of value is supported by an entrepreneurial orientation (Marcos-Cuevas, Nätti, Palo, & Baumann, 2016). Based on that, value creation can be built jointly by the technopreneurial orientation shared by the entire strategic environment. So the proposed hypothesis is as follows:

H2a: The co-creation is affected significantly by the technopreneurial orientation.
H2b: The co-creation significantly mediates techno-preneurial orientation on the achievement of sustainability performance.

Entrepreneurship has a positive relationship with sustainable development in the presence of innovation and high technology (Youssef, Boubaker, & Omri, 2018). Technology-based entrepreneurship has the opportunity to play a greater role in promoting sustainable development (George, Merrill, & Schillebeeckx, 2020). Therefore, technology-based entrepreneurship becomes important when issues related to sustainable development occur (Nilsson, Jansson, Vall, & Modig, 2018). An entrepreneurial approach to sustainability generates themes that are closely related to great uncertainty and ignorance (Sung & Park, 2018). This affects the ability of actors to predict the future effectively to avoid the effects of its degradation (Dorion et al., 2018). To find out that sustainability is a manifestation of the balance of the three main pillars of sustainability, namely social, economic, and environmental which are influenced by technopreneurial orientation, the researcher proposes the following hypothesis:

H3: Technopreneurial orientation has a significant effect on the achievement of the sustainability performance.

IV. Methodology

In this study, an explanatory survey was conducted to determine the characteristics of the research object which can be identified from a series of analytical activities and research samples (Leedy & Ormrod, 2015). The data from this quantitative study were obtained from the results of distributing online questionnaires at one time (cross-sectional). A total of 149 answers from expert engineers in the main islands in Indonesia, reflecting 33 indicators of the variables of technopreneurship, co-creation, and sustainability. The indicator uses a 7-point Likert scale response, ranging from strongly disagree with a score of 1, to strongly agree with a score of 7. A Likert scale with 7 categories ensures a higher quality of the information in the data collection phase (Tarka, 2017). Scale 7 also provides a more accurate measure of electronically distributed and unsupervised questionnaires (Finstad, 2010) and is more suitable for use on respondents with high cognitive abilities (Weijters, Cabooter, & Schillewaert, 2010).

In this study, the variable technopreneurial orientation was measured using seven indicators by adopting from previous studies. The indicator is a combination of the two. First, from Lumpkin & Dess, (1996) for activeness in perfecting a new method/method/solution, intensity of activity in identifying opportunities, efforts to minimize risk to get opportunities, competitive activity in delivering solutions, independence to think and act in developing, produce and implement new ideas. Second, from Fowosire et al., 2017) for expertise in using technology to find opportunities, expertise in using technology to create opportunities.

Value creation is a strategic function of the interaction of parties whose shared interests contribute to creating a unique experience. Based on this, the DART model, namely Dialogue, Access, Risk, and Transparency, was developed as a necessary element for the creation of shared value (Taghizadeh et al., 2016). In this study the DART model was developed into 13 indicators; starting from the perception of the desire to have a dialogue with each other in sharing ideas/ideas, active dialogue with each other, the level of support for dialogue with each other, the availability of facilities for access, the opportunity to access, ease of access, the existence of control from both parties on access, understanding for each other. sharing risk, mutual respect in decisions related to risk, mutual trust in the risks borne, perceptions of the importance of information disclosure, information disclosure, perceptions of the quality of disclosure in information disclosure.

Furthermore, sustainability performance as measured through a three-pillar approach to sustainability (triple bottom line/TBL) has become a widely accepted perspective. Based on the TBL, economic, social, and environmental, the measurement of sustainability performance in this study uses 13 indicators (WEC, 2019); efforts to improve electrification/access to electricity connections, increase the affordability of electrical energy, availability of quality electrical energy, the relationship between companies and the community, management of the electricity system, reliability of the electricity system, resilience of the electricity system, flexibility of electricity infrastructure against trends of change, level of community prosperity, efficiency efforts of the entire electricity system, efforts to decarbonize the entire electricity system, efforts to use new and renewable energy, aesthetics of transmission and distribution networks.

This study uses structural equation modeling (SEM) analysis with partial least-squares (PLS) approach. The aim is to examine the relationship between variables in this case how the respondents' technopreneurship orientation through the co-creation process to create sustainability. SEM-PLS analysis in research using ADANCO software. The first stage is to test confirmatory factor analysis to obtain the validity and reliability of the constructs and their respective indicators. The second stage examines the structural model of the relationship between the variables. The value of the coefficient of determination is used to predict the contribution of the influence of the exogenous latent variable to the endogenous latent variable. Then the path coefficient value is used to determine the pattern of the effects caused by the exogenous latent variable on the endogenous latent variable. This study defines sustainability as an endogenous latent variable, co-creation as an intervening latent variable, and technopreneurial orientation as an exogenous latent variable.

V. Result

All indicators of measuring this variable are valid and reliable, as shown in Figure 1 on the loading factor value of each indicator, and Table 1, the brief descriptive output results of the ADANCO software. Figure 1 shows the coefficient of determination (R^2) 0.5139 which indicates 51.39% of the variance in the co-creation variable explained by the technopreneurial orientation variable.

While the value of the coefficient of determination (R^2) is 0.5826, indicating 58.26% of the variance in the sustainability variable explained by the co-creation and technopreneurial orientation variable. The results of the software output for the structural model show values such as Table 3. The path coefficient test results in this model have a value of 0.7169 on the path of the relationship between technopreneurial orientation and co-creation, indicating the higher the technopreneurship orientation among expert engineers in a collaboration, then co-creation will increase by 71.69% or more co-creation among engineers. Likewise, the path coefficient value of 0.5679 on the relationship between co-creation and sustainability, indicates thatsustainability will increase by 56.79% due to co-creation that occurs among engineers. Meanwhile, the path coefficient value of 0.2455 on the direct relationship between technopreneurship orientation and sustainability, is still lower than the value of the indirect effect of 0.4071, proving that the co-creation process mediates technopreneurship orientation among expert engineers to achieve sustainability. The complete results are shown in Tables 3 and 4. In this study, an indication of the size of the influence between variables is shown by the value of Cohen's f^2. The value of 1.0573 on the relationship between technopreneurial orientation and co-creation, and 0.3755 on co-creation and sustainability prove the magnitude of the influence between each. Meanwhile, the value of 0.0702 ignores the direct relationship between technopreneurial orientation and sustainability (Hair, Hult, Ringle, & Sarstedt, 2017).

The path coefficient value to be confirmed, the ADANCO software bootstrap 999 samples, and 5% confidence. The results obtained a t-value of 17.7863 and a p-value of 0.0000 on the relationship between

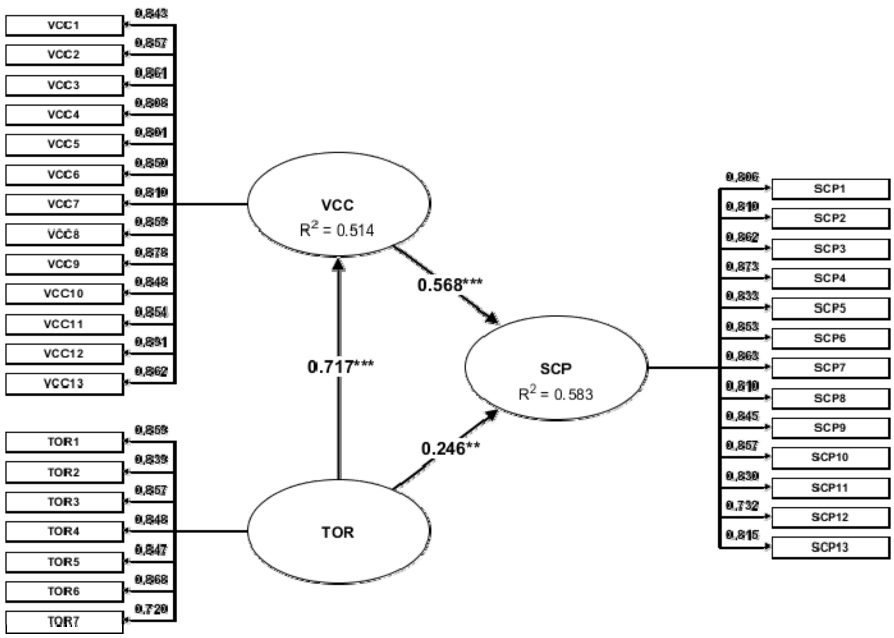

Figure 1. The software output indicates the validity and reliability of the indicators, the R^2 value and the path coefficient of each relationship

Table 1. Descriptive statistic, loading factor, and variance inflation factor

Variable	Indicators	Mean	LF (>0.5)	VIF (<0.5)
	TOR1	6,1208	0,8590	4,0440
	TOR2	6,1879	0,8389	3,1170
	TOR3	6,1812	0,8571	3,2891
Technopreneurial Orientation (TOR)	TOR4	6,0000	0,8485	2,7361
	TOR5	6,0000	0,8467	2,9988
	TOR6	6,1007	0,8677	2,9840
	TOR7	6,0336	0,7201	2,0645

Table 1. Continued

Variable	Indicators	Mean	LF (>0.5)	VIF (<0.5)
Value Co-creation (VCC)	VCC1	6,2349	0,8434	3,7701
	VCC2	6,1141	0,8572	3,9038
	VCC3	6,1544	0,8612	4,2368
	VCC4	5,8926	0,8075	2,9036
	VCC5	6,0067	0,8014	3,0315
	VCC6	5,9732	0,8502	3,5199
	VCC7	6,0470	0,8105	2,7512
	VCC8	5,9060	0,8590	4,0834
	VCC9	6,0604	0,8780	4,4378
	VCC10	5,9396	0,8482	4,2066
	VCC11	6,0067	0,8544	4,3793
	VCC12	6,0134	0,8909	4,0196
	VCC13	6,0000	0,8623	4,0081
Sustainability (SCP)	SCP1	6,4027	0,8055	3,3782
	SCP2	6,3826	0,8105	3,6155
	SCP3	6,4094	0,8619	4,6030
	SCP4	6,4228	0,8735	4,3481
	SCP5	6,3893	0,8326	4,1750
	SCP6	6,3758	0,8525	4,2141
	SCP7	6,4228	0,8628	4,1414
	SCP8	6,1946	0,8098	2,7871
	SCP9	6,3490	0,8446	3,7816
	SCP10	6,3356	0,8573	3,4671
	SCP11	6,2148	0,8302	4,0583
	SCP12	6,2215	0,7319	2,6850
	SCP13	6,2416	0,8151	3,2196

VIF: Variance Inflation Factor
LF: Loading Factor

Table 2. Construct validity and reliablity

Construct	AVE (>0.5)	ρA (>0.7)	Cronbach-α (>0.7)
Technoprenurial Orientation (TOR)	0.6978	0.9317	0.9272
Co-creation (VCC)	0.7198	0.9683	0.9675
Sustainability (SCP)	0.6900	0.9637	0.9624

AVE: Average variance extracted
ρA: Dijkstra-Henseler's coefficient

Table 3. Output of structural model path

R^2	Path	Path coefficient	Cohen (f^2)	t-value ($t > 1.96$)	p-value ($p < 0.05$)
VCC : 05139	TOR - VCC	0.7169	1.0573	17.7863	0.0000
SUS : 0.5826	VCC - SCP	0.5679	0.3755	5.4244	0.0000
-	TOR - SCP	0.2455	0.0702	2.7642	0.0029

R^2: Coefficient of determination
Cohen (f^2): Effect size

Table 4. Bootstrap output of path modelling

Path	Direct effect	Indirect effect	Total effect	t-value ($t > 1.96$)	p-value ($p < 0.05$)
TOR - VCC	0.7169	-	0.7169	17.7863	0.0000
VCC - SCP	0.5679	-	0.5679	5.4244	0.0000
TOR - SCP	0.2455	0.4071	0.6526	11.8228	0.0000

technopreneurial orientation and co-creation, and this proves the significance of the influence between them. In the relationship between co-creation and sustainability, the t-value is 5.4244 and the p-value is 0.0000, so there is also a significant effect on the relationship. On the direct influence between technopreneurship orientation and sustainability, there is also a significant relationship, as evidenced by the t-value of 2.7641 which is greater than 1.96, or the p-value of 0.0058 which is smaller than 0.05 (Hair et al., 2017). The significance test result of the direct and indirect effect (total effect) which obtained a t-value of 11.8228 and a p-value of 0.0000, on the relationship between technopreneurial orientation to sustainability through the co-creation process proved to be greater than the t-value of 2.7642 and p-value of 0.0029 on the direct relationship between technopreneurship orientation and sustainability. With this, it is proven that the intervening role of the co-creation variable is significant. Although all hypotheses are accepted, it still proves the important role of co-creation in mediating the influence of technopreneurship orientation on sustainability. The results of this total effect also prove that a series of process stages that must be met such as the hypothesized model is recommended. Thus, the results of this research have the interpretation that the expert power system engineers who have a strong technopreneurial orientation will be more in need of a co-creation process to realize the high value of its sustainability performance.

VI. Discussion

Practically, this study confirms the importance of successful sustainability in the electricity sector through co-creation activities that are preceded by a technology-based orientation to the experts. Various organizations and companies in the electricity sector or other energy sectors that focus on the three pillars of global and regional sustainability, often encounter difficulties when they have to carry out activities that involve the active role of all parties, even though they are held in a sense of togetherness. This happened because of the lack of technopreneurial orientation among the expert engineers. As is known, the energy sector always involves high technology to achieve high efficiency. So it is necessary to guarantee the success of each stage of its activities with parameters that can be interpreted from something complicated to easy to understand for laymen. Therefore, the role of the expert engineer who understands the technical aspects must be improved in his entrepreneurship orientation from the beginning of the initiation of his program of activities so that it becomes the key to success in the long term.

This research has succeeded in adopting sustainability aspects from the energy trilemma index, which is then applied to the investigation of the behavior of expert engineers towards sustainability. Therefore, the operational implications of these aspects must refer to the perception of the expert engineers on how to plan activities that contain an entrepreneurial mindset so that they can work together with interested parties in the electricity sector in achieving sustainability goals in energy. trilemma index, namely according to its three dimensions, energy security, energy equity, and environmental sustainability. The behavior of togetherness in achieving energy security goals can be seen clearly from the efforts to achieve significant electrification targets. Efforts to make electrical energy affordable in a fair manner to remote areas are also significantly implemented. Likewise, the provision of quality energy has always been a common achievement target. This is also in line with the togetherness of steps from all parties which is reflected in the strong relationship of good togetherness with all levels of the local community. It seems that the strong efforts of the expert engineers to be able to continue to be able to jointly create value for electricity sustainability in achieving energy equity are implied by the shared goal of achieving the fulfillment of electrical energy needs in the future. Likewise, in concerted efforts to eliminate systemic disorders in duration and frequency. The recovery mechanism quickly and independently must also get guarantees from all parties together. So, if the three previous aspects are successfully pursued, then it could have implications for increasing people's prosperity because of consuming electrical energy. The implications of joint efforts to achieve environmental sustainability according to the priority of achieving efficiency, as well as efforts to decarbonize the entire electricity system by seeking the use of renewable energy in the form of an energy mix, can minimize losses due to stalling of coal-fired power plant assets that have been built.

The proof of a positive paradigm that co-creation can realize sustainability theoretically supports previous research which says that the balance of social, economic, and environmental as the basis for forming a collective future, is shaped by togetherness in value creation (Ma et al., 2019). The increase in sustainability caused by the increase in co-creation behavior is shaped by a balance between the provider and beneficiary components in a harmonious environment (Kuenkel & Gruen, 2018). Similarly, the statement that the sustainability performance of the energy transition can be jointly directed to renewable energy, thus requiring greater togetherness in making it happen (Jenkins, 2019). The increase in co-creation behavior which will be followed by an increase in sustainability is also supported by the statement that the creation of shared value affects the high joint success to realize sustainable development (Kruger et al., 2018). Based on the arguments above, that is why the value co-creation (VCC) variable acts as an important mediator in achieving sustainability.

By confirming the desire of the key respondents to devote time to the establishment of an interactive collaboration (co-creation), it is seen that the expert engineers are very enthusiastic to spend their time on every electricity technology event. On that occasion, it was revealed that expert engineers always took the time to satisfy their curiosity about the progress and development of up-to-date electricity technology, which occurred because of the co-creation earlier (Gbadamosi, 2019). Likewise, the explanation of the reason for the strong curiosity in co-creation with technology activists was also answered by the strong desire of the expert engineer for the development of scientific and technological progress (De Silva & Wright, 2019). They are also very proactive and productive in initiating entrepreneurship from a value co-creation perspective (Shams & Kaufmann, 2016). The results of this study are also proven to support previous research that technopreneurship is able to create new value that can sustain economic growth (Kohtamäki & Rajala, 2016; Nurdiyanto, 2018). Because technology can drive the market to transform into a network that allows the process of creating shared value (Breidbach & Maglio, 2016). This research will lead to mutually beneficial co-creation for the sustainability of the electricity sector in entrepreneurial attitudes, which have their characteristic which can be involved in all social and cultural structures.

Theoretically, this research contribution adds to the literature on the mediating role of value co-creation in the DART dimensions (dialogue, accessibility, risk, and transparency) in empowering engineering-skill-based entrepreneurial orientation, which in this study is termed technopreneurial orientation, in order to achieve sustainability. Furthermore, the practical contribution of this research is on how to manage electric power engineers in facing the challenges of decarbonization. The condition of the large number of fossil fuel power plants that are still of economic age requires their role. Excavation efforts that put forward an entrepreneurial orientation from maximizing the function of their technical expertise are carried out by means of collaborative creation for the sake of achieving sustainability in the electricity sector.

VII. Conclusion

In general, this study proves that the characteristics of power system expert engineers who carry out strategic planning in the national scope can achieve good performance in realizing sustainability as a value from the results of co-creation. This study was successful in empirically proving a management model in a national-scale strategic company that prioritizes sustainability as a performance benchmark. The significance of expert engineers in achieving electricity sustainability in Indonesia cannot be separated from the complexity and dynamics involved in achieving such sustainability. As a result, we require a strong technopreneurship orientation from expert engineers in order to engage in co-creation and achieve electricity sustainability.

The technopreneurship orientation of expert engineers is proven to support the realization of electricity sustainability through the co-creation process. However, several factors require more in-depth research to improve the sustainability performance of the electricity sector. The first suggestion that can be proposed as a recommendation for engineering management in the electricity sector is the need for action from the management to improve the situation of togetherness in dialogue that provides mutual access to openness to minimize risk perceptions together. The second suggestion for the management, especially those dealing with the strategic electricity industry, is the need to pay attention to the aspects that are used as indicators of the co-creation model for sustainability in this research. The third suggestion from this research is for stakeholders to consider facilitating experts in their respective fields to contribute to the three pillars of sustainability through dialogue by having transparent access and awareness of the risks borne by each party.

Before generalizing the findings of this study, it is necessary to consider its limitations. Respondents in this study were limited to working years of more than ten years, so the millennial generation was excluded. Although the data was collected anonymously, self-report behavior measurement allows social desirability bias to occur due to the tendency of responding inappropriately.

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Characteristics of firms that issue redeemable convertible preferred stock: Evidence from South Korea

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A B S T R A C T

Purpose: The issuance of redeemable convertible preferred stock (RCPS) has been steadily increasing in Korea since the revision of the Commercial Act, which allows firms to issue various types of stocks, in 2010. This study aims to verify equity financing behavior by examining the characteristics of firms that issue RCPS.
Design/methodology/approach: Using a sample of 12,768 firm-year observations of Korean listed companies from 2011 to 2018, this study conducts univariate and multivariate analyses to examine the factors that affect firms' decisions regarding RCPS issuance. For multivariate analysis, logistic regression analysis is used.
Findings: This study shows that firms issuing RCPS have higher debt ratios and lower operating cash flows than non-issuing firms. It is also found that firms issuing RCPS are smaller and younger than non-issuing firms. These findings indicate that firms with higher costs of financial distress, lower internal cash flow, and lower credibility/reputation are more likely to issue RCPS because they are constrained by debt capacity.
Research limitations/implications: According to pecking order theory, firms prefer debt over equity if external funds are required. The results of this study support the pecking order theory by providing evidence that firms rely on hybrid securities financing like redeemable preferred stock, a priority after debt when they are constrained by debt capacity.
Originality/value: This study sheds light on financing decisions related to the issuance of hybrid securities from the perspective of pecking order theory. It also contributes to broadening the scope of research on hybrid securities by providing empirical evidence on the financial characteristics of firms that issue RCPS.

Keywords: Capital Structure, Debt, Equity, Hybrid Securities, Redeemable Convertible Preferred Stock

I. Introduction

Redeemable convertible preferred stock (hereafter referred to as RCPS) is a particular type of hybrid securities that provides investors with both redemption and conversion options, so it can be converted to common stock or redeemed on the terms wherein they are issued.[1] This feature of RCPS is attractive to potential investors, allowing firms to increase their external financing opportunities. However, it simultaneously embeds the risk of diluting the stock value of existing

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1) RCPS is favorable to investors in that they can secure the downside protection against the risk of investment loss and at the same time maintain the upside potential inherent in equity investments.

shareholders due to conversion options or by leading to an overestimation of firm value (Forbes, 2019; Economist, 2020). Recently, RCPS has been widely used as a typical capital-raising option for firms, but there is a lack of understanding regarding the firms that finance RCPS because research on RCPS is very limited. Thus, this study investigates the characteristics of firms that issue RCPS based on the pecking order theory.

According to pecking order theory, firms rely on internal financing when internal funds are sufficient. If external financing is required, they first prefer to finance with debt, then possibly with hybrid securities like preferred stocks, and finally with common stocks (Myers 1983; Myers and Majluf 1984). Pecking order theory has been empirically tested in numerous studies, but the results are inconsistent and mixed, leaving the ability of the theory to explain firms' financing decisions ambiguous (Fama and French 2002; Frank and Goyal 2003; Leary and Roberts 2010). Unlike prior studies, Lemmon and Zender (2010) suggest that pecking order theory is valid to describe the financing behavior of firms when considering debt capacity. They find that firms that are not constrained by concerns over debt capacity prefer debt to equity if external funds are required, whereas firms with debt capacity constraints tend to rely on equity financing. Given their findings, firms constrained by debt capacity are expected to turn to equity financing and choose hybrid securities with the highest priority preference among equity. Specifically, RCPS is a type of hybrid securities with both redemption and conversion options that enhance firms' chances of securing external financing as they appeal to investors. Therefore, RCPS is likely to be one of the most preferred options for firms facing difficulties in debt financing. Given this, investigating the characteristics of RCPS-issuing firms seems appropriate to verify whether firms with concerns over debt capacity follow pecking order theory and explain the motivation for issuing hybrid securities.

In Korea, the issuance of RCPS continues to increase as the Commercial Law was amended in 2010, permitting firms to issue various types of stocks that are different with respect to their particulars in terms of profit dividends, repayment, conversion, etc. (Article 344 of Commercial Law). Thus, Korea provides an appropriate setting for researchers to investigate the characteristics of RCPS-issuing firms empirically. This study conducted univariate and multivariate analyses using 12,768 firm-year observations of listed firms in the stock market in South Korea from 2011 to 2018.[2)]

The univariate analysis results show that debt ratio and firm value are higher for RCPS-issuing firms than for non-issuing ones. Operating cash flow, firm size, and age are lower for RCPS-issuing firms than for non-issuing ones. On the other hand, the multivariate analysis results are consistent with the univariate analysis results, except that the firm value of RCPS issuers is not significantly higher than that of non-issuers. Overall, these results indicate that firms with higher costs of financial distress, lower internal cash flow, and lower credibility/reputation are more likely to issue RCPS because they are constrained by debt capacity; thus supporting pecking order theory.

Additionally, this study further investigates whether firms with lower ownership concentration are more likely to issue RCPS because the conversion option of RCPS involves the risk of diluting ownership concentration. However, it finds no evidence that the likelihood of RCPS issuance is affected by firms' ownership concentration.

This study contributes to the literature in several ways. It sheds light on financing decisions related to the issuance of hybrid securities from the perspective of pecking order theory. While prior studies provide inconsistent findings on the pecking order theory, this study determines what lies behind these inconsistent findings. It provides evidence that firms' financing behavior conforms to the pecking order theory when debt capacity is considered, by analyzing firms that issue hybrid securities. Furthermore, few studies have

2) Although RCPS is mainly used to raise capital for start-up or unicorn companies, data of unlisted firms is not available, so this study conducts the analysis by limiting the data of listed firms in this study. Thus, the results of this study should be interpreted with caution as the characteristics of listed firms that issue RCPS.

been conducted on RCPS, although issuing RCPS has become a remarkable trend in the capital market. There is a study on the accounting classification of RCPS as debt or equity based on its market perception (McCarthy and Schneider, 2001), but this is the first study to identify the financial characteristics of firms that issue RCPS. Thus, this study contributes to broadening the scope of research on hybrid securities by providing empirical evidence that the issuance of RCPS is affected by firm characteristics related to concerns over debt capacity. This study has significant implications for managers, auditors, regulators, and capital market participants interested in the issuance of hybrid securities, including RCPS.

The remainder of this paper is organized as follows. Section 2 reviews relevant literature and outlines the study's hypotheses. Section 3 describes the sample selection process and research methods. Section 4 presents the results of the analysis. Section 5 concludes the study.

II. Literature Review and Hypothesis Development

A. Literature Review

According to the pecking order theory developed by Myers and Majluf (1984), firms have a preference order for capital financing to minimize adverse selection costs under information asymmetry between firms and investors. Specifically, firms prefer retained earnings, short-term securities, debt, preferred stock, and common stock, in that order. This theory perpetuates that preferred stock is inferior to debt in the preference for external financing, but as the issuance of preferred stock increased in the U.S in the 1970s, studies have been conducted to examine the determinants of corporate financing with preferred stock.

By conducting a ratio analysis for preferred stock-issuing firms and non-issuing control firms, Moyer et al. (1987) found that firms issuing preferred stock have lower market values, lower interest coverage ratios, lower levels of retained earnings, and lower equity ratios than non-issuing firms. Their findings indicated that firms tend to issue preferred stock rather than debt when they are financially distressed. This is because the tax credits for interest payments from debt financing are insignificant for these firms, and the risk of bankruptcy can be reduced through preferred stock financing. Heinkel and Zeckner (1990) analyzed the optimal capital structure in a model with an investment opportunity and found that firms use preferred stocks to enhance debt capacity without creating an underinvestment problem. Ely et al. (2002) investigated the effect of a firm's tax status on its financing preference with preferred stock relative to debt by analyzing preferred stock issuers and non-issuers. They found that firms with lower expected marginal tax rates are more likely to choose their preferred stock over debt because the value of debt tax shields decreases as a firm's expected marginal tax rate decreases. Further, Frischmann et al. (1999) examined trends in preferred stock issued over 1993-1996 and report significant growth in new types of preferred stock (hybrid securities) like redeemable or convertible preferred stocks. They find that this variant of preferred stock accounts for the majority of recent preferred stock issuances and therefore argue that it is necessary to understand the features of these securities, including the motivations of the firms that issue them. They also discuss the effects of these securities on financial reporting and suggest the establishment of accounting standards related to the classification because they possess both debt and equity characteristics.

In line with the diversification of preferred stock, some academic studies extend the literature by focusing on a specific type of security. Carter and Manzon (1995) examined mandatorily redeemable preferred stock, which can be viewed as substitutes for debt because they have similarities in cash flows and contractual rights. They find that firms with low marginal tax rates issue more mandatorily redeemable preferred stock relative to debt compared to firms with high tax rates. This suggests that firms that cannot efficiently use interest tax shields are more likely to rely on mandatorily redeemable preferred stock over debt. Lee and Figlewicz (1999) investigated the characteristics of firms that issue convertible preferred stock by comparing them with firms that issue convertible debt. They find that the levels of financial, operating, and bankruptcy risks are higher for firms issuing convertible preferred stock than for those issuing convertible debt. They also find that convertible preferred stock-issuing firms have lower levels of free cash flow and growth potential than convertible debt-issuing firms.

Kimmel and Warfield (1995) found that the market perception of redeemable preferred stock varies depending on their attributes like voting rights and conversion features by analyzing the systematic risk of 239 firms that issue redeemable preferred stock. Therefore, they proposed that the specific disclosure of security attributes, rather than dichotomous classification, is required to represent the economic substance of hybrid securities. McCarthy and Schneider (2001) investigated the market perception of preferred stocks with both redeemable and convertible features. Based on a sample of firms reporting convertible redeemable preferred stocks from 1991 to 1995, they found that the market perceives the convertible redeemable preferred stock as debt for two out of five years. They argued that the current accounting rules for convertible redeemable preferred stock which must be excluded from equity but not classified as debt, do not adequately reflect market perceptions. More recently, Levi and Segal (2015) examined whether firms' financing behavior is affected by the enactment of SFAS 150, which classifies mandatorily redeemable preferred stock as a liability. They found a decline in the issuance of mandatorily redeemable preferred stock after the adoption of SFAS 150, implying that a change in the classification of hybrid securities from equity or mezzanine to debt reduces the incentives for firms to issue mandatorily redeemable preferred stock. Their findings demonstrate that the reporting classification of these securities is one of the factors that influences firms' financing decisions.

This study extends the literature by exploring the characteristics of firms that issue RCPS to understand firms' financing decisions with the issuance of hybrid securities based on pecking order theory.

B. Hypothesis Development

This study considers firm characteristics including debt ratio, operating cash flow, firm value, size, and age to investigate whether firms constrained by debt capacity are more likely to issue RCPS. First, firms with higher debt ratios have higher financial distress costs because the probability of default and bankruptcy is greater. Therefore, firms with higher debt ratios are more likely to curtail debt financing and turn to equity. The issuance of RCPS can be a favorable option for firms with high debt ratios in their financing choices, because it can possibly reduce the risk of default and preserve debt capacity. RCPS allows firms to refuse to pay the holder for a redemption request when their profits are not available to distribute dividends, although it contains a debt-like redemption feature that requires firms to pay the holder. Furthermore, RCPS is classified as equity if certain conditions are satisfied.[3)] Thus, firms with a higher debt ratio are expected to be more likely to issue an RCPS.

Hypothesis 1. RCPS-issuing firms are more likely to have a higher debt ratio than non-issuing firms.

Second, the capacity of firms to generate cash flow is a crucial factor in assessing their default risk and credit ratings (Standard and Poor's, 2006).[4)] Thus, firms without sufficiently generated cash flows are likely to have difficulty accessing the debt market at a low cost. They cannot rely heavily on debt financing and are forced to rely on equity to fill their financing deficits. Accordingly, RCPS issuance is likely to be

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3) Under K-IFRS 1032, RCPS is classified as equity if the issuer has a redemption option and there is no refix option clause which allows the conversion price to be adjusted in a case of a fall in stock price.

4) Firms find it difficult to raise external financing using bank debt or issuing bond when their default risk is high or credit rating is low.

affected by debt capacity constraints due to an incapacity to generate cash flow. It is expected that firms with a lower level of operating cash flow are more likely to issue RCPS as operating cash flow represents the firms' capacity to generate cash flow.

Hypothesis 2. RCPS-issuing firms are more likely to have a lower level of operating cash flow than non-issuing firms.

Third, many studies find that high-growth firms are the primary issuers of equity (Myers 1977; Smith and Watts 1992; Barclay et al. 2006; Modiglinai and Miller 1963; Almeida et al. 2004; Fama and French 2002; Frank and Goyal 2003).[5] Lemmon and Zender (2010) suggest that these firms tend to issue equity because they have significant external financing needs and move quickly toward debt capacity. In line with previous research, this study anticipates that firms with high growth opportunities attempt to fulfill their financing needs with hybrid securities such as RCPS, because they are highly likely to face debt capacity constraints. Firms with higher growth opportunities have higher firm value as growth opportunities are reflected in market prices as intangible assets.[6] Thus, issuance of an RCPS is expected to be positively related to firm value.

Hypothesis 3. RCPS-issuing firms are more likely to have higher firm value than non-issuing firms.

Fourth, firms' size and age are critical indicators that determine their capability to access debt financing. Large firms have a lower probability of bankruptcy because they tend to be more diversified and fail less often (Rajan and Zingales, 1995). Firms that operate for a long period have a solid reputation in the market (Diamond, 1991). Therefore, large and mature firms have easier access to the debt market at a lower cost than do small and young firms. Conversely, smaller and younger firms are more likely to be constrained by debt financing because of low creditability or reputation, which makes it difficult to cover most of their financing needs with debt. Hence, smaller and younger firms are expected to be more likely to issue RCPS.

Hypothesis 4. RCPS-issuing firms will be smaller and younger than non-issuing firms.

Lastly, RCPS gives the holders the option to convert preferred shares into a fixed number of common shares at a set price: the conversion price. In Korea, firms are allowed to issue RCPS with refix option clauses that adjust the conversion price in the case of a fall in stock price. This could be beneficial for investors, as the number of common shares they can receive increases when stock prices decrease. This embeds the risk of diluting ownership concentration for major shareholders, resulting from an increase in the number of common shares issued. Hence, firms with concentrated ownership are expected to be reluctant to use RCSP in their financing decisions. That is, RCPS is more likely to be a preferred option for firms with lower ownership concentration.

Hypothesis 5. RCPS-issuing firms will have lower ownership concentration than non-issuing firms.

III. Research Design

A. Data Collection

Our initial sample consists of firms listed on the Korea Stock Exchange (KSE) during the period between 2011 and 2018. Firms in the financial industry are excluded from the process of selecting

5) Fama and French (2002) and Frank and Goyal (2003) argue that their findings contract the pecking order theory because they have a great asymmetric information and thus have the strong incentives to follow the pecking order theory.

6) However, simultaneously, there exists a possibility that the issuance of RCPS is recognized as financial distress of firms or future cash outflow of redemption option to the investors in the market, leading to a negative impact on the firm value. Therefore, it is an empirical question whether RCPS issuing firms have a higher firm value than non-issuing firms.

Table 1. Sample selection procedure

Procedures	Number of Firm-years
2011-2018 Observations with reporting data in TS2000 excluding firms in the financial industry	14,396
Less:	
Observations without stock price and other financial data	1,163
Observations with impaired capital	465
Final sample firm-years	12,768

Table 2. Number of firms by year

Year	Number of Firms
2011	11
2012	10
2013	16
2014	24
2015	19
2016	21
2017	24
2018	33
total	158

the final sample because they have different financial statement forms and accounting rules, and thus cannot be compared with those in other industries. This study excludes firms for which the necessary financial and stock price data are not available in the TS 2000 and KIS-VALUE databases.[7] It also eliminates firms with impaired capital from the sample to prevent financial ratio distortion that might occur because of the aggravation of the financial structure. These procedures result in a final sample comprising 12,768 firm-years. A winsorization process was performed for continuous variables above and below the 1 percent level to rule out the effect of outliers. The sample selection procedure is presented in Table 1. The number of observations with the issuance of the RCPS is 158 firm-years in the final sample, as shown in Table 2.[8]

B. Model Specification

This study conducted univariate and multivariate analyses to examine the factors that affect firms' decisions regarding RCPS issuance. For the univariate analysis, the total sample is divided into two sub-samples: RCPS-issuing and non-issuing firms. The t-test and Wilcoxon test were used to compare the mean values of the variables of interest between the two subsamples.

For multivariate analysis, this study estimated the following logistic regression model wherein the dependent variable was *RCPS*. *RCPS* stands for the dummy variable that equals 1 if the firm issued RCPS and 0 otherwise. The main variables of interest are the debt ratio (*LEV*), operating cash flows (*OCF*), firm value (*TQ*), firm size (*SIZE*), firm age (*AGE*), and ownership concentration (*OWN*). The model includes control variables like log of total assets (*ASSET*), return on assets (*ROA*), ratio of tangible assets to total assets (*TANG*), year indicators (*YR*), and industry indicators (*IND*).

$$\begin{aligned} \text{Logit}\ (RCPS) = {} & \beta_0 + \beta_1\ LEV + \beta_2\ OCF + \beta_3\ TQ \\ & + \beta_4\ SIZE + \beta_5\ AGE + \beta_6\ OWN \\ & + \beta_7\ ASSET + \beta_8\ ROA + \beta_9\ FIX \\ & + \beta_{10} \sum YR + \beta_{11} \sum IND \\ & + \varepsilon \quad \text{(Model 1)} \end{aligned}$$

RCPS: dummy variable that equals 1 if the firm issued RCPS and 0 otherwise.
LEV: total liabilities divided by total assets.
OCF: operating cash flows divided by total assets.

7) TS2000 (www.kokoinfo.com) and KIS-VALUE (www. kisline. com) databases systems are Korean equivalents of COMPUSTAT or CRSP in the USA, providing financial and stock price data for firms listed on the KSE (Choi and Lee, 2013).
8) Data related to the issuance of the RCPS are hand-collected from the firms' annual reports disclosed in DART site (Repository of Korea's Corporate Filings, https://dart.fss.or.kr).

TQ: firm value measured by Tobin's Q (the sum of debt and market value of equity divided by total assets).
SIZE: dummy variable that equals 1 if the firm is classified as a large business and 0 otherwise.
AGE: log of firm age.
OWN: ownership ratio of the largest shareholder.
ASSET: log of total assets.
ROA: net income divided by total assets.
TANG: tangible assets divided by total assets.
YR: year indicators.
IND: industry indicators.

IV. Empirical Results

A. Descriptive Statistics and Correlation

Table 3 presents descriptive statistics of the variables used in the tests. To rule out the effects of outliers, this study winsorizes the top and bottom 1% of the observations for all the continuous variables. The mean (median) value of the dummy variable for *RCPS* is 0.012, implying that the ratio of firms issuing RCPS is approximately 1.2% of the listed firms in the stock market from 2011 to 2018. The mean (median) values of debt ratio (*LEV*), operating cash flow (*OCF*), and firm value (*TQ*) are 0.371 (0.367), 0.043 (0.043), and 1.421 (1.088), respectively. The mean value of the dummy variable for large businesses (*SIZE*) is 0.116, which indicates that firms classified as large businesses constitute approximately 11.6% of the total sample. The mean (median) value of the log of firm age (*AGE*) is 3.178 (3.219). The ownership ratio of the largest shareholder (*OWN*) is approximately 28.1%. For the control variables, the mean (median) value of the log of total assets (*ASSET*) is 19.005 (18.743). The mean (median) values of return on assets (*ROA*) and tangible assets divided by total assets (*TANG*) are 0.015 (0.027) and 0.262 (0.243), respectively.

Table 4 presents the results of the correlation analysis of the variables. The dummy variable for RCPS-issuing firms (*RCPS*) has a significantly positive correlation with debt ratio (*LEV*) and a significantly negative correlation with operating cash flow (*OCF*) and firm age (*AGE*), as hypothesized. *RCPS* is positively correlated with firm value (*TQ*) but not significantly.

Table 3. Descriptive statistics of variables

Variables	N	Mean	Median	SD	MIN	MAX
RCPS	12,768	0.012	0.000	0.111	0.000	1.000
LEV	12,768	0.371	0.367	0.197	0.026	0.822
OCF	12,768	0.043	0.043	0.082	-0.215	0.269
TQ	12,768	1.421	1.088	1.025	0.464	6.729
SIZE	12,768	0.116	0.000	0.320	0.000	1.000
AGE	12,768	3.178	3.219	0.689	0.693	4.290
OWN	12,768	0.281	0.254	0.143	0.046	0.700
ASSET	12,768	19.005	18.743	1.351	16.698	23.717
ROA	12,768	0.015	0.027	0.094	-0.401	0.222
TANG	12,768	0.262	0.243	0.187	0.000	0.763

Variable definitions
RCPS: dummy variable that equals 1 if the firm issued RCPS, and 0 otherwise.
LEV: total liabilities divided by total assets.
OCF: operating cash flows divided by total assets.
TQ: firm value measured by Tobin's Q (the sum of debt and market value of equity divided by total assets).
SIZE: dummy variable that equals 1 if the firm is classified as large business, and 0 otherwise.
AGE: log of firm age.
OWN: ownership ratio of the largest shareholder.
ASSE: log of total assets.
ROA: net income divided by total assets.
TANG: tangible assets divided by total assets.

Additionally, *RCPS* is negatively correlated with firm size (*SIZE*) and the ownership ratio of the largest shareholder (*OWN*) but not significantly.

B. Univariate Analysis

Table 5 presents the results of the t-test and Wilcoxon test to examine the differences in the characteristics of RCPS-issuing firms compared to non-issuing firms. The Kolmogorov-Smirnov test proved that the p-values of all variables are less than 0.05, which rejects the null hypothesis of normal distribution; therefore, the results of the Wilcoxon test are used for interpretation.

RCPS-issuing firms have higher mean values than non-issuing firms for debt ratio (*LEV*) and firm value (*TQ*). This indicates that RCPS issuers have relatively higher leverage and growth opportunities than non-issuers. As for operating cash flow (*OCF*) and firm age (*AGE*), RCPS-issuing firms have lower mean values than non-issuing firms, indicating that RCPS issuers have a relatively lower capacity to generate cash flow and reputation than non-issuers. These results suggest that RCPS-issuing firms are more likely to be constrained by concerns over debt capacity than non-issuing firms. However, there is no significant difference between the two firms in the mean values of firm size (*SIZE*) and ownership ratio of the largest shareholder (*OWN*). However, these results were

Table 5. The results of t-test and Wilcoxon test

Variables	RCPS=0	RCPS=1	t-test	Wilcoxon test
	Mean	Mean	t-stat	z-stat
LEV	0.370	0.448	-4.95***	-4.94***
OCF	0.044	0.023	3.19***	2.72***
TQ	1.420	1.516	-1.17	-2.65***
SIZE	0.116	0.076	1.89*	1.57
AGE	3.180	2.984	3.09***	3.44***
OWN	0.281	0.281	0.06	0.12

Note: These variables are listed in Table 3. * and *** indicate significance levels at the 10, and 1%, respectively, based on two-tailed tests.

Table 4. Correlations of variables

	RCPS	*LEV*	*OCF*	*TQ*	*SIZE*	*AGE*	*OWN*	*ASSET*	*ROA*	*TANG*
RCPS	1.0000	0.0438	-0.0282	0.0104	-0.0139	-0.0315	-0.0005	0.0100	-0.0242	0.0002
		<.0001	0.0014	0.2419	0.1156	0.0004	0.9544	0.2600	0.0063	0.9833
LEV		1.0000	-0.1345	-0.1221	0.1219	0.0669	-0.0418	0.2033	-0.2392	0.2894
			<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
OCF			1.0000	-0.0070	0.0422	-0.0309	0.1070	0.1320	0.5228	0.1147
				0.4319	<.0001	0.0005	<.0001	<.0001	<.0001	<.0001
TQ				1.0000	-0.0578	-0.2159	-0.0689	-0.1778	-0.0478	-0.1499
					<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
SIZE					1.0000	0.0938	0.1267	0.5718	0.0450	0.0160
						<.0001	<.0001	<.0001	<.0001	0.0712
AGE						1.0000	-0.1004	0.2359	0.0101	0.0905
							<.0001	<.0001	0.2551	<.0001
OWN							1.0000	0.0872	0.1523	0.0238
								<.0001	<.0001	0.0072
ASSET								1.0000	0.1918	0.1174
									<.0001	<.0001
ROA									1.0000	-0.0011
										0.9020
TANG										1.0000

Note: The variables are defined as in Table 3.

derived when the control variables were not considered, and a multiple regression analysis was required to test the hypotheses.

C. Multivariate Analysis

Table 6 presents the results of estimating Model 1 to verify our hypotheses. The value of Pseudo-R^2 for Model 1 is 0.0683. The coefficient of the debt ratio (*LEV*) is significantly positive for the dummy variable for RCPS-issuing firms (*RCPS*) at $p < 0.01$. This result indicates that firms with higher debt ratios are more likely to issue RCPS, which supports Hypothesis 1. The coefficient of operating cash flow (*OCF*) was significantly negative for *RCPS* at $p < 0.01$. This implies that firms with a lower level of operating cash flow are more likely to issue RCPS, thereby supporting Hypothesis 2. The coefficient of firm value (*TQ*) is positive for *RCPS*, but statistically insignificant. Thus, regarding Hypothesis 3, the issuance of RCPS seems to be irrelevant to firms' growth opportunities. However, it is also possible that the issuance of RCPS is recognized as financial distress of firms or future cash outflow of redemption options to investors in the market, leading to a negative impact on firm value. Thus, the statistically insignificant coefficient of firm value may be attributed to the mixed effect of growth opportunities and financial distress/ future cash outflows of the redemption option. The coefficients of firm size (*SIZE*) and firm age (*AGE*) are both significantly negative for the dummy variable for RCPS-issuing firms (*RCPS*), at $p < 0.01$. These results indicate that firms of lower size and age are more likely to issue RCPS, thereby supporting Hypothesis 4. The coefficient of the ownership ratio of the largest shareholder (*OWN*) is statistically insignificant for *RCPS*, which rejects Hypothesis 5. This suggests that ownership concentration does not affect firms' decisions regarding the issuance of RCPS.

D. Additional Analysis

This study conducts an additional analysis using a matching sample because the number of RCPS

Table 6. The results of logistic regression analysis

Variables	Logit (*RCPS*) = $\beta_0 + \beta_1$ *LEV* + β_2 *OCF* + β_3 *TQ* + β_4 *SIZE* + β_5 *AGE* + β_6 *OWN* +β_7 *ASSET* + β_8 *ROA* + β_9 *FIX* + β_{10} $\sum$*YR* + β_{11} $\sum$*IND* + ε		
	Estimate	Wald χ^2	p-value
Intercept	-8.341	29.83***	<.0001
LEV	2.164	21.50***	<.0001
OCF	-2.574	5.32**	0.021
TQ	0.024	0.08	0.775
SIZE	-1.170	9.90***	0.002
AGE	-0.344	9.62***	0.002
OWN	0.398	0.46	0.499
ASSET	0.258	10.62***	0.001
ROA	-0.321	0.11	0.736
TANG	-0.219	0.20	0.656
YR		Included	
IND		Included	
Pseudo-R^2		0.0683	
N		12,768	

Note: These variables are listed in Table 3. ** and *** indicate significance levels at the 5 and 1%, respectively, based on two-tailed tests.

Table 7. The results of additional logistic regression analysis

Variables	Logit ($RCPS$) = β_0 + β_1 LEV + β_2 OCF + β_3 TQ + β_4 $SIZE$ + β_5 AGE + β_6 OWN + β_7 $ASSET$ + β_8 ROA + β_9 FIX + β_{10} $\sum YR$ + β_{11} $\sum IND$ + ε		
	Estimate	Wald χ^2	p-value
Intercept	-0.421	0.03	0.853
LEV	2.289	9.90***	0.002
OCF	-2.626	2.33	0.127
TQ	0.074	0.30	0.586
SIZE	-0.375	0.42	0.516
AGE	-0.362	3.96**	0.047
OWN	0.664	0.49	0.485
ASSET	0.027	0.05	0.827
ROA	1.177	0.60	0.441
TANG	0.335	0.19	0.663
YR		Included	
IND		Included	
Pseudo-R^2		0.0812	
N		316	

Note: These variables are listed in Table 3. ** and *** indicate significance levels at the 5 and 1%, respectively, based on two-tailed tests.

firm years accounts for a relatively low proportion of the total sample. Following the paired sample approach, this study constructs a control sample of 158 non-issuing firms matched by industry and asset size to RCPS-issuing firms, additionally generating a matching sample of 365 firm-year observations (Beaver, 1966; Altman, 1968; Barnes, 1990). Table 7 presents the results of estimating Model 1 to verify our hypotheses based on a matching sample of 365 firm years. The coefficient of the debt ratio (*LEV*) is significantly positive, while the coefficient of firm age (*AGE*) is significantly negative. The coefficient of firm value (*TQ*) is positive, but statistically insignificant. These results are consistent with those in Table 6. However, the coefficients of operating cash flow (*OCF*) and firm size (*SIZE*) were negative but statistically insignificant. The lack of statistical significance for these variables is presumed to be due to the small size of the matching sample.

V. Conclusions

This study attempts to explore the characteristics of firms that issue RCPS as issuing RCPS has recently emerged as a typical option for firms to raise capital. According to pecking order theory, firms prefer debt first, followed by hybrid securities and equity in the case of external funds (Myers 1983; Myers and Majluf 1984). Thus, it is expected that firms restricted by their debt capacity are likely to issue hybrid securities. Specifically, RCPS is a particular type of hybrid security that possibly provides investors with both redemption and conversion options. As this feature appeals to potential investors and thus increases the chance of successful financing, RCPS is likely to be a preferred option in their financing choices of hybrid securities for firms constrained by debt capacity.

Using a sample of 12,768 firm-year observations of Korean listed firms covering 2011 to 2018, this study examines the characteristics of RCPS-issuing firms to verify whether firms with concerns over debt capacity issue hybrid securities based on pecking order theory. The results of the analysis show that firms issuing RCPS have higher debt ratios and lower operating cash flows than non-issuing firms. It is also found that firms issuing RCPS are smaller and younger than non-issuing firms. These findings indicate that the likelihood of RCPS issuance is affected by firm characteristics related to concerns regarding debt capacity. On the other hand, it is not found that firms issuing RCSP have a higher firm value than non-issuing firms. Additionally, this study investigates whether firms issuing RCPS have a lower ownership concentration than non-issuing firms because the conversion option of RCPS involves the risk of dilution of ownership concentration. However, it does not find a significant relationship between the issuance of RCPS and ownership concentration.

The theoretical and practical contributions of this study are as follows. First, the results of the study contribute to broadening the scope of research on the capital structure by providing evidence that firms' financing behavior conforms to the pecking order theory when debt capacity is considered. Second, to the best of our knowledge, this is the first study to investigate the characteristics of firms that issue RCPS. There is a lack of understanding regarding firms that finance with RCPS, although issuing RCPS has become a notable trend in the capital market. The issuance of RCPS has been steadily increasing in Korea since the revision of the Commercial Act in 2010, which allows firms to issue various types of stocks. This setting provides the valuable opportunity of investigating the characteristics of firms that finance RCPS. In this study, the characteristics of firms issuing RCPS depict that firms restricted by their debt capacity are likely to issue RCPS. It implies that RCPS is one of the most preferred options for firms facing difficulties in debt financing because the feature of RCPS appeals to potential investors and thus increases the chance of successful financing. Lastly, this study provides a caveat that corporate managers should carefully weigh the pros and cons of issuing RCPS in their financing choices, as the issuance of RCPS can send a negative signal to the market that firms are financially constrained. Our findings help investors, auditors, and regulators to better understand the motivations for issuing RCPS, and also suggest that considerable prudence is required when making economic decisions regarding RCPS-issuing firms.

A limitation of this study is that the analysis is conducted based on the data of firms listed on the stock market because the data of unlisted firms are not available, raising the need for further research. Therefore, in future research, it will be a challenge to identify the characteristics of unlisted firms that issue RCPS. It would also be interesting to examine how RCPS-issuing firms make their financial and tax reporting decisions in consideration of debt capacity concerns.

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Developing Student's Nascent Digital Entrepreneurial Model

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A B S T R A C T

Purpose: The purpose of this study was to analyze the effect of entrepreneurial orientation on entrepreneurial competence, the effect of entrepreneurial competence, entrepreneurship knowledge, environmental support on entrepreneurial self-efficacy, and the influence of entrepreneurial competence, entrepreneurial self-efficacy, and environmental support on student's nascent digital entrepreneurs in Semarang, Indonesia.
Design/methodology/approach: This study uses a quantitative approach with a survey to collect data.Research respondents are 143 students in Semarang who have digital businesses. The research analysis was carried out using PLS-SEM.
Findings: The result showed that entrepreneurial orientation has a positive influence on entrepreneurial competence. Furthermore, entrepreneurial knowledge, entrepreneurial competence, and environmental support have a positive effect on entrepreneurial self-efficacy. The study proves environmental support and self-efficacy have a positive effect on digital entrepreneurial behaviors. However, entrepreneurial competence has no influence on digital entrepreneurial behaviors.
Research limitations/implications: This study has several limitations: the object of analysis is one area in Semarang, and only five factors that influence digital entrepreneurial behavior. Future research should expand the scope of research to more areas, and add antecedents to the model so that the results can be generalized.
Originality/value: The study is highlighting the important of developing nascent digital entrepreneurs of university students because they are the answer of the necessity of the 4th industry revolution.

Keywords: entrepreneurial competence, entrepreneurial knowledge, environmental support, entrepreneurial self-efficacy, student's nascent digital entrepreneur

I. Introduction

Facing the fourth industrial revolution, the Indonesian people have a huge opportunity in the development of digital entrepreneurship (entrepreneurship by utilizing digital transformation), because demographically Indonesia has a large population and more importantly internet access is getting easier, cheaper and more accessible, high penetration (Vorbach et al., 2019). In connection with the business transformation process towards digital, reliable and competent human resources (HR) are needed in utilizing digital technology (Flores et al., 2020).

Producing superior human resources is the responsibility of formal, non-formal and informal education, including universities. Higher education collaboration with internal and external stakeholders is absolutely necessary to be supporting infrastructure

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and human resources.

Students are an important part of the nation's elements that play a role in encouraging the acceleration of digital entrepreneurs, not only because the number is quite large but also supported by an understanding of information technology and entrepreneurship learning during college. Digital entrepreneurship has also attracted the business interests of millennial businessmen, especially in universities (Farani et al., 2017). Students can use their time to develop digital businesses when they are carrying out their obligations to complete their study.

The importance of the contribution of college graduate entrepreneurs can be seen from the increasing open unemployment rate in general and the open unemployment rate for college graduates in 2019-2020, one of the main factors being the COVID-19 pandemic. The open unemployment rate of university graduate students in 2019 was recorded at 746,351 (10.5%), in 2020 it increased to 981,203 (10.04%), and in 2021 there were 848,657 (5.87%) of the overall open unemployment rate based on education (BPS, 2021). Based on this data, serious efforts are needed to reduce the open unemployment rate for students after the COVID-19 pandemic by effort push creation graduate digital entrepreneurship college high.

Start up very identical and is often associated with new ventures in digital, information technology and applications. To form a new digital business, students must be equipped with digital entrepreneurship learning, psychological aspects that encourage confidence in realizing digital businesses, the role of environmental support so that they are able to realize the formation of students as new entrepreneurs who have businesses in the digital field (student's nascent digital entrepreneur).

Previous studies that have tried to find the antecedent factors that effect the realization entrepreneurial behavior still shows different results and indicate research gap in previous literatures. Research conducted by Onjewu et al. (2021) showed that entrepreneurial knowledge in the form of inviting guest lecturers or speakers from outside the campus had no significant effect on student's nascent entrepreneur, while entrepreneurial knowledge in the form of courses, workshops and training had a significant effect on student's nascent entrepreneur. Research conducted Barazandeh et al. (2015) conclude that entrepreneurial competence has a significant effect on the performance of nascent entrepreneurs, while Ahmed et al. (2021) in their research says that entrepreneurial competence in the form of digital literacy has no significant effect on digital entrepreneurial behavior. The results of research conducted by Amir et al. (2018) concluded that environmental support had a significant effect on entrepreneurial behavior, while results study by Khoshmaram et al. (2020) concluded that environmental support had no significant effect on entrepreneurial behavior.

Understanding and planning are needed about the development and management of student digital businesses in building the intention and behavior of students in digital entrepreneurship from startups to established businesses. According to the Global Entrepreneurship Monitor (Bosma et al., 2020) in the entrepreneurial process its existence is at the TEA (Totally Early Activity) stage, where a person will make a decision whether to continue his business or not to continue. There are still differences in the results of research on the factors that influence entrepreneurial behavior, which is a gap for research on the development of digital entrepreneurial behavior models. Semarang as one of the big cities in Indonesia which has many universities and students is certainly expected to be able to contribute to the birth of digital entrepreneurs who are college graduates.

Based on phenomena and research gap, this study is purposed to analyze the effect of entrepreneurial orientation on entrepreneurial competence, the effect of entrepreneurial competence, entrepreneurship knowledge, environmental support on entrepreneurial self-efficacy, and the influence of entrepreneurial competence, entrepreneurial self-efficacy, and environmental support on student's nascent digital entrepreneurs in Semarang, Indonesia

II. Literature Reviews

A. Entrepreneurial Orientation on Entrepreneurial Competence

Competence is one aspect of human capital which consists of traits that encourage entrepreneurial success (Al Mamun & Fazal, 2018). Competence and entrepreneurial orientation are unique intangible resources owned by an entrepreneur. Entrepreneurial orientation is a set of behavior consisting of innovativeness, proactiveness, risk taking, autonomy and aggressiveness which play a role in increasing one's entrepreneurial competence (Bolton & Lane, 2012). The higher a person's entrepreneurial orientation will the more increase entrepreneurial competence. Aisyah et al. (2017) found a significant effect of small medium enterprises owner on entrepreneurial competence in Makassar, Indonesia. Another study by Al Mamun and Fazal (2018) in Malaysia and by Khan et al. (2020) in Pakistan also found a significant effect of entrepreneurial orientation on entrepreneurial competence.

H1: entrepreneurial orientation has a significant effect on entrepreneurial competence.

B. Entrepreneurial Competence on Entrepreneurial Self-efficacy

The social cognitive theory proposed by Bandura gave birth to the concept of self-efficacy which is defined as: individual's belief that he or she can complete specific tasks under various circumstances. In the field of entrepreneurship, entrepreneurial self-efficacy is often defined as an individual's belief in their ability to successfully launch an entrepreneurial venture (McGee et al., 2009). As a sub-category of entrepreneurship (Prendes-Espinosa et al., 2021), the development of digital entrepreneurship could apply social cognitive theory. A high entrepreneurial competence will enhance one's belief to success their business. In the current era of digitalization and automation, universities play an important role in developing student's digital entrepreneurial competencies because almost all business activities are basically the formation of a system of professional competencies (Kurmanov et al., 2020). Talua et al. (2016) suggested linkages between competency and efficacy. In field digital competence, Bazkiaei et al. (2020) found a significant relationship between digital competence and digital entrepreneurial self-efficacy in students in Bangladesh and Malaysia. Li et al. (2020), and Setiawan et al. (2022) found the significance effect of competence on entrepreneurial self-efficacy.

H2: Entrepreneurial competence significantly effect on entrepreneurial self-efficacy.

C. Entrepreneurial Knowledge on Entrepreneurial Self-Efficacy

Among these four sources of self-efficacy, performance accomplishment is especially influential because it is based on experiences of personal mastery (Y.-S. Wang et al., 2020). Educated and trained students in digital will elevate an individual's digital entrepreneurial self-efficacy (Y.-S. Wang et al., 2020). Regarding to Khoshmaram et al. (2020), entrepreneurial knowledge is one of human capital, and it will play a role in growing entrepreneurial self-efficacy (Zhao et al., 2005). Y.-S. Wang et al. (2020) found a positive relationship between internet entrepreneurial knowledge and internet entrepreneurial self-efficacy in their study in Taiwan. Onjewu et al. (2021) conducted research on student's nascent digital entrepreneurship (2021), found that entrepreneurial knowledge in the form of a course, workshop, training, guess lecturer of entrepreneurship was a positive effect on entrepreneurial self-efficacy.

H3: Entrepreneurial knowledge positive effect on entrepreneurial self-efficacy.

D. Environmental Support on Entrepreneurial Self-Efficacy

Ajzen developed theory of planned behavior to determine person's behavior which consist three main element: attitudes, subjective norms, and perceived control behavior (Ajzen, 2014). Based on developed model of theory of planned behavior (Ajzen, 2014), environmental support is one of background factor which could effect to certain behavior. The role of these environmental factors is to provide the resources needed by novice entrepreneurs to start a business. However, according to Krueger et al. (2000) the influence of contextual factors such as environmental support is indirect effect through entrepreneurial self-efficacy. In some entrepreneurial research, environmental effects will first arise entrepreneurial self-efficacy before finally could effect to behavior. Policy supports from university will arise student's confidence to realize their digital business (Widiasih & Darma, 2021). S Darmanto et al. (2022) also found a significant effect of environmental support on entrepreneurial self-efficacy.

H4: Environmental support positive effect on entrepreneurial self-efficacy.

E. Entrepreneurial Competence on Entrepreneurial Behavior

Competency is associated with the start-up, growth and sustainability which are characterized as valuable knowledge, skills and abilities (Al Mamun & Fazal, 2018). Individuals with entrepreneurial. competence can lead competitor advantages and will enhance the performance of entrepreneurs (Khan et al., 2020). Entrepreneurial skills and entrepreneurial personality are the basic of entrepreneurial competencies and it is assessed by perceived capability, perceived opportunities, having less fear of failure, and entrepreneur role model all year (Barazandeh et al., 2015). Results research conducted by Apriyani et al. (2019) concluded that entrepreneurial competence has a significant effect on entrepreneurial behavior. According to Li et al. (2020) entrepreneurial competence in the form of entrepreneurial passion is an important component in the realization of entrepreneurial behavior.

H5: Entrepreneurial competence positively effect on entrepreneurial behavior.

F. Entrepreneurial self-efficacy on entrepreneurial behavior

Entrepreneurial self-efficacy is assessed as the main individual character that has the most influence on entrepreneurial behavior, or it can be said that someone deciding to become an entrepreneur is determined by the magnitude of the influence of entrepreneurial self-efficacy (Pihie & Bagheri, 2011). The higher individual belief in conducting business activities will effect the behavior of individual business development (Dessyana & Riyanti, 2017). Entrepreneurial self-efficacy are found has positive effect of entrepreneurial behavior (individual actions indicated by entrepreneurial decisions), or in digital business development, it is defined as a person's decision to realize the establishment of a digital business. Previous studies by Li et al. (2020) and Onjewu et al. (2021) concluded that entrepreneurial self-efficacy has a significant effect on entrepreneurial behavior.

H6: Entrepreneurial self-efficacy has a significant effect on entrepreneurial behavior.

G. Environmental support on entrepreneurial behavior

The development of behavior in the Theory of planned behavior is not only based on their 3 main elements, but also on the basis of background factors which consist of personal, demography and environmental. According to Engle et al. (2010) Theory of Planned Behavior can be applied in almost all planned behavior including entrepreneurship, so it can also be used to develop digital entrepreneurship research models. Environmental supports not only boosts entrepreneurial intention but also develops entrepreneurial behavior for budding entrepreneurs (Kristiansen & Indarti, 2004). Environmental supports could be from family, social, institution or government support. Environmental support could encourage someone to behave an entrepreneur although they have entrepreneurial intention (Akter & Iqbal, 2022). Family support such as support from parents and friends found significantly arises entrepreneurial behavior (Susetyo Darmanto & Yuliari, 2016). The role of government supports through training and programs also proved significant effect in developing entrepreneurial behavior (Amir et al., 2018). Social support such as conducted by a joint business group also assists to develop entrepreneurial behavior (Ekopriyono & Darmanto, 2020).

H7: Environmental support significant effect on entrepreneurial behavior.

Figure 1 shows the relationship between variables as the basis for formulating hypotheses, consisting of three types of exogenous variables, and three endogenous variables. Each component model is based on a literature review of the theory of planned behavior and social cognitive theory.

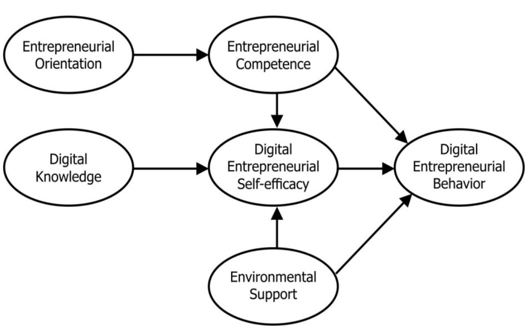

Figure 1. Research conceptual framework

III. Method

A. Samples

The population in this study are active students at universities in Semarang City, Indonesia, who have digital businesses or have marketed their businesses digitally. The research sample was determined by adopting criteria a cross-sectional design, taken using a purposive sampling technique so that a total of 143 samples were collected. Paper-based surveys were distributed to students in college entrepreneurship groups through supervisors, and online surveys using facilities from Google Forms.

B. Measurement

This study uses three exogenous variables consisting of entrepreneurial orientation, digital knowledge, and environmental support as an explanation for the three endogenous variables, namely entrepreneurial competence, entrepreneurial self-efficacy, and student's nascent digital entrepreneur. The research variables were measured by adopting previous research as described in Table 1. All variables in this study were measured using a Likert scale with five alternative answers, namely "Strongly disagree" (1) to "Strongly agree" (5). In addition, the first part of the survey questionnaire briefly describes the rationale for the study and instructions for filling out the survey questionnaire and socio-demographic information. Questions include respondents, gender, age, education, marital status, parental background, type of business, and length of business.

C. Data Analysis

This study uses the SPSS software package was used to analyze descriptive demographic profiles of respondents, and research variables. Inferential data analysis was performed using the partial least squares structural equation modeling (PLS-SEM) technique.

Table 1. Measurement

Variables	Indicators	References
Entrepreneurial Orientation (EO)	1. I have a strong tendency to support the discovery of new ideas 2. I have a strong tendency to develop new products 3. I always take the initiative to look for opportunities for new activities or activities 4. I am always active in anticipating changing consumer needs 5. I always update business information 6. I have a strong tendency to dare to take risks entering the market 7. I have the courage to take the necessary actions to launch a new product 8. I have a strong tendency to dare to carry out new strategies	(Cho & Lee, 2018; Efrata et al., 2021; Naveed et al., 2021; Satar & Natasha, 2019)
Digital Knowledge (DK)	1. I have basic knowledge of online business regulation 2. I have basic knowledge of website design 3. I have knowledge of how to open a new digital business 4. I have knowledge of how to offer digital products that the market needs	(Efrata et al., 2021; Farani et al., 2017; KrischananKampanthong, 2021; Islami, 2019; Widiasih & Darma, 2021)
Environmental Support (ES)	1. My parents and close people support me in realizing a digital business 2. My college supports social activities and digital business activities 3. Local and central governments provide support for information networks for digital business development 4. The government supports stakeholders who help develop digital businesses 5. I easily access information networks and bureaucracy to help digital activities	(Ahmed et al., 2021; Akter & Iqbal, 2022; Khoshmaram et al., 2020)
Entrepreneurial Competence (EC)	1. I am able to monitor the progress of the business so that it is in line with long-term business goals 2. I am able to explore new ideas as business opportunities 3. I am able to capture quality business opportunities 4. I am able to develop long-term trusting relationships with other people 5. I am able to keep up with business developments, apply the skills and knowledge learned to real practice. 6. I can identify strengths and weaknesses and match them to opportunities and threats 7. I am able to be honest and transparent in business matters 8. I am able to cooperate and help others in business (especially close associates).	(Aisyah et al., 2017; Apriyani et al., 2019; Farani et al., 2017; Sitinjak, 2019)
Entrepreneurial Self-Efficacy (ESE)	1. I have confidence that I can realize a digital business 2. I have the ability to take advantage of digital business opportunities 3. I have ability in digital business management and application 4. I have ability develop and commercializing new digital ideas 5. I have the ability to build good relationships with business partners	(Wu et al., 2022) (Cai et al., 2021; Elnadi & Gheith, 2021; Jiatong et al., 2021; Soomro & Shah, 2022; Wu et al., 2022)
Digital Entrepreneurial Behavior (DEB)	1. I've discussed digital business ideas with potential customers 2. I've gathered information about the market and competitors of the digital venture 3. I have written a business plan 4. I have started a digital product or service business development 5. I have started marketing a digital product or product promotion 6. I have purchased materials and equipment for digital business 7. I've been trying to get business funding from outside 8. I already have a patent, copyright or trademark 9. I have registered the business that I manage with the authorized agency 10. I have sold a digital product or service	(Akter & Iqbal, 2022; Li et al., 2020; Murad et al., 2022; Neneh, 2020)

According to Hair Jr et al. (2016), PLS-SEM is a statistical tool with good capabilities, even in studies with small samples and predictive model. SEM-PLS data analysis was carried out in two stages, namely the analysis of the measurement model including convergent validity, discriminant validity, reliability testing and structural model analysis. Analysis of the measurement model is determined by convergent validity and discriminant validity. An indicator is said to meet the criteria for convergent validity if it has a factor loading value of more than 0.6, while the validity test is discriminant use cross-loading criteria and Fornell-Larcker. Standard criteria Fornell-Larcker if correlation between variable with AVE squared higher than the correlation of other variables in the research model (Ramli et al., 2018). The reliability test is measured by the Cronbach Alpha value (a), rho_A (r), and the composite reliability (CR) value. If all scores exceed 0.7 and the average variance extract (AVE) value is more big from 0.5 then declared reliable (Hair et al., 2019; Latan et al., 2018). Analysis structural evaluated by coefficient path between variables, the variance inflation factor (VIF), and coefficient of determination (R2) (Latan & Noonan, 2017). The PLS-SEM technique in this study used SmartPLS version 3.2.8 (Ringle et al., 2015).

IV. Results

A. Respondent demographic profile

Table 2 demographic information for the people who participated in the study. Respondents were male (38.5%) and female (61.5%) from a total of 143 respondents, and the largest sample group was aged 21+ to 25 years (47.6%). Characteristics based on the education level of the respondents taking undergraduate education (92.2%) and diploma (7.8%). Overall, based on business products, it is known that 38% of respondents have businesses in the field of digital services. Finally, the majority of respondents have the characteristics of 1 year to 3,5 year in business (57.3%).

Table 2. Respondent's profile

Demographic	Characteristics	Frequency	Percent
Gender	Man	64	44.8%
	Woman	79	55.2%
Age	18 years to 21 years	56	39.2%
	21+ years to 25 years old	68	47.6%
	25+ years - 30 years	13	9.1%
	30+ years or older	6	4.2%
Level of education	Diploma	11	7.8%
	Bachelor	132	92.2%
Parent's Profession	Farmer	19	13.3%
	Teacher/lecturer	3	2.1%
	Private sector employee	62	43.4%
	Government employees	3	2.1%
	Businessman	51	35.7%
	Another	5	3.5%
Business Products	Digital Services	38	26.6%
	Food	46	32.2%
	Fashion	35	24.7%
	Other	24	16.5%
Age in Business	Less than 1 year	49	34.4%
	1 year to less than 3.5 years	82	57.3%
	More than 3.5 years	12	8.4%

B. Descriptive statistics

Table 3 presents the mean, standard deviation (SD), minimum, and maximum values for each construct in the proposed model. The average score for the entrepreneurial orientation variable is 4.46, the digital knowledge variable is 4.37, the environmental support variable is 4.38, the entrepreneurial competence variable is 4.43, the entrepreneurial self-efficacy variable is 4.43, and the digital entrepreneurial behavior variable is 4.16. These values in this study are categorized as high based on the tree box method criteria, which are above 3.67.

Table 3. Descriptive statistics of variables

Variables	Minimum	Maximum	Mean	Std. Deviation
EO	1.00	5.00	4.46	0.57
DK	1.25	5.00	4.37	0.62
ES	2.20	5.00	4.38	0.56
EC	1.88	5.00	4.43	0.50
ESE	2.20	5.00	4.43	0.52
DEB	2.40	5.00	4.16	0.63

C. Measurement Model Analysis

The measurement of the model on the SEM-PLS can be assessed by looking at the loading factor of the research indicators. The calculation SmartPLS results in Table 4 show that the loading factor exceeds the minimum value of 0.6, except for one indicator of entrepreneurial competence (EC7). However, in this study the indicator is maintained because it reflects the respondent 's perception and is supported by the fulfillment of the reliability test .

Convergent validity results by looking at Cronbach alpha, Composite reliability, and average variance extract (AVE). Table 4 shows the composite reliability (CR), rho_A, and cronbach alpha exceeding the recommended value of 0.7 (Hair Jr et al., 2021). The results showed that the mean extract variance (AVE) was higher than the definite value of 0.5 (Hair et al., 2019). Finally, the results of discriminant validity in Table 5 show the square root of the AVE for all variables exceeding the intercorrelation, indicating sufficient discriminant validity (Fornell & Larcker, 1981).

Table 4. Result of confirmatory factor analysis

Construct	Indicator	l	a	r	CR	AVE
Entrepreneurial Orientation	EO1	0.710	0.887	0.893	0.910	0.559
	EO2	0.725				
	EO3	0.731				
	EO4	0.729				
	EO5	0.781				
	EO6	0.769				
	EO7	0.772				
	EO8	0.760				
Digital Knowledge	DK1	0.756	0.778	0.786	0.857	0.600
	DK2	0.808				
	DK3	0.810				
	DK4	0.719				
Environmental Support	ES1	0.693	0.802	0.811	0.863	0.560
	ES2	0.690				
	ES3	0.778				
	ES4	0.859				
	ES5	0.707				

Table 4. Continued

Construct	Indicator	l	a	r	CR	AVE
Entrepreneurial Competence	EC1	0.718	0.861	0.869	0.892	0.512
	EC2	0.754				
	EC3	0.747				
	EC4	0.783				
	EC5	0.743				
	EC6	0.774				
	EC7	0.520				
	EC8	0.648				
Entrepreneurial Self-efficacy	ESE1	0.763	0.840	0.842	0.887	0.610
	ESE2	0.747				
	ESE3	0.803				
	ESE4	0.790				
	ESE5	0.802				
Digital Entrepreneurial Behavior	DEB1	0.684	0.896	0.898	0.914	0.517
	DEB2	0.716				
	DEB3	0.691				
	DEB4	0.733				
	DEB5	0.687				
	DEB6	0.724				
	DEB7	0.732				
	DEB8	0.753				
	DEB9	0.738				
	DEB10	0.727				

D. Structural Model Analysis

The next analysis is a structural model for path coefficients for various direct and indirect relationships between exogenous and endogenous variables. Paths are analyzed using beta coefficients, critical ratios, and significance to determine which hypotheses are supported. The calculation results as summarized in the table are known from seven hypotheses, six relationships are supported, and one relationship is rejected. Figure 2 shows the path coefficients and variances that can be explained in digital entrepreneurial behavior. Based on Table 5, it is known that the path coefficient of direct influence to EO on EC (β= 0.390, and p=0.000<0.05), EC to ESE (β = 0462, p = 0.000 <0.05), DK to ESE (β = 0.236, p = 0.006 < 0.05), ES to ESE (β=0.166, p=0.035<0.5), EC to DEB (β=0.113, p = 0.246>0.05), ESE to DEB (β= 0.383, p=0.001<0.05), and SE to DEB (β=0.260, p=0.023<0.05). Based on the data from the research, it can be concluded that six paths of direct influence are significant so that six hypotheses are accepted, while one path is not significant so that the fifth hypothesis (H5) is rejected (Table 6). The total effect

Table 5. Fornell-larcker criterion discriminant validity

Variables	EO	DK	ES	EC	ESE	DEB
EO	0.747					
DK	0.432	0.774				
ES	0.443	0.535	0.748			
EC	0.690	0.662	0.552	0.716		
ESE	0.644	0.631	0.547	0.710	0.781	
DEB	0.327	0.592	0.532	0.528	0.605	0.719

of the results of the PLS-SEM bootstrap calculation is described in Table 7. The results of the calculations explain that all the indirect effects of EO, DK, ES, EC and ESE on DEB are significant (p-value<0.05). This finding indicates that ESE provides a mediating role for all indirect relationships.

These results reveal that the antecedent variables are able to describe digital entrepreneurial behavior among students with an f-square value above 0.000. The further result is that the model explains 43% of the variance in digital entrepreneurial behavior, which is much higher than 0.35. Finally, the VIF value of all variables is below 3 so that it shows the absence of multicollinearity.

Table 7. Total effect

Effect	Estimate	T Statistics	P Values	Decision
EO -> DEB	0.2 00	2,741	0.006	Supported
DK -> DEB	0.09 0	2,084	0.038	Supported
ES -> DEB	0.324	3.123	0.002	Supported
EC -> DEB	0.29 0	3.02 0	0.003	Supported
ESE -> DEB	0.383	3.35 0	0.001	Supported

VIF = 1.256 ... 2.517
f square = 0.010 ... 0.250
R^2 EC = 0.477; R^2 ESE=0.568; R^2 DEB= 0.430

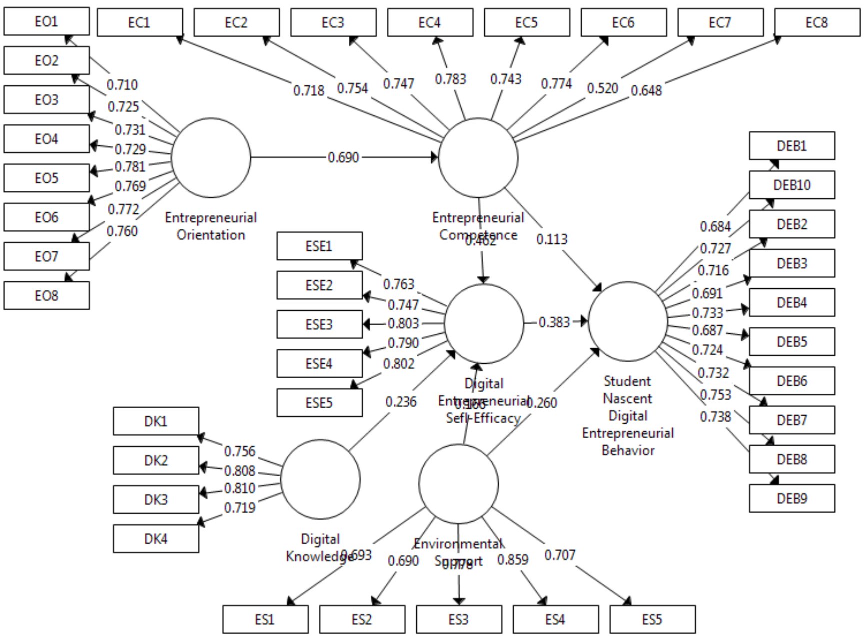

Figure 2. The final model result

Table 6. Path coefficient

Hypothesis	Effect	Coefficient	T Statistics	P Values	Decision
1	EO -> EC	0.690	8,401	0.000	Supported
2	EC -> ESE	0.462	5.319	0.000	Supported
3	DK -> ESE	0.236	2,774	0.006	Supported
4	ES -> ESE	0.166	2.118	0.035	Supported
5	EC -> DEB	0.113	1.161	0.246	Rejected
6	ESE -> DEB	0.383	3.350	0.001	Supported
7	ES -> DEB	0.260	2.272	0.023	Supported

V. Discussion

The objective of this study is to analyze the influence of entrepreneurial orientation on entrepreneurial competence, the influence of entrepreneurial competence, knowledge entrepreneurship, support environment to entrepreneurial self-efficacy, and influence competence entrepreneurship, entrepreneurial self-efficacy, environmental support for student's nascent digital entrepreneurs. This study also analyzes the mediating role of entrepreneurial competence and entrepreneurial self-efficacy in mediate the role of human capital, strategy and Support environment on student digital entrepreneurship behavior. Based on result, from the 7 hypotheses proposed, 6 hypotheses are proven to have a positive and significant influence, namely entrepreneurial orientation to entrepreneurial competence, entrepreneurial knowledge, entrepreneurial competence, environmental support to entrepreneurial self-efficacy, entrepreneurial self-efficacy, and environmental support to entrepreneurial behavior. While one hypothesis, namely entrepreneurial competence on entrepreneurial behavior, proved insignificant.

One's entrepreneurial orientation derives from a set of emotions, beliefs and willingness to succeed their business (Zollo et al., 2021). Understanding the development of entrepreneurial orientation will lead us to efforts to improve entrepreneurial competence as a weapon to face tough business competition (Khan et al., 2020). Research conducted in Malaysia by Al Mamun and Fazal (2018) proves that entrepreneurial orientation in the form of creativity and innovativeness, proactiveness, autonomy has a positive and significant influence on entrepreneurial competence. Subsequent research conducted by Khan, et al (2020) in Pakistan, also proves that entrepreneurial orientation has a positive and significant effect on entrepreneurial competence.

Kurmanov et al. (2020) stated the importance of entrepreneurship competence in an effort to develop digital entrepreneurial competence for students as a way to overcome the business challenges they face, both cognitively, socially and behaviorally. Entrepreneurial self-efficacy is a cognitive aspect that has a strong relationship with competence (Kassim et al., 2021). The results of this study prove that entrepreneurial competence has a positive and significant effect on entrepreneurial self-efficacy, thus supporting the previous research (Sitinjak, 2019). Results study by Cai et al (2020) on 312 students in China also proves that competence has an effect on entrepreneurial self-efficacy. However, the results of this study concluded that the direct influence of entrepreneurial competence on entrepreneurial behavior (student's nascent digital entrepreneur) proved insignificant. Entrepreneurial self-efficacy is needed to realize student's nascent digital entrepreneur from ability competence owned entrepreneurship. Previous research conducted by Islam (2019) concludes no existence influence significant among competence to entrepreneurial behavior.

Entrepreneurial knowledge is a construct that represents experience or formal learning obtained from other people who play a role in growing cognitive abilities so that it will increase one's belief in successful of entrepreneurship (Zhao, et al., 2005). It is a human capital resource which in social cognitive theory is mentioned as one of the supporting factors vicarious experience or the experience gained from others and will arise one's self-efficacy (Liñán et al., 2005). Someone who has digital entrepreneurial knowledge will have high confidence in creating digital business (Wang, 2020). The results of this study support research conducted by Onjewe, et al. (2021) who concluded that a course on entrepreneurship, workshops, creativity labs and training on entrepreneurship, guess lectures had a positive and significant impact on the entrepreneurial self-efficacy of students in the UK. Previous research conducted by Wang et al (2020) on 356 students in Taiwan also proved that entrepreneurial knowledge had a significant effect on entrepreneurial self-efficacy.

Environmental support even in the development of the theory of planned behavior (Ajzen, 2014) plays a role as a background factor, but in this study has the ability to build entrepreneurial behavior either directly or through entrepreneurial self-efficacy. One element forming self-efficacy is social persuasion

(Boyd & Vozikis, 1994), which in this study is manifested as environmental support from social support or support from people closest to proven to have a significant influence on entrepreneurial self-efficacy. This results study support previous study done by Widiasih & Darma (2021) who prove that public support plays a role to increase entrepreneurial self-efficacy and to realize student's nascent digital entrepreneur behavior. Research conducted by X. T. Nguyen (2020) on 350 students also prove that college support take significant beffect in increase the entrepreneurial self-efficacy of students in Vietnam. In addition to playing a role in increasing entrepreneurial self-efficacy, the results of this study also show that environmental support also has a direct influence on entrepreneurial behavior. This shows that, if good environmental, social, institutional (university) and government support is given optimally, it will be able to help the development of student's nascent digital entrepreneur. Research conducted by Amir et al. (2018) proves that environmental support in the form of trainings provided by the government has proven to have a significant influence on entrepreneurial behavior. Results research conducted by Akter and Iqbal (2022) on 327 students private universities in Bangladesh also concluded the significant role of university environment support on entrepreneurial behavior.

Establishing and developing a digital business is not easy, its success depends on several aspects, and one of the main factors is entrepreneurial self-efficacy (Dessyana & Riyanti, 2017). The results of his research prove that entrepreneurial self-efficacy has a positive and significant effect on nascent digital entrepreneurs in Jakarta. Entrepreneurial self-efficacy is rated as the most consistent individual aspect in realize behavior entrepreneurship (Hermawan et al., 2016). One's who has higher levels of entrepreneurial self-efficacy are proved to create new business compared to individuals who have less ones (Li et al., 2020). The results of this study support previous research done by Dessyana and Riyanti (2017) concluded that entrepreneurial self-efficacy has a positive and significant effect on entrepreneurial behavior. Results study by Onjewu et al. (2021) also prove influence significant entrepreneurial self-efficacy towards nascent entrepreneurs in the UK.

This study also proves the significant role of entrepreneurial self-efficacy in mediating aspects of personality, human capital and environment. Human capital play a role as resources, and has important implications, namely encouraging improvement efforts, survival so that could trained and repaired (S. Darmanto & Lestari, 2014). In study this is human capital realized in a form of entrepreneurial knowledge whose role is in Creating a student's nascent digital entrepreneur is enhanced through the role of entrepreneurial self-efficacy. This results study support (Onjewu et al., 2021) study which concluded significant role significant of entrepreneurial self-efficacy in mediating entrepreneurial knowledge on entrepreneurial behavior. The personality aspect proposed in this study is entrepreneurial competence which directly does not have a significant effect on entrepreneurial behavior so that the mediating role of entrepreneurial self-efficacy becomes real in bridging aspects of personality and entrepreneurial behavior. The results of research conducted by Ci, et al (2020) also prove the mediating role of entrepreneurial self-efficacy in mediating entrepreneurial competence and behavior. The significant role of entrepreneurial self-efficacy is also manifested in mediating environmental support for entrepreneurial behavior. According to Krueger et al. (2000) the influence of contextual factors such as environmental support is indirect through entrepreneurial self-efficacy. Previous study done by S. Darmanto and Lestari (2014) also prove the mediating role of entrepreneurial self-efficacy in mediating environmental support for entrepreneurial behavior.

VI. Conclusions

Digital entrepreneurship has attracted the business interests of millennial businessmen in college because students can use their time to develop digital businesses when they are carrying out their obligations to finish their study. This study aims to develop an empirical model of student's nascent digital behavior or students' nascent digital entrepreneur based on a digital entrepreneurial performance model based on the Theory of Planned Behavior and Social Cognition Theory. This study concludes that there is a positive and significant effect of entrepreneurial orientation on entrepreneurial competence. The tendency of digital entrepreneurs to support ideas, innovation, and business opportunities, dare to take risks, and carry out new strategies has a positive contribution to entrepreneurial competence. This finding strengthens the prior studies that the entrepreneurial orientation dimension is strongly related to the entrepreneurial competence (Khan et al., 2021; Kharismasyah et al., 2022).

Moreover, the current study concludes that digital knowledge, entrepreneurial competence, and environmental support have enhanced entrepreneurial self-efficacy. The results indicated that digital knowledge and entrepreneurial competence obtained from various sources will further increase a student's entrepreneurial self-efficacy. Likewise, environmental support also has an important role in growing entrepreneurial self-efficacy. These finding support the results of prior studies (Ganefri et al., 2021; Handayati et al., 2020; Wardana et al., 2020), that digital entrepreneurship knowledge and entrepreneurial skills contribute positively to student entrepreneurial self-efficacy. Some studies also show conformity with the results of this study that the entrepreneurial environment has an important role in entrepreneurial behavior (Martins & Perez, 2020; T. T. Nguyen, 2020; Wach & Bilan, 2021).

Lastly, the role of personality, human capital and environment in shaping student's nascent digital entrepreneur. The mediating ability of entrepreneurial self-efficacy also shows its importance as an aspect that needs attention in the development of entrepreneurial behavior. This finding is supported with various researches (Koe et al., 2022; X. Wang et al., 2020; Wijayanti et al., 2016). Entrepreneurial competence has a mediating role that needs to be considered to improve company performance (Kanaan-Jebna et al., 2022). Likewise, entrepreneurial self-efficacy has a mediating role, and it is an important driver of entrepreneurial intention (Jung-Rae, 2022; Maheshwari & Kha, 2022), which, based on TPB, has a positive impact on entrepreneurial behavior (Al-Mamary & Alraja, 2022).

VII. Implication

Digital entrepreneurship is the answer to the growing global situation towards digitization and automation. There is still a high open unemployment rate during the pandemic and post- pandemic to becomes must have space used for maximizing development student digital entrepreneurship . Some students are still developing conventional entrepreneurship and only a few are developing digital businesses or digital-based businesses. The results of this study provide managerial implications in the form of the necessity of universities, private, and government for increase student digital entrepreneurship through lecture programs, trainings, practices, assistance development network and financially.

Theoretically, the significant role of personality, human capital and environmental aspects is support for the applied theory of planned behavior in development digital entrepreneurial behavior. Development and application of the theory of planned behavior in various behaviors including entrepreneurial behavior is also becomes recommendation from Ajzen as the fouder of the theory of planned behavior. Strong influence and the mediating ability of entrepreneurial self-efficacy contributes to the development of social cognitive theory, so to further develop social cognitive theory it is necessary to follow up with research at different levels of entrepreneurial self-efficacy.

VIII. Limitations and Recommendations

This study has some limitations and recommendations for future research. The observed population is limited only for digital entrepreneurial students in Semarang, Indonesia, therefore next research should expand the scope of research respondents to more areas area, for example one province, one country or between countries so that the results can be applied in other regions or countries that have different personality backgrounds or environmental conditions. Studies can also be expanded or developed to other groups, such as nascent digital entrepreneurs who are non-university students. The research model development is limited to analyze competence, knowledge, environment as representative of personality, human capital and environment, so future research is recommended to analyze other aspects such as social capital, risk propensity. This study was a cross-sectional and using a questionnaire to collect the data which potentially effect inherent problems, therefore a longitudinal study is recommended for further research.

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Effects of the EU's Carding System for IUU Fishing on Its Trading Partners

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A B S T R A C T

Purpose: This study investigated the effects of the EU carding system for IUU fishing on its trading partners carded for illegal fishing practices, with the purpose of analyzing the extent to which the carding system affected trade between the EU and third countries identified and penalized for IUU fishing, and to identify factors influencing the likelihood of card removal.
Design/methodology/approach: The study used fishery and aquaculture trade data from 2004 to 2020 from the European Market Observatory for Fisheries and Aquaculture Products on 26 carded countries. Major analytic tools applied in this study include OLS, Panel Random Effect, Logit and Probit Models.
Findings: The study confirmed that being carded by the EU for IUU fishing significantly negatively impacted countries' fishery trade flows, especially in the case of red cards. Furthermore, increases in capture of wild fish and corruption reduced the likelihood of having the card removed.
Research limitations/implications: An important limitation of this study is that it did not account for the influence of other major industry players (such as Japan, USA, China) on the country's overall trade flows. Notwithstanding, it explored how certain variables reduced the likelihood of card removal, finding that countries with higher levels of corruption and fish capture were less likely to have their cards revoked, putting them at a further disadvantage. The findings are especially important in the context of the fishing industry which supports local economies in many developing countries that are usually the target of such coercive measures. Restricted trade flows are especially damaging to small-scale fishers who are often forgotten in the global fight against IUU fishing. This study brings attention to the carding system's potential for trade disruptions and future applications of this sanctioning mechanism should take this under advisement.
Originality/value: Studies of the EU carding system's produced effects remain scarce, with existing ones focusing either on individual countries or on the mechanism's general potential for curbing IUU fishing. Considering the global nature of the fishing industry and the harmful potential of the carding system for vulnerable coastal communities, this study attempted to achieve a broader and more in-depth understanding of the EU carding system's effects by examining all countries that were carded for IUU fishing from the enforcement of the IUU Regulation until 2020.

Keywords: IUU fishing, EU carding system, the IUU Regulation, fishery trade, sanctions

I. Introduction

Fish and fishery products are among the most traded food commodities in the world. The fishing sector is estimated to provide livelihoods for around 820

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million people worldwide, many of whom come from poor marginalized communities (FAO, 2022a). In 2020 alone, global fish production reached about 179 million tons, directly employing about 59 million people (UN, 2022). Developing countries are important actors on the market, with many having their fish exports outnumber all other agricultural products combined (Bellmann, Tipping & Sumaila, 2016). Yet according to FAO (2022b), 90% of assessed marine fish stocks are now fully exploited, overexploited or depleted. The decades-long privatization of fishing rights and commodification of marine resources, along with bad government policies, have resulted in fleet overcapacity and overfishing (Pinkerton & Davis, 2015; Parlee & Foley, 2022). This has not only harmed the marine environment and local fishing communities, but it also contributed to the practice of illegal, unreported and unregulated (IUU) fishing, particularly by large fleets in high seas (Delpeuch, Migliaccio & Symes, 2022).

IUU fishing is a persistent and global problem that poses serious threats to the marine environment, coastal communities, ocean sustainability and human security. Not only does it contribute to further overfishing and destruction of marine habitats, it has severe negative effects on food security, especially in countries whose local economies depend on fishing for survival (Lindley, Percy & Techera, 2019; Rosello, 2020). The term encompasses various different violations: "illegal fishing" refers to fishing activities violating domestic or international law, "unreported fishing" refers to unreported or misreported fishing practices that violate domestic or international regulations, and "unregulated fishing" involves undermining the rules and measures of regional organizations managing shared marine resources (FAO, 2001).

Extant literature suggests that over 85% of global commercial stocks may be at risk of IUU fishing (Rosello, 2020). The economic cost of this illegal practice is very high, with studies showing global damage ranging between $10 and $23.5 billion annually (Agnew et al., 2009). Between 11 and 26 million tons of fish are caught illegally each year, representing at least 15% of world catches (European Commission, 2019). Significant declines in catch due to overfishing, along with an increase in operating costs and a shortage of workers, have fostered grueling and exploitative working conditions and increased other illegal practices. IUU fishing is often connected to other types of labor and human rights violations and transnational organized crime, including migrant smuggling, slavery, drug trafficking, money laundering, and tax fraud (Lindley et al., 2019; Liliansa, 2020; Rosello, 2020; UN, 2022).

Various measures have been introduced to combat IUU fishing at both international and local levels. SDG targets 14.4 and 14.6 aim to end IUU fishing and eliminate harmful subsidies, and they have inspired governments, regional fisheries management organizations, intergovernmental organizations, and non-governmental organizations to take action (FAO, 2020). In 2009, the FAO Conference approved *the Agreement on Port State Measures to Prevent, Deter, and Eliminate Illegal, Unreported and Unregulated Fishing* (PSMA), aimed at preventing illegal catch from entering national and international markets (FAO, 2020).

More recently, the World Trade Organization has agreed to ban harmful subsidies to fishing vessels and operators caught engaging in illegal fishing practices (WTO, 2022). This marks a significant global shift in institutional commitment to solving this problem and it represents a historic achievement for the WTO since it is only the second agreement reached since the organization was founded, and the first to focus on the environment and meet an SDG target (ibid.). However, despite the progress achieved, many problems still persist due to poor coastal management, corruption, lack of regulation enforcement, insufficient monitoring, financial secrecy, and weak intergovernmental cooperation (Elvestad & Kvalvik, 2015; Lee, 2019; Daniels et al., 2022).

Port measures and market instruments have been introduced to address some of these issues (Elvestad & Kvalvik, 2015). Since around 36% of all fisheries' production is traded, market measures can prove very influential (Hosch, 2016). Key examples include catch certification schemes and trade restrictions (ibid). As one of the world's largest economies (accounting for 16% of global GDP), the EU majorly influences the global trading system (Eurostat, 2020). It employs both catch certification and trade restrictions. Catch certifications schemes work by reducing financial incentives for illegal products due to the difficulty in selling them (Hosch, 2016). Notwithstanding its potential, the EU's system is paper-based and does not operate a central data registry, and to date, evidence of its impact on trade has been scarce (ibid).

The EU's trade restrictions take the form of a carding system instituted by Council Regulation No. 1005/2008 establishing a Community system to prevent, deter and eliminate illegal, unreported and unregulated fishing (IUU Regulation).[1] The IUU Regulation's purpose is to incentivize fish and aquaculture exporting countries to reduce IUU fishing in their waters (Sumaila, 2019). The Regulation entered into force in 2010, applying to all landings and transshipments of EU and third-country fishing vessels in EU ports, as well as all trade of marine fishery products to and from the EU (European Commission, 2021). It stipulates that the EU will issue formal warnings (yellow cards) to countries not cooperating in the fight against IUU fishing, either by not having appropriate policies or by failing to implement them (ibid.).

The EU Regulation applies to all fishing vessels—under any flag and in all maritime waters—engaging in IUU fishing. This includes activities in contravention with the conservation and management measures applicable in the area concerned, such as, *inter alia*, fishing without a license, fishing in a forbidden area, fishing during a closed season, using prohibited gear, not fulfilling reporting obligations, falsifying identity, or obstructing inspection (European Commission, 2021).

The yellow card initiates a formal dialogue between the EU and the carded country, in which the former seeks to provide assistance in addressing the identified problems. Although the card itself is not a trade restriction, its purpose is to act as an incentive to spark regulation change. Should a country fail to address identified shortcomings, the EU will issue a red card that signifies a complete ban on fish imports from that country (EU IUU Fishing Coalition, 2022). Importantly, the red card also prevents EU vessels from operating in the carded country's waters, which can impact EU export figures because fish caught by an EU vessel outside EU waters are considered an export from that Member State to the country of landing (Popescu & Scholaert, 2021). The cards are removed once the country has made sufficient progress in addressing its identified shortcomings but can be reissued if IUU fishing practices are detected again (EU IUU Fishing Coalition, 2022).

The scheme's overall goal is to create long-lasting, positive changes in marine governance. In addition to economic pressure, the EU's mechanism puts social pressure on the carded country amid international stigma to change local practices and re-establish certain norms. This entails a focus on improving labor conditions and human rights through knowledge sourcing, discussions, and assistance, with the purpose of creating regulatory change (Kadfak & Linke, 2021). This means the EU exerts not just economic coercion, but also normative power, making the carding scheme a "powerful tool of socializing normative values" (ibid., p.7).

The use of economic coercion to elicit countries' compliance with certain demands is not new in international politics. Most literature on economic sanctions focuses on their effectiveness, with many authors arguing that they have no effect or can even produce negative consequences (Hufbauer, Schott & Elliott, 1990; Allen, 2005; Peksen, 2009; Anguelov, 2015; Choi, Kim & Oh, 2017). Moreover, sanctions appear to be more effective against democratic countries compared to authoritarian ones, where regimes can adapt more easily without political consequences, and sanctions have also proven to be more impactful when there are friendly relations in place (Allen, 2005).

Research on the EU carding scheme shows that it has had some positive impact on curbing IUU fishing in targeted countries (Kadfak & Linke, 2021;

1) The full text of the IUU Regulation can be found at https://eur-lex.europa.eu/eli/reg/2008/1005/oj

EU IUU Fishing Coalition, 2022). The greatest weakness identified so far is the lack of participation in the sanctions regime from other influential traders like Japan, the US, and China (Sumaila, 2019). Nonetheless, despite being in force for over a decade, studies of the EU carding system's produced effects remain scarce, with existing ones focusing either on individual countries or on the mechanism's general potential for curbing IUU fishing (Sumaila, 2019; Rogers, 2021; Kadfak & Linke, 2021; Wongrak et al., 2021; EU IUU Fishing Coalition, 2022). Moreover, the impact of the sanctions regime on small-scale fisheries is severely under-researched. Unlike large-scale fishing fleets that operate for profit alone, small-scale fisheries exist primarily to provide a livelihood for the local community (Pinkerton, 2017). They have already been negatively impacted by dominant neoliberal practices in the fishing industry which have placed them at a disadvantage, favoring industrial fleets (Pinkerton & Davis, 2015; Knott & Neis, 2017).

The uniform handling of IUU fishing practices on the global level has meant that small-scale fishers are now taking another heavy blow to their already vulnerable existence. As they fall outside the scope of reporting and regulatory frameworks reserved for industrial fleets, and usually come from developing countries with weaker regulation, small-scale fishers are often unable to comply with the imposed IUU requirements, despite fishing legally (Song et al., 2020; Cisneros-Montemayor et al., 2022). Additionally, since the WTO Agreement uses unspecific language around the subsidization of fisher incomes, beneficial subsidies that keep self-employed fishers alive during lean seasons are now also potentially under threat (Jarrett & Gilbert, 2020; Cisneros-Montemayor et al., 2022). For these reasons, it is important to analyze and fully understand the impacts of sanctions mechanisms on trade flows and what they mean for a country's economy, especially in the context of the fishing industry where more than half of the total global export value comes from developing countries (Bellmann et al., 2016).

To that end, this study attempted to achieve a broader and more in-depth understanding of the EU carding mechanism by examining all countries that were carded for IUU fishing from the enforcement of the IUU Regulation until 2020. The purpose was to analyze the extent to which the carding system impacted trade between the EU and third countries identified and penalized for IUU fishing, and to identify factors influencing the likelihood of card removal, which would help revitalize local fishing communities. Although many studies of international trade have frequently applied gravity models in their analyses, this study purposefully avoided it because of the specificities of the fishing industry. Unlike other commodities, wild fish are not geographically confined to any single area, and industrial fleets extract their resources in high seas, thousands of miles away from national borders. Therefore, the size of countries and the distances between them have little impact on fish trade since everyone operates outside of their area most of the time, especially in the context of IUU fishing (Daniels et al., 2022). Moreover, fish products are regularly transshipped on high seas after capture, vessels can be registered in many different countries, and owners of large fleets are rarely tied to them geographically (or at all) (ibid.).

Instead, the study used the OLS regression model (under assumptions of parameter linearity, random sampling, absence of multicollinearity, and error homoskedasticity) to have the best possible unbiased estimators of real values. It also used the panel random effects model as a robustness check for the time series data. Finally, because it also wanted to check what factors kept the cards in place, the study employed logit and probit models, using card presence as an ordinal dependent variable. The next section provides further explanations of the used data and methodology, followed by the results of the analyses and their interpretation, with a discussion of potential implications and limitations in the conclusion.

II. Data and Methodology

The study analyzed panel data for the trade of fishery and aquaculture products between the EU and 26 countries carded for IUU fishing between 2004 (the last largest expansion of the EU) and 2020. The analyzed countries included Belize, Cambodia, Comoros, Curaçao, Ecuador, Fiji, Ghana, Guinea, Kiribati, Liberia, Panama, Papua New Guinea, the Philippines, the Republic of Korea, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Sierra Leone, the Solomon Islands, Sri Lanka, Taiwan, Thailand, Togo, Trinidad and Tobago, Tuvalu, Vanuatu, and Vietnam. Of the 26 countries, 10 have been unsuccessful in having their cards removed.[2] Table 1 displays descriptive statistics for the continuous variables (discrete variables are not included).

The main dependent variable was the total trade flow of fishery and aquaculture products (in kilograms) for each country. Data were obtained from the European Market Observatory for Fisheries and Aquaculture Products, a consolidated database of aggregated and harmonized data on fisheries and aquaculture trade supported by the European Commission.

The main independent variable was the EU card status obtained from the EU IUU Fishing Coalition database. While all the countries analyzed were carded for IUU fishing at some point in time, the discrete variable used here indicated the country's card status as of 2020. Countries whose cards were removed (green) were marked with 1, countries with yellow cards were marked with 2, and countries with red cards were marked with 3. The analysis focused on the effects of card issuance, removal, or reissuance on countries' trade flows over time. The hypothesis was that being carded for IUU fishing would negatively affect the total trade flows of fishery and aquaculture products between a carded country and the EU.

Special attention was paid to this card issuance variable, and binary dummy variables were created as alternatives. The first approach was to divide this variable into being carded (yellow and red) or not carded (green).[3] This approach was used either as an alternative to the original variable or as a dependent variable in the follow-up analyses assessing the likelihood of being carded. The second approach was to create a series of dummy variables (green vs. non-green, yellow vs. non-yellow, and red vs. non-red) to identify any specific differences. These two alternatives tested the hypothesis of the carding system's negative impact on trade flows.

Other independent variables included GDP per capita (World Bank and IMF data); agriculture,

Table 1. Descriptive statistics for continuous variables

Variable	Obs	Mean	Std. dev.	Min	Max
Total trade flow in kg (log)	411	14.34656	3.848683	0	19.74413
GDP per capita (log)	442	8.041392	1.213294	5.585635	10.417
Agriculture, forestry and fishing as % of GDP	400	17.43818	14.45205	0.1550077	66.03273
Control of corruption (estimate)	425	-0.27905	0.591074	-1.31589	1.156046
Total fishery and aquaculture production in t (log)	435	11.93115	2.068125	6.474724	15.89951
Capture in t (log)	435	11.77296	1.879865	6.471635	15.05114

Notes: Variables marked with (log) are log-transformed. Agriculture was not log-transformed as it comprises percentages with small values.

2) At the time of writing, Cambodia, Comoros, Ecuador, Liberia, Panama, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Sierra Leone, Trinidad and Tobago, and Vietnam are still carded. Cameroon received a yellow card for the first time in 2021 but is not included in this study. Ghana was also reissued a yellow card in 2021, but this is not reflected here as the effects of these yellow cards cannot be measured properly yet.

3) Among the 26 countries, 10 are either yellow or red, and 16 are green, so, re-grouping the three categories into two (yellow + red vs. green) should be a natural breakdown, as well.

forestry and fishing as a value-added percentage of GDP (World Bank data); control of corruption estimates (World Bank data); total fishery and aquaculture production (in tons) including all quantities farmed, caught and landed for food and feed purposes but excluding discards (FAO's FishStatJ v4.02.04 data); capture (in tons) including all quantities caught and landed for food and feed purposes but excluding discards (FAO's FishStatJ v4.02.04 data); and global freedom scores (1 = free, 2 = partly free, 3 = not free) (Freedom House data).

It was expected that the GDP per capita variable would have a positive sign (countries with higher income would have higher trade flows). The rationale for using this variable was the fact that a country should be vulnerable to economic coercion for trade sanctions to be effective, as less developed countries tend to feel more pressure when trade bans are imposed on them (Allen, 2005). Second, the importance of the agricultural sector in a country's overall GDP was deemed relevant for assessing the impact of sanctions on the fishing industry. The expectation was that sanctions for fishing would be more effective when more revenue came from fishing (Rogers, 2021). Additionally, when agriculture accounted for a higher proportion of the GDP, this would negatively impact fishery trade because of the fishing industry's higher importance for the country, making this variable's expected sign negative. The index for control of corruption captured perceptions of the extent to which public power was exercised for private gain, which contributed to bad governance and less transparency. Similarly, the global freedom score was used as a proxy for the level of democracy (as this was proven difficult to measure), which was important because previous studies had showed that sanctions were more effective in democratic countries than in authoritarian ones (Allen, 2005).

Total fishery and aquaculture production included fish, crustaceans, mollusks, aquatic mammals, other aquatic animals, residues, and plants taken for commercial, industrial, recreational, and subsistence purposes from inland, brackish, and marine waters. Data included all quantities farmed (including from mariculture), caught, and landed for both food and feed purposes but excluded discards. Similarly, total capture covered all quantities caught and landed from all waters, excluding farmed products and discards. Both datasets were used because regulating the capture of wild fish was seen as important for sustainability and environmental protection, and overfishing can have a permanent negative impact on both food security and marine habitats.[4)]

Finally, whether a country was party to FAO's Agreement on Port State Measures (1 = yes, 0 = no) was used as a dummy variable assuming that parties to the agreement would be more inclined to fight against IUU fishing. Taking all these variables into consideration, the following equation was formulated:

$$\begin{aligned} Y_{it} = \ & \beta_0 + \beta_1(Card_i) \\ & + \beta_2(GDP\ per\ capita_{it}) + \beta_3(AGRI_{it}) \\ & + \beta_4(prod_{it}) + \beta_5(CAPT_{it}) \\ & + \beta_6(COR_{it}) + \beta_7(FREE_i) \\ & + \beta_8(PSMA_i) + \epsilon_{it} \end{aligned} \tag{1}$$

where Y_{it} indicates the value of total trade flows in fishery products for country i in year t. Explanatory variables include *Card* (the original variable, indicating green, yellow, and red cards, as well as its alternative binary dummy variables), the log value of *GDP per capita*, agriculture's proportion of GDP (*AGRI*), the log value of total fishery production (*PROD*), the log value of total capture (*CAPT*), corruption estimates (*COR*), freedom score (*FREE*), participation in the Agreement on Port State Measures (*PSMA*), and ε_{it} for residuals. The time-invariant variables do not have t in the subscript.

Moreover, the study focused on how some of these variables could affect the likelihood of card removal (getting a green card). Higher levels of corruption and less freedom, along with higher GDP per capita, should have decreased the likelihood of card removal because they offset the impact of economic sanctions, making it less likely that the country would submit

4) Overfishing here means overexploitation of fish stocks that are caught faster than they can reproduce.

to economic coercion. Given that a binary variable was used as a dependent variable, the following equation was analyzed based on logit and probit models, together with several control variables from the previous analyses.

$$Card_i = \beta_0 + \beta_1(CAP_i) + \beta_2(GDP\ per\ capita_{it}) + \beta_3(COR_{it}) + \beta_4(FREE_i) + \beta_5(PSMA_i) + \epsilon_{it} \quad (2)$$

III. Results

Table 2 shows the OLS regression results. The hypothesis that being carded for IUU fishing would negatively impact fishery and aquaculture trade flows was supported by all models. For every unit of increase in card status, trade *decreased* between 1.8% and 2.5%, with results for this variable remaining consistently significant (Models 1-6), even when accounting for other variables that may have reduced the impact of being carded, such as higher GDP or lower significance of the agricultural sector for the country. As expected, the effect of GDP per capita was

Table 2. OLS regression model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Card	-2.457***	-2.226***	-2.169***	-1.785***	-1.781***	-1.842***			
	(0.215)	(0.241)	(0.224)	(0.225)	(0.230)	(0.206)			
GDP per cap (log)		0.543***	0.606***	0.231**			0.748***		
		(0.113)	(0.116)	(0.103)			(0.120)		
Agriculture/ GDP		-0.025***	-0.092***	-0.050***	-0.052***	-0.046***	-0.096***	-0.057***	-0.054***
		(0.009)	(0.013)	(0.012)	(0.012)	(0.011)	(0.014)	(0.013)	(0.011)
Corruption			-3.274***	-2.229***	-2.148***	-3.044***	-3.341***	-2.075***	-1.955***
			(0.326)	(0.318)	(0.308)	(0.308)	(0.345)	(0.328)	(0.299)
Production (log)				4.771***	4.632***	4.484***		4.313***	3.153***
				(0.728)	(0.712)	(0.692)		(0.774)	(0.609)
Capture (log)				-4.288***	-4.087***	-3.880***		-3.642***	-2.384***
				(0.848)	(0.822)	(0.789)		(0.900)	(0.714)
Freedom restrict						-1.098***			
						(0.194)			
PSMA						1.886***			
						(0.441)			
Card (Binary)							-1.996***	-1.241***	
							(0.368)	(0.333)	
Yellow card									0.269
									(0.261)
Red card									-4.733***
									(0.427)
Constant	18.089***	13.863***	13.373***	8.752***	9.922***	9.255***	9.776***	6.311***	5.308***
	(0.368)	(1.078)	(1.034)	(1.462)	(1.521)	(1.495)	(0.951)	(1.567)	(1.325)

Notes: ***, **, and * respectively denote significance levels at 1%, 5%, and 10%. The dependent variable is the log-transformed trade flow data for fishery and aquaculture products. Variables marked with (log) are log-transformed. The White heteroskedasticity-consistent standard errors are in parentheses. Models 7 to 9 use alternative variables for Card, as mentioned previously. Green card is dropped from Model 9 due to multicollinearity. Agriculture is measured as a percentage of GDP. Freedom restrict denotes a restriction of freedom.

significant and positive across models (2, 3, 4, and 7), indicating that for every 1% increase in GDP per capita, trade flows increased by 0.2% to 0.7%. This showed that development strengthened trade security, offsetting the impact of sanctions.

The results also supported the prediction that a higher proportion of GDP represented by the agricultural sector would entail a more negative impact if the country was carded for IUU fishing. Across models, the agriculture variable remained significant and negative: for every 1% increase in the proportion of national GDP represented by the agricultural sector, fishery trade decreased by 0.025% to 0.096%. Corruption and authoritarianism had a similar impact; for every unit of increase in corruption, trade decreased by 1.95% to 3.97% (Models 3-9), and for every unit of increase in freedom restrictions, trade decreased by more than 1% (Model 6). Finally, as shown in Model 6, whether a country had signed the Agreement on Port State Measures also had a significant impact, with trade increasing by 1.89% in participating countries.

The variables of total fishery production and capture presented an interesting case as they were both significant across the models, but with opposite impacts. For every unit of increase in total fishery and aquaculture production, trade increased by 3.15% to 4.77%, but trade decreased by 2.38% to 4.29% as capture amounts increased. This can be explained by the fact that total production included fish from farmed sources, while capture referred to the harvesting of wild resources that negatively impacted the marine environment, in turn negatively affecting trade patterns in the context of the IUU fishing regulation.

The last three columns of the table show the results of sensitivity tests used to confirm the robustness of the preliminary findings that the carding system works, effectively reducing trade flows from the carded countries. Models 7 and 8 show results based on the alternative binary dummy (carded vs. not carded), which were significant and negative (-1.996 and -1.241). Either a yellow or red card was effective in reducing trade flows with the EU. The last column, in which a series of dummy variables[5)] assessed card differences, contains an important finding: while the effect of yellow cards did not differ significantly from that of green ones, red cards significantly reduced trade flows. Moreover, the coefficients were -4.733, larger than any other ones (in absolute values) in the same category. Although receiving cards (either yellow or red) effectively reduced trade flows, red cards were particularly effective, suggesting that implementing punishment (red) conveyed a stronger signal in markets than a warning (yellow).

Table 3 shows the results based on the panel random effect analysis, which served as a robustness check. These results were basically consistent with the previous ones, and the carding variables' effects were significant and negative, reaffirming the hypothesis that the carding system would effectively reduce trade flows. Moreover, the last column suggests that red cards were particularly effective. Other variables' effects remained in the same direction. Although some lost significance, production and capture had a positive impact (2.48%-2.73%) and a negative impact (1.99-2.19%), respectively, confirming the previous findings. The agricultural sector's significance was also reaffirmed.

Lastly, logit and probit analyses (based on Equation 2) provided interesting additional insights, as shown in Table 4. A binary dummy variable of being carded or not was used as an alternative to measure the determinants of the likelihood of being carded. Following the previous analyses' logic, the focus was placed on specific variables potentially offsetting the impact of economic coercion and hindering the elimination of IUU fishing. For example, the study aimed to determine whether an increase in wild catch would decrease the likelihood of card removal. Strikingly, all models supported this prediction, with statistically significant effects. As another example, the study tested whether economic strength, as measured by GDP per capita, would reduce the importance of cards and thus prevent their removal. This variable's effect was not significant, however,

5) Green vs. non-green, yellow vs. non-yellow, and red vs. non-red with the "green" dummy as a default, which was automatically dropped from the analyses due to multicollinearity.

Table 3. Panel random effects model

	(1)	(2)	(3)	(4)
Card	-2.120**	-1.877***		
	(0.849)	(0.669)		
Lag of agriculture		-0.026**	-0.026**	-0.025*
		(0.013)	(0.013)	(0.013)
Lag of corruption		0.192	0.179	0.027
		(0.432)	(0.443)	(0.428)
Lag of production (log)		2.480***	2.653***	2.731***
		(0.924)	(0.985)	(0.976)
Lag of capture (log)		-1.992**	-2.143**	-2.193**
		(0.944)	(0.992)	(1.005)
Freedom restrictions		0.837		
		(0.832)		
PSMA		1.771		
		(1.533)		
Card (Binary)			-1.083	
			(1.309)	
Yellow card				0.426
				(1.230)
Red card				-4.690***
				(0.955)
Constant	17.218***	8.437***	8.428***	8.038***
	(1.562)	(2.684)	(2.277)	(2.114)

Notes: ***, **, and * respectively denote significance levels at 1%, 5%, and 10%. Fixed effects are not employed due to time-invariant variables. The dependent variable is the log-transformed trade flow data for fishery and aquaculture products. The White heteroskedasticity-consistent standard errors are in parentheses. Variables marked with (log) are log-transformed. Lag indicates values lagged by 1 year to avoid endogeneity issues.

Table 4. Logit and probit models

	Logit (1)	Logit (2)	Probit (1)	Probit (2)
Capture (log)	-0.203***	-0.438***	-0.125***	-0.273***
	(0.058)	(0.067)	(0.035)	(0.040)
GDP per capita (log)	-0.075	0.156	-0.050	0.102*
	(0.093)	(0.100)	(0.056)	(0.061)
Corruption		-0.948***		-0.558***
		(0.272)		(0.158)
Freedom restriction		-0.133		-0.049
		(0.217)		(0.131)
PSMA		2.345***		1.435***
		(0.300)		(0.170)
Constant	2.527***	1.631*	1.583***	0.953*
	(0.769)	(0.972)	(0.483)	(0.568)

Notes: ***, **, and * respectively denote significance levels at 1%, 5%, and 10%. The dependent variable is the presence or absence of an EU card. Variables marked with (log) are log-transformed. PSMA is a dummy variable.

except in the second probit model. The corruption variable remained significant across all models, showing that corruption reduced the likelihood of card removal. Participation in the PSMA also had a positive, significant effect on the likelihood of card removal.

IV. Conclusion

The findings of this study suggest that the EU carding system has had a significant impact on the trade of fishery and aquaculture products with targeted countries. The results show a significant decrease in trade with countries that have received either a yellow or red card. The red card is especially important, as it signifies a complete ban on fishery trade and fishing activities by EU vessels in that country's waters, and of EU imports from vessels flagged to the carded country. This shows that market measures can be used to mitigate illegal activities in the fishing industry that impact not only the marine environment and sustainability but also labor practices and human rights issues. At the same time, despite a decrease in trade with the EU, many of these countries have not made efforts to improve their situation and remain carded for IUU fishing. For this reason, the study also explored how certain variables could have reduced the likelihood of card removal, finding that countries with higher levels of corruption and fish capture were less likely to have had their cards revoked.

An important limitation of this study is that it did not account for the influence of other major industry players (such as Japan, USA, China) on the country's overall trade flows, which could potentially explain the noticeable difference in efforts between countries to change their carding status. This aligns with Sumaila 's (2019) argument, holding that until other major fish traders impose a similar sanction system, the EU's carding scheme alone will not be sufficient to completely deter illegal fishing practices. Notwithstanding these limitations, this study provides empirical grounds for the argument that trade sanctions in themselves can produce the intended effect, if applied properly. The mere fact that some countries show a definite drop in trade flows just from EU restrictions alone, shows that even unilateral sanctions can have significant economic consequences. It is important to understand this potential, especially in light of the ever-increasing restrictive IUU fishing countermeasures that are being implemented globally. Their disruptive impact must be understood thoroughly because they have the potential not just to undermine IUU fishing but to simultaneously threaten the existence of the most vulnerable actors in the industry.

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The Influence of Present Health Status (Post Covid-19) on Retirement Planning in Malaysia

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A B S T R A C T

Purpose: To investigate whether present health status influence retirement planning in the new economic challenge post Covid 19. The relationship between present health status and retirement planning should be better explored and investigated for strengthening the retirement planning among Malaysian women.
Design/methodology/approach: This study is developed based on a quantitative approach where primary data was acquired through online surveys to 433 workers in various locations in Malaysia. The target population of this study are people who work full time in Malaysia's government and private sectors whose ages range from 25 to 55 years old.
Findings: The significant result from this study has shown that there is a health status effect on the employees' retirement planning. The result identified that the health status is an important factor for retirement planning during the post-COVID-19 among the working population in Malaysia.
Research limitations/implications: Even though the COVID-19 pandemic has caused many monetary, economic and social challenges, it has also opened up a new door opportunity for constructive change. Government, policy-makers and the general public need more transparent and resourceful in making difficult choices and trade-offs between short-term and long-term concerns. Nevertheless, the real challenges exposed in the COVID-19 pandemic are the lack of progressive long-term thinking on retirement planning. This paper has its limitations, that since COVID-19 is still ongoing, this study only focuses on the current present health status of Malaysian employees.
Originality/value: Studying the employee's behaviour during the times of distress is important to understand how do they manage their finances. This is a valuable knowledge that could be applied in future. Many employees were caught unaware and faced challenges in the recent past. This could be avoided if prior knowledge and the savings are available.

Keywords: Covid-19, Latent Variable, Partial Least Square, Present Health Status, Retirement Planning, RMSEA

I. Introduction

The unprecedented pandemic that hit the world in early 2020 has tremendously changed all aspects of people's lives. The outbreak of COVID-19 has impacted the economy quite severely, affected every person financial virtually, every company, and organisation around the world. Many people had lost their job and income. Beside the challenging economy, COVID-19 has also caused human loss and greatly affected people's health and some committed suicide. As the world transition from the COVID-19 pandemic

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to endemicity, the world now is facing the new set of economic challenges due to an imminent recession and fast-rising inflation. Economic downturn has become a real threat. Retirees needs to re-evaluate their retirement planning and re-calculate their expected returns to ensure that they have enough savings to sustain their lifestyle in the future. Health is bigger part of retirement planning is the main motivation of this study. Many probably know many things in life as their get older. But, when it comes to retirement planning, health could be the major factors that can impact the ability to maintain financial security. No doubt, money play a crucial part in daily lives but money can also become the major causes of stresses and illness such as diabetes, heart disease, migraine, headaches, and poor sleep. Not only that, money problems or worries can cause anxiety and depression, taking away peace of mind to enjoy daily life and that can take a toll on physical health. In addition, health could be the largest expenses in retirement because in today world, people are generally living longer in retirement, health care inflation continues to rise faster than the rate of general inflation and chronic illnesses and age-related health problems have increased (National Center for Health Statistics, January 2020). This study will focus on the following objective; to predict the influence of health-related factors on the retirement planning practices among Malaysian citizens. Therefore, this study will attempt to answer this research questions; how the health-related factors predict and motivate the retirement planning practices among Malaysian citizens? The rest of this article is arranged as follows; section 2 explains the literature review, section 3 explains the research methodology and the hypotheses section 4 reports the data analysis and results of this study and finally section 5 provides the conclusion of this research article as well as the limitations.

II. Literature Review

A. Present Health and Retirement planning

According to Martin, Guillemette, & Browning, (2016) most people think retirement planning is important only when they are approaching retirement, or if they are young and too far away to think about the retirement years. Hitherto, even if they start to save for retirement, it is still inadequate. Park, (2017) stresses that planning for retirement when he or she is still young, resourceful and efficient at the workplace is very important for avoiding psychological comorbidities when the retirement comes. Barbosa et al. (2016) also shows the significant relationship between retirement planning and individual's wellbeing in retirement. Notably, Purnell et al. (2016), Ruberton et al. (2016) and Weckroth et al. (2017) shows retirement planning has powerful relationship with financial welfare, health and life satisfaction because according to Kendig et al. (2016), the loss of income and resources is a negative predictor of life satisfaction during retirement. Moreover, Major et al. (2016), Hoffmann and Plotkina (2020) explained that retirement is associated with attitude and emotional wellbeing. In financial planning, it is not enough to have strong knowledge on economic and education but also it is important to prepare for any unprecedented events such as Covid-19 pandemic and even death. Empirical studies on Chinese YMCA of Hong Kong (2016) revealed that over 50% of retirees in Hong Kong developed depression related to poor financial planning, unprepared for their retirement, hence they experience anxiety and stresses that somehow affected their overall health. Based on longitudinal study, Cohen-Mansfield and Regev (2018) empirically agreed that retirement planning programs and then follow ups program are important to improve the older adult's quality of life. Shen et al. (2016) also revealed that people with poor financial literacy are more likely to be financially fragile, hence it will cause mentally stressed and anxious. In order to have satisfactory post-retirement life, pre-retirement planning is needed for workers or employees. (Calasanti et al., 2021; Dufour et al., 2021). Amoah-Mensah and Darkwa (2016) finding in their hotel industry workers study stated that social and psychological preparations for retirement significantly affect the pre-retirement satisfaction. In addition to that, health issues, social and psychological challenges were perceived as major issues among workers after retirement due to non-payment of social security benefits (Oluremi and Bala, 2018). Nga and Yeoh (2018) also agreed that health status is found to caused limitations to retirement saving behaviour. Effective retirement planning, income and health are the significant factors for retirement preparation (Lee et al., 2018; Oluremi and Bala, 2018; Nga and Yeoh, 2018). Due to established retirement planning, some employees able to enjoy their retirement by spending happy times with their loved ones, families and also over come health issues. Lee et al (2018) stated that health has significant relationship with financial wealth invested in stock, while age has a negative effect on it. Mental and physical well-being of employees was found to be as significant factor for satisfactory retirement (Schmitt et al., 1979). Due to self-esteem provision and good health were significantly correlated with retirement satisfaction, it is important for an individual to have good mental and physical health to take rational decision concerning retirement planning. As known to many people, employees' health condition, work-related dissatisfaction and personal desires are some determinants that lead to retirement decision. Notwithstanding, income, retirement age, marital status, job satisfaction, health conditions as well as social security all are important elements of social and psychological well-being of each individual. Limited studies have attempted to measure specific areas of retirement planning such as employees present health status. It was reported that the potential of retirement planning is to improve post-retirement well-being. However, it remains unclear whether different retirement planning activities are associated with one's health and to what extent it will influence retirement assurance. In the present study, the relationship between present health status and other well-being factors such as current lifestyle habit in maintaining their health condition was emphasized as one of the elements for retirement planning. The relationship between these variables should be better explored and investigate, seeing that the health concern can signify anxiety at the same affecting the retirement planning and expectation.

III. Theoretical Foundation

Cumulative dis/advantage theory by Dannefer (2003) are theory often used to develop the argument around the influence of stress on health outcomes. Every of often, while cumulative dis/advantage research takes a life-course approach, for example the relationship between financial hardship in childhood and cognitive health outcomes in later life (Szanton et al., 2010), this study will examine the consequence of present health during the time of Covid-19 pandemic of disadvantages and the negative impacts of COVID-19 on health and well-being (Douglas et al., 2020; Poortinga et al., 2021; Shoari et al., 2020; Ugolini et al., 2020; Xie et al., 2020). Furthermore, as people spent more time staying at home with limited daily activities due to movement control order during the pandemic, this may contribute to poor health and well-being outcomes. This paper will focus on the relationship between present health and retirement planning post Covid-19. It has been found that health and well-being have declined due to the coronavirus disease (COVID-19) pandemic in many countries worldwide (Fiorillo & Gorwood, 2020; Moreno et al., 2020). Drawing from the cumulative advantage or (dis)advantage (CAD) theory suggests that early life advantages or disadvantages can shape life-courses and have long-term effects on later life outcomes, it is possible that there is also a direct effect of poor health on retirement planning (Dannefer 2003; Ferraro & Kelley-Moore 2003; Ferraro & Shippee 2009; O'Rand 1996; Willson, Shuey, & Elder 2007). This paper will explore the relationship between present health status and retirement planning; hence this research expect that the current retirement planning associated with present health post Covid-19. The cumulative disadvantage theory extends this investigation by hypothesizing that present health status of individuals will affect their retirement planning.

IV. Research Method

This study is developed based on a quantitative approach where primary data was acquired through online surveys to 433 workers in various locations in Malaysia. The target population of this study are people who work full time in Malaysia's government as well as private sectors whose ages range from 25 to 55 years old. The eligible workers in this study were employees with incomes ranging from RM24,000 to RM200,000 per annum. 87.4% are women respondents and 12.6% are men respondents. This sampling is important to explore a variety of behavioural elements that may influence their retirement planning as well as their ability to provide accurate answers to all questions in the questionnaire. The purpose of the study was explained to them and they were subsequently invited to participate in this research. In the cover letter, participants were informed of the objectives of the study and given assurance regarding the anonymity of the data collected. Participants were informed about the study's objectives, the variables included, and their rights regarding personal data protection. Data collection was made through 100% online (Google Form) due to Covid-19 Movement Control Order enforced in Malaysia. Online surveys were quick because participants have the flexibility to complete the questionnaire at any time during the appointed duration and researchers can obtain a sufficient number of responses in a short period of time.

A. Primary Measure of Present Health Status

Previous studies by Xue, R., Gepp, A., O'Neill, T. J., Stern, S., & Vanstone, B. J, (2019), found that when people approach older age, they are more likely to have health problems, and thus are less likely to spend much time on learning new financial products, engaging in financial practice, or making efficient investment decisions. This is possibly why their financial literacy levels decrease dramatically when they get much older due to some illnesses. In addition, those in good health tend to have good life styles and are likely to have more time to spend on learning how to manage their money and searching for financial advice. They are thus more likely to plan better for their retirement planning. Age was included as they are potential strong predictors present health status and retirement planning. The variables for this study are measured based on a five-point Likert Scale; Strongly Disagree = 1; Disagree = 2; Neutral = 3; Agree = 4; Strongly Agree = 5. For present health status, respondent was asked if they are;

HEALTH1: Healthy Person
HEALTH2: Never Hospitalised
HEALTH3: No High Blood Pressure
HEALTH4: No Hereditary Diseases
HEALTH5: Regular Health Screening
HEALTH6: Tested Positive and Cured from Covid-19
HEALTH7: Active Lifestyle-Daily Exercise

On the other hand, to identify the best and the worst contributing statement in a questionnaire while quantifying a qualitative variable, Partial Least Square Analysis were used. This also reveals the hypothesized relationships between the research constructs and the latent variable as postulated in the conceptual model. This PLS is applied on the present status of health of potential retirees to assess and quantify the latent variable. Finally, Structural Equation Model (SEM) were also used to analyse if there is ceteris peribus concept after controlling the residuals.

V. Result

Table 1 shows that age did not have significant effect on respondent's present health status in retirement planning. Hence, age influencing employee's retirement planning is rejected.

Table 2 shows female respondent age between 36-45 years were the highest. Majority respondents in this study were female with total of 387 while male 56 respectively.

Figure 1 shows after the modification indices was done in the AMOS analysis. The first figure shown previously indicates RMSEA value is 0.01% which is above benchmark of 0.08%, hence the modification indices are used to reduce the RMSEA value. When running modification indices, it shows error 5 and error 7 are highly correlated. Similarly, error 3 and 4, error 1 and 2 are also highly correlated. Since they are highly correlated, they are not independent in general but statistically theory says the error are to be independent, hence to rectify one of the errors, the double error links are to be implemented to modified the result. After linking the errors, the CMIN has come down to 2.11% and also RMSEA reduced from 0.10% to 0.05% which is very good now. After linking the error 5 and 7, error 3 and 4, error 1 and 2, the revised result is given in the Table 3. The revised result shows that the constructs are accepted except HEL 6 with negative value of -0.09%.

Table 4 shows improved result where the HEL1 is contributing in terms of standardised regression value is 0.81% and the R Square is 0.65% which is the highest among all the other variables. HEL6 are not contributing since the R square value is 0.00% and the standardised regression showing -0.06% even

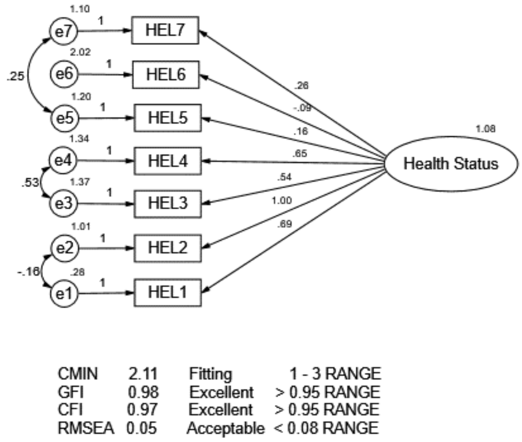

Figure 1. PLS analysis for present health status

Table 2. Partial least square (PLS) analysis

Gender	Male	Female	Total
Age			
Between 26-35 years	11	106	117
Between 36-45 years	23	204	227
Between 46-55 years	13	66	79
Above 56 years	9	11	20
Total	56	387	443

Table 3. The contribution of different constructs of present health status

	Estimate	S.E.	C.R.	P
HEL1	0.69	0.08	8.79	***
HEL2	1.00			
HEL3	0.54	0.16	3.34	***
HEL4	0.65	0.19	3.41	***
HEL5	0.16	0.07	2.34	0.02
HEL6	-0.09	0.08	-1.16	0.24
HEL7	0.26	0.09	3.03	0.00

S. E=Standard Error; C. R=Critical Ratio;
*p < 0.05; ** p < 0.1; *** p < 0.001

Table 1. Age influenced on present health status

	Coefficients		Sig.	
(Constant)		7.12		0.00
Age	-0.11		0.14	Rejected
Present Health	-0.03		0.02	*
a. Dependent Variable: Retirement Planning				

Table 4. Partial least square analysis of present health status

	R Square	Std Regression
HEL1	0.65	0.81
HEL2	0.52	0.72
HEL3	0.19	0.43
HEL4	0.25	0.50
HEL5	0.02	0.15
HEL6	0.00	-0.06
HEL7	0.06	0.25

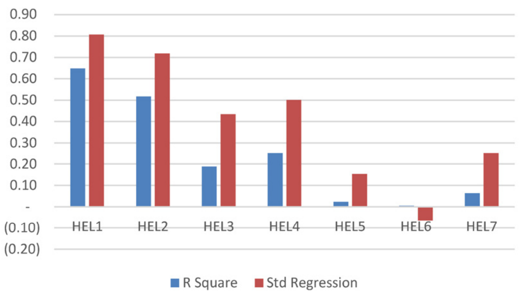

Figure 2. The pattern of present health status construct after linking the error.

The same result is produced above in Figure 2 in terms of a bar graph. The bar graphs show HEL1, HEL2, HEL3 and HEL4 are good contributor whereby HEL5 and HEL7 are fairly contributing. HEL6 are not all contributing due to its R square value is 0.00%.

VI. Discussion

Out of seven statements chosen to asses or quantifying the present health status, four variables are excellently contributing, two variables are fairly contributing, and once statement are not all contributing which is the HEL6 (Tested Positive and Cured from Covid-19). The present health status in this study also shows the validity of the statements included in the questionnaire. This article is taken to study the present health status and its statements if the statements will it be contributing in assessing the present health status was tested by Partial Least Square analysis. The results show that the PLS analysis that HEL1 (Healthy Person), HEL2 (Never Hospitalised), HEL3 (No High Blood Pressure) and HEL4 (No Hereditary Diseases) are excellently contributing, HEL5 (Regular Health Screening) and HEL7 (Active Lifestyle-Daily Exercise) are fairly contributing whereby HEL6 (Tested Positive and Cured from Covid-19) are not at all contributing. This quantification produces high level of RMSEA and after linking the error with modification indices, the result is improved with Standard regression and the R square producing good result and this is to be adopted in multiple regression analysis or in SEM. The consequences from this study indicate that if the variable is properly selected for SEM without any error, the result will be robust strong. Many researchers did not give importance to these items of independent of errors or residuals, hence whatever results that are coming were interpreted straight away. In this article, it is highlighted that the errors are very important, the errors have to contains and reduced, uncorrelated and has to be independent. All these errors were solved using the PLS analysis. The implication of this study for researcher is that, if they used this technique, the variables will be quantifying properly and correct results will be produced, hence it could be very helpful in updating or remodelling the theory. Finally, this study developed to investigate whether present health status influence retirement planning in the new economic challenge post Covid 19 among the working population in Malaysia. The significant result from this study has shown that there is a health status effect on the employees' retirement planning. The result identified that the health status is an important factor for retirement planning during the post-COVID-19 among the working population in Malaysia. This outcome is consistent with prior research by (Bressan et al.,2013 & Argimon, 2016) that physical and psychological health play an important role in the retirement process such as satisfactory conditions. Women especially are more likely to live longer than their spouse and may spend down savings eventually when they health is declining, it will impact their financial security. Even though the COVID-19 pandemic has caused many monetary, economic and social challenges, it has also opened up a new door opportunity for constructive change. Government, policymakers and the general public need more transparent and resourceful in making difficult choices and trade-offs between short-term and long-term concerns. Nevertheless, the real challenges exposed in the COVID-19 pandemic are the lack of progressive long-term thinking on retirement planning. On separate notes, retirees should plan for the possibility of lost income should an unprecedented situation or illness force them to retire earlier than expected. It is highly encouraging to invest in health by maintaining healthy lifestyle habits and strong social connections because healthy habits can significantly improve well-being and vitality during retirement years.

A. Conclusion and Future Recommendations

Firstly, this study enhances the literature reviewed by indicating on how wide range of health and planning for retirement changed due to COVID-19. Few studies so far have evaluated such measures despite their limitations, evidently indicate trends on how health and retirement planning changed due to loss of income and economic downturn. Secondly, this paper contributes new knowledge investigation of the relationships between present health characteristic and retirement planning during COVID-19 using Partial Least Square analysis. It should be noted that this study represents the first and second wave of the COVID-19 pandemic (late 2020 till early 2022). The impact of the pandemic on health and retirement planning has fluctuated but it is expected that in general health and well-being outcomes have remained worse than pre-COVID-19 times throughout the pandemic (Sønderskov et al., 2021). As COVID-19 continued in 2022, well-being levels for certain individuals might have improved by adapting new norms and lifestyle but might have worsened for others such as the virus infection, economic and financial impacts of continuous pandemic that have caused unemployment or loss of income. Continuous study of health and retirement planning and financial decision making throughout now endemic phase is needed to obtain the full picture of the impacts of COVID-19.

B. Study Limitations

This study has its limitations that should be considered. The trends in health and well-being before and during the COVID-19 pandemic need to be analysed further for the context of Malaysian people as a whole. Similar studies from other contexts will enrich the current findings. Future studies measuring health and retirement planning trends following the current endemic phase and economic recession would be particularly useful.

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Efforts of South Korean Local Governments to Expand the Good Landlord Movement: Focus on Property Tax Reduction and Exemption

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A B S T R A C T

Purpose: This study aimed to review whether local governments in Korea introduced the Good Landlord Property Tax Reduction and Exemption System (GLPTRES) in a timely and organic manner and promoted the expansion of the Good Landlord Movement by analyzing the system's problems and proposing improvements.
Design/methodology/approach: To obtain data about the GLPTRES and tax reduction and exemption outcomes, this study used the Ministry of the Interior and Safety's Information Disclosure System. On January 26, 2022, the researcher requested information disclosure about 15 regional local governments and 187 basic local governments under such regional local governments. Between January 27 and February 25, 2022, the author was notified by all basic local governments of their decisions to disclose information or the non-availability of such information, which was reflected in the analysis.
Findings: The timing of property tax reduction and exemption decisions for good landlords was generally late. There was a relationship between regional local governments and their basic local governments in its implementation. Furthermore, the effectiveness of the GLPTRES was found to be generally low.
Research limitations/implications: The period of this study was restricted to 2020, and the analysis focused on the 123 local governments that implemented this system. The lessons learned from Korea can be applied to other countries implementing government support for small businesses during crises.
Originality/value: This is the first study to analyze the timeliness of resolutions made by local governments on the GLPTRES implemented in Korea for the first time in 2020 to support small business tenants in trouble due to COVID-19, the relationship between local governments, and its effectiveness.

Keywords: COVID-19, Small Business Tenants, Good Landlord Movement, Property Tax Reduction and Exemption, Local Governments

I. Introduction

"We are all suffering due to COVID-19. I would therefore like to help by giving you a payment holiday: you do not need to pay rent for this month. Keep strong." (Pyeongtaek-si, 2020). This is part of a multimedia message service sent in February 2020 by a landlord who owns a store building in Pyeongtaek to exempt a small business operating a restaurant from paying rent. A movement to discount store rent in Korea began in Jeonju in February 2020, not long after the first confirmation of Corona disease 2019 (COVID-19) was declared on January 20, 2020. It was reported that store building landlords discounted more than 10% of the rent for three or more months (Kang, 2020).

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On February 29, 2020, at the peak of the first wave of COVID-19, the country implemented social distancing for the first time. Through three waves of COVID-19 to the end of the year, the phases of social distancing were enforced by various administrative orders. This included restrictions on business hours and prohibitions on social gatherings. It was reported that small businesses that provided services through face-to-face contact in physical stores were affected to varying degrees by the reduced business due to lockdowns (Shin et al., 2021; Korea Federation of Small and Medium Business, 2021). In particular, small businesses were likely to close as they were highly vulnerable to the COVID-19 pandemic compared to larger businesses (Waldkirch, 2021). The situation was more problematic for small business tenants (SBTs) renting store buildings.

According to the Korea Federation of Micro Enterprises (KFME) (2020a), the biggest problem for small businesses during COVID-19 was rent because a fixed cost must be paid regardless of declining revenues. Moreover, if the small business faced closure but still had prior loans to repay, they could not even close until the loans were resolved. Ultimately, small businesses were caught in a vicious cycle where they were forced to continue paying rent (Kang et al., 2021), and local and central governments had no practical solution for this problem. In this situation, landlords began to demonstrate goodwill to SBTs. As people rallied together to overcome the crisis faced by the country, another public movement began in 2020.

Landlords who discounted (or froze) rent to SBTs, such as store building landlords in Jeonju Hanok Village, were called good landlords, and this voluntary rent discount movement is referred to as the Good Landlord Movement (GLM). This movement reminded people of the nationwide Gold Collecting Campaign in 1998 (Ministry of SMEs and Startups [MSS], 2020; Kwon, 2020), where citizens voluntarily sold or donated gold to help the country repay foreign debt.

Local governments and the central government made various efforts to expand the GLM. The central government attempted to support good landlords through income tax or corporate tax credits, and a related bill was passed in the National Assembly on February 28, 2020. Local governments also attempted to expand the GLM through local tax reductions and exemptions. On February 5, 2020, the Ministry of the Interior and Safety (MOIS) announced that good landlords could be eligible for local tax reductions and exemptions (MOIS, 2020a), and efforts by local governments to expand the GLM resulted in tax breaks for good landlords similar to that offered by the central government (Gyeongsangnam-do, 2020a, 2020b).

On March 19, 2020, 59 days after the first COVID-19 case was confirmed, Uijeongbu and Hwaseong became the first basic local governments with local assemblies to pass resolutions on property tax reductions and exemptions to expand the GLM. As of December 31, 2020, during the third wave of COVID-19, 123 basic local governments were implementing the GLPTRES.

However, local governments were criticized for not being sufficiently aggressive in providing support while encouraging this movement, and there were increasing calls to stipulate criteria and examine outcomes to ensure the system's effectiveness (Sung, 2021; Kim, 2021). Local governments internally discussed the need to provide significant support to promote the GLM (Gwangju City Council, 2020). Since its implementation in 2020, no studies have examined it thus far. Choi (2021) suggested the necessity for a comprehensive analysis of efforts to expand the GLM by both the central and local governments.

Therefore, this study posed the following three research questions to examine the effectiveness of the GLPTRES introduced in 2020 to support SBTs in trouble due to COVID-19 in Korea. First, was the timing of the local assembly passing a resolution on the GLPTRES or establishing and amending its ordinance appropriate? Second, was there an organic relationship between regional local government decisions on local tax reductions and exemptions and basic local government decisions on property tax reductions and exemptions? Third, did the GLPTRES incentivize store building landlords sufficiently to participate in a rent discount movement? Based on the aforementioned questions, this study used the MOIS's Information Disclosure System and collected outcomes related to the GLPTRES and tax reductions and exemptions. On January 26, 2022, this study requested all local governments to disclose information, excluding Seoul and Busan, which did not introduce the GLPTRES. From January 27 to February 25, 2022, this study was notified by 187 basic local governments of their decisions to disclose information or the non-availability of such information, which were then reflected in the analysis. The results show that most basic local governments passed resolutions on the introduction of the GLPTRES belatedly and that there was a relationship between local tax reductions and exemptions by regional local governments and those implemented by basic local governments. Furthermore, the results indicate that the effectiveness of the system was generally poor.

The GLM is a public movement to share pain between parties in lease contracts, promote shared cooperation, and bring the private sector to the fore to overcome a national crisis. Political philosopher Michael Sandel commented on this movement: "It goes beyond what a government alone, even effective government action, can do" (MOFA_KOREAZ, 2020). Local governments should improve the GLPTRES to expand this movement to help businesses function during crises. Therefore, analyzing efforts by local governments in Korea to promote the GLM and propose policies is significant for small businesses and local governments. This study was conducted because providing indirect but quick and timely support to SBTs through the GLPTRES is more useful than direct cash after the fact. This study was conducted with exemption approval (IRB File No: NON2022-001) from the relevant Institutional Review Board.

II. Literature Review on Laws and Previous Studies

A. Applicable Laws Related to the Property Tax System and Tax Reductions and Exemptions

First, this study examined the property tax system under the Local Tax Act (LTA) and the Framework Act on Local Taxes (FALT). Regarding property tax reductions and exemptions for good landlords, store buildings are subject to taxation. Hence, this study examined buildings.

Property tax is a type of local tax imposed on land, buildings, housing, aircraft, and ships located in Sis (cities), Guns (counties), or Gus (districts) (basic local governments) (Article 105 of the LTA), and those owning properties as of June 1 every year are subject to taxation (Article 107.1 and 114 of the LTA). In addition, tax authorities impose the following tax items in addition to property tax (principal tax): 1) property tax on urban areas; 2) local resource and facility tax for firefighting; 3) local education tax (Article 112, 143, and 150 of the LTA). While property tax belongs to Sis, Guns, or Gus, local resource and facility tax and local education tax belong to metropolitan governments (Article 8.3 and 8.4 of FALT). To provide reductions and exemptions from local resource and facility tax, the regional assembly must pass a resolution for this tax item. However, it is different for local education tax that is imposed and collected as 20% of property tax (Article 151.1.6 of the LTA). Although the regional assembly does not pass resolutions on reductions and exemptions for this tax item, it automatically leads to tax reductions and exemptions if Sis, Guns, or Gus decide to provide property tax reductions and exemptions.

This can be explained in the following example of property tax reductions and exemptions for good landlords: Basic local government X decides to provide property reduction and the exemption for buildings as much as the average of the highest rent discounts provided by landlords for three months or more. We assumed that a store building landlord is supposed to receive the monthly rent of 1 million KRW and discount it to 500 thousand KRW from January to June. As a result, 336,770 KRW in total is imposed as property tax for the landlord's building, including the following: 162,700 KRW of property tax (principal tax), 91,130 KRW of property tax on urban areas, 50,400 KRW of local resource and facility tax, and 32,540 KRW of local education tax. We examined two scenarios: (1) where only basic local government X passes a resolution on 50% property tax reductions and exemptions; (2) where basic local government X and regional local government Y, which has jurisdiction over basic local government X, make a resolution on 50% reductions and exemptions for local resource and facility tax and local education tax.

As shown in Table 1, in the former scenario, a 50% reduction and exemption are provided for property tax (principal tax), property tax in urban areas, and local education tax. Therefore, the total amount of tax reduction and exemption is 143,190 KRW. In the latter scenario, local resource and facility tax are subject to tax reduction and exemption, and half of the amount (i.e., 168,390 KRW) is provided as a tax reduction and exemption. In the latter scenario, 25,200 KRW more is provided than in the former scenario. These results suggest that if regional local governments introduce the Good Landlord Local Tax Reduction and Exemption System (GLLTRES), the tax breaks for good landlords will increase. However, if basic local governments do not introduce the GLPTRES, they will not receive local tax incentives. Therefore, to further spread the GLM, efforts by basic local governments to introduce GLPTRES are most important. Meanwhile, regardless of whether a regional local government introduces GLLTRES, if a basic local government introduces a system that reduces and exempts property tax for good landlords, the entire system is called GLPTRES.

Second, a resolution must be passed by the local assembly before providing local tax reductions and exemptions. This is specified in Articles 4.1.1, 4.3, and 4.4 of the Restriction of Special Local Taxation Act (RSLTA) and Article 2.5 of the Enforcement Decree of the RSLTA. This study reviewed the contents of the laws as of January 20, 2020, when the first COVID-19 case was confirmed.

Local governments may decide to provide tax reductions and exemptions for local tax if it is deemed necessary for public interest, including providing support for people's livelihoods, improving living environments in farming and fishing villages, and supporting the expansion of public transportation (Article 4.1.1 of the RSLTA). It may be prescribed in an ordinance (Article 4.3 of the RSLTA). Another method is to obtain a resolution from the local assembly (Article 4.4 of the RSLTA). In this case, the reason for tax reductions and exemptions must be acts of God, earthquakes, winds and floods, lightning, fire, war, collapse, or other similar reasons (Article 2.5 of the Enforcement Decree of the RSLTA). Further, the head of the local government may provide local tax reductions and exemptions to those deemed necessary.

However, it must be decided whether COVID-19 was the reason for tax reductions and exemptions. The Notice of the Local Tax Support Plan for New COVID-19 Virus Victims sent by the MOIS to metropolitan governments across the country on February 5, 2020, recommended obtaining a resolution from the local assembly and taking timely action to provide local tax breaks if the head of the local government deemed local tax reduction and exemption

Table 1. Comparison of tax reduction and exemption amount

Item	Tax amount before reduction and exemption (KRW)	Tax reduction and exemption amount (KRW)	
		Case 1	Case 2
Property tax	162,700	81,350	81,350
Property tax on urban areas	91,130	45,570	45,570
Local resource and facility tax	50,400	-	25,200
Local education tax	32,540	16,270	16,270
Total	336,770	143,190	168,390

Note: In Case 1, only basic local government X introduced the GLPTRES, and in Case 2, both basic local government X and regional local government Y introduced the reduction and exemption systems for good landlords.

necessary (MOIS, 2020a). On March 9, 2020, the MOIS gave its authoritative interpretation (Local Tax Relief Division No. 531) that not natural disasters under the Framework Act on the Management of Disaster and Safety and social disasters under the Infectious Disease Control and Prevention Act (IDCPA) are applicable if local tax reductions and exemptions can be provided with a resolution obtained from the local assembly. The MOIS did not specify those eligible nor the degree and scope for local tax reductions and exemptions. Nevertheless, it stated that each local government should comprehensively consider potential infringements on tax fairness due to tax reductions and exemptions and the level and scale of damage in the affected area and financial conditions and autonomously decide whether to offer tax reductions and exemptions (MOIS, 2020b).

While local tax reductions and exemptions due to COVID-19 were possible under the current laws, the government specifically named infectious diseases as one of the reasons for local tax reductions and exemptions. Article 4.1.3 of the RSLTA was enforced from June 8, 2021, after it was passed by a plenary session of the National Assembly on May 21, 2021. It states the following: "when local tax reductions and exemptions are deemed necessary due to the outbreak of infectious diseases under Article 2.1 of the IDCPA." It is meaningful as it specifies the legal basis to swiftly provide support to cover damage due to the prolongation of COVID-19, the increasing number of cases, and the recurring pandemic.

B. Literature Review

Since COVID-19 broke out, countries have established and enforced different policies to bring this infectious disease under control. As discussed earlier, small businesses suffered significantly, and the damage was presumably larger under stronger disease control and prevention policies by local and central governments. In this regard, it is meaningful to review COVID-19-related literature in Korea and the US.

The two countries responded differently to COVID-19 in the early days of the pandemic. With lessons learned from the Middle East Respiratory Syndrome in 2015, Korea deployed aggressive disease control and prevention. On the other hand, the US was not particularly aggressive and adopted a laissez-faire approach, leaving the responsibility to individuals (Kim & Mun, 2022). Furthermore, considering that small businesses in both countries suffered the most significant impact, although the two countries applied different COVID-19 policies, it helps to recognize how necessary it is to prepare faster and more effective support policies for small businesses.

As of January 20, 2020, Korea has confirmed its first COVID-19 case. A cluster infection at the end of February in the Shincheonji Church in Daegu triggered the first wave of COVID-19. The number of COVID-19 cases at that time was 10,774, and social distancing was instituted on February 29, 2020. Cluster infections in the Seoul metropolitan area following a rally for Liberation Day in August led to the second wave of the pandemic with 13,282 cases. In the third wave of the pandemic, cluster infections in care hospitals, religious facilities, and correctional facilities increased to 45,567 cases (Inter-agency collaborations, 2021; Kim et al., 2021; Korea Disease Control and Prevention Agency, 2022). Local governments and the central government issued intensive administrative orders in May, July, and December to halt the pandemic (Lee, 2021).

KFME (2020b) surveyed 1,018 small businesses regarding the impact of COVID-19 from October 19 to November 5, 2020. The results showed that the month in which small businesses were most impacted was February, followed by August and January. Moreover, 45.3% of the small businesses responded that it took one to two years to recover from the damage, and 39.2% responded that it took more than two years. Furthermore, 67.5% and 31.7% were willing to continue business and considered closing, respectively. These results provide important evidence about when local governments should make a resolution to introduce the GLPTRES during the spread of COVID-19.

The Business Survey Index (BSI) was conducted by the MSS and the Small Enterprise and Market Service (SEMAS) (2021) to identify monthly economic trends by surveying the revenue and financial conditions of small businesses. One hundred points or above means recovery in the real economy, while below 100 means deterioration. The average index in 2019 was 67.2. In 2020, the index fell below that average in February, March, September, and December at 41.5, 29.7, 54.9, and 51.6, respectively. In March, it dropped as much as 43.6 from a year earlier. These results suggest how quickly COVID-19 caused damage to small businesses and how urgent, swift support from local governments and the central government is required for small businesses when a pandemic breaks out.

Kim and Kim (2021) analyzed the number of small businesses in Seoul six months and one year after September 30, 2019, before COVID-19. While the number was 407,127 at the baseline date, it was 391,500 on March 31, 2020, and 367,534 on September 30, 2020, a decline of 15,627 and 39,593, respectively. Furthermore, as the number of COVID-19 cases increased, the number of stores decreased. The end of March 2020 was during the first pandemic in Korea, where intensive social distancing was instituted, while the end of September 2020 was when the second wave of the COVID-19 pandemic was progressing. These results suggest that damage to small businesses increased as the COVID-19 pandemic protracted.

The first COVID-19 case was confirmed in the US on January 21, 2020, one day later than in Korea. The Centers for Disease Control and Prevention (CDC) (2020) officially confirmed the case. With the poor initial response to COVID-19 and the collapse of the healthcare system, President Trump declared a national emergency on March 13, 2020. By March 17, 2020, COVID-19 had spread to 50 states. On March 26, 2020, there were approximately 82,000 COVID-19 cases and 1,000 deaths. The following day, President Trump signed the Coronavirus Aid, Relief, and Economic Security (CARES) Act to tackle the economic crisis due to COVID-19 (Schumaker, 2020). Further, the US implemented stay-at-home orders as one of the policies to mitigate the spread of COVID-19. This was stipulated from March 1 to May 31, 2020, across 50 regions, including 44 states. Mandatory stay-at-home orders were issued in 42 regions, with California first issuing the orders on March 19, 2020 (Moreland et al., 2020). Previous studies that analyzed the impact of COVID-19 on small businesses in the US in the first half of 2020, including March 2020, were examined as follows.

Bartik et al. (2020) surveyed the impact of COVID-19 on more than 5,800 small businesses in the US from March 28 to April 4, 2020. The results showed that small businesses had already experienced massive layoffs and shut-downs before they were eligible for government support through the CARES Act just a few weeks after the outbreak of COVID-19. Businesses that temporarily or permanently closed due to COVID-19 accounted for 41.3% and 1.8%, respectively, and as of late March 2020, overall employment had declined by 39% compared to January 31, 2020. The results indicate the significance of the immediacy of financial support to ensure that small businesses are not shut down.

Humphries et al. (2020) surveyed more than 8,000 small business owners in the US on the impact of COVID-19 from March 28 to April 20, 2020. Many small businesses were already hit by March 27, 2020, and 59% of the respondents temporarily let their employees go by March 30. On March 28, 30% held a negative view that the economy would not recover in the next two years, but this percentage increased to 50% on April 20. As much as 5% responded that their businesses would be more than 90% likely to undergo permanent closure or bankruptcy within six months. These results indicate that small businesses were at risk of dismissing employees and closing if the COVID-19 pandemic persisted.

Fairlie (2020) investigated how the number of active business owners changed in April, May, and June compared to February 2020. The results show that the number in April, reflecting the impact of stay-at-home orders to respond to the pandemic, decreased by 3.3 million (22%) compared to February. This was a considerably larger decline than the 5% during the Great Recession. Although May and June recorded a rebound from April when stay-at-home orders were eased, the number of active business owners was still 15% and 8% lower than in February, respectively. These results illustrate the magnitude of the impact that the country's strong COVID-19 control and prevention policies had on the survival of small businesses and the necessity of initial support measures for them.

The aforementioned prior studies confirm that damage to small businesses due to COVID-19 was inevitable, although the duration and degree of such damage varied. Furthermore, they demonstrate how important and necessary it is for local and central governments to intervene promptly and actively (Kim, 2020) to recover the damages suffered by small businesses.

III. Data and Status of Property Tax Reduction and Exemption

A. Data

This study aimed to review whether local governments in Korea introduced the GLPTRES in a timely and organic manner and promoted the expansion of the GLM by analyzing the system's problems and proposing improvements.

To obtain data about the GLPTRES and tax reduction and exemption outcomes, this study used the MOIS's Information Disclosure System (www.open.go.kr). The system's procedure and content are described as follows.

This study examined the requested and disclosed periods. In 2020, Seoul and Busan, among 17 regional local governments, implemented locally tailored support projects, which were applicable to general financial support, not local tax reduction and exemption. Hence, this study examined 15 regional local governments except for the aforementioned two cities.

The researcher requested 15 regional local governments to disclose information on January 26, 2022. The regional local governments, except for Ulsan and Sejong, provided local tax reductions and exemptions to good landlords based on property tax, which is imposed by basic local governments. Therefore, the information disclosure requests made by this researcher were sent to applicable basic local governments. In the end, the requests were received as new ones and processed again as if made to each of the 187 basic local governments. This author was notified of their decisions to disclose information or the non-availability of such information from 187 basic local governments from January 27 to February 25, 2022. Sejong and Jeju were considered as each of the basic local governments. The same applies below: information disclosed by 186 Sis, Guns, or Gus was used immediately in the analysis. In the case of one autonomous Si, each of the two administrative Gus disclosed information; therefore, the researcher combined the information and reflected it in the analysis.

Moreover, the information requested was divided into GLPTRES and tax reduction and exemption outcomes. The former included the basis, eligible duration, and eligible items and limits for local tax reductions and exemptions. The latter included the total number and total amount of tax reduction and exemption cases. This study attempted to obtain the aforementioned information for the following reasons through the information disclosure request. First, the GLPTRES was legislated and decided by each of the local governments to respond to the social disaster of COVID-19, and the content also differed. Second, changes made since the introduction of the GLPTRES, including the extension of the eligible duration of tax reduction and exemption, were required. Third, information about the GLPTRES from the websites of local governments is limited. The primary means for local governments to inform this system and encourage participation in the GLM is their website. Nonetheless, there was a limitation in collecting information as only a few local governments disclosed tax reduction and exemption announcements, including submission documentation and how to complete an application form for tax reductions and exemptions.

This study used a questionnaire survey to obtain the intended information through the information disclosure request. The contents of the survey were not subjective.

B. Status of Tax Reduction and Exemption

This study examined to what extent property tax reductions and exemptions were provided to good landlords by regional local governments in 2020. It was important to set the baseline date for outcomes. This is because some basic local governments continue to offer property tax reductions and exemptions even if good landlords file an application for property tax reductions and exemptions after the statutory deadline. Considering the above, the baseline date was set as December 31, 2021. 15 regional local governments and 187 basic local governments under their jurisdictions were subject to analysis.

As shown in Table 2, Ulsan and Sejong did not implement the GLPTRES, and only 123 basic local governments under 13 regional local governments enforced the system. Both regional local governments and the basic local governments of Incheon, Daejeon, and Gyeongnam implemented the GLPTRES. However, in Daegu and Gwangju, the regional local governments did not implement the GLPTRES, but basic local governments did. Meanwhile, only one basic local government implemented the GLPTRES in Chungbuk and Jeonbuk, where the GLM began, respectively.

The total number of tax reduction and exemption cases was 33,301, and the total amount was 8,675,424 thousand KRW. By the local government, the number of tax reduction and exemption cases was 17,029 in Gyeonggi, followed by Gyeongnam (4,383), Daegu (2,848), and Gyeongbuk (2,081). Furthermore, the total amount of tax reduction and exemption was 4,673,492 thousand KRW in Gyeonggi, followed by Gyeongnam (906,871 thousand KRW), Gyeongbuk (790,088 thousand KRW), and Daejeon (658,217 thousand KRW).

Meanwhile, the total amount of property tax reduction and the exemption was merely 3.7% of 236.7 billion KRW provided by the central government to good landlords in 2020 (Yang, 2021; National Tax Service,

Table 2. GLPTRES implementation and property tax reduction and exemption outcomes (as of December 31, 2021)

Regional local government		Basic local government		Tax reduction and exemption outcome	
Name	Implemented	Total	Implemented	No. of cases	Amount*
Daegu	No	8	8	2,848	595,677
Incheon	Yes	10	10	1,684	306,738
Gwangju	No	5	5	831	99,189
Daejeon	Yes	5	5	1,324	658,217
Ulsan	No	5	0	0	0
Sejong	No	1	0	0	0
Gyeonggi	No	31	24	17,029	4,673,492
Gangwon	Yes	18	7	1,127	303,212
Chungbuk	No	11	1	1	21
Chungnam	No	15	4	276	39,839
Jeonbuk	No	14	1	740	167,419
Jeonnam	No	22	20	854	125,668
Gyeongbuk	Yes	23	19	2,081	790,088
Gyeongnam	Yes	18	18	4,383	906,871
Jeju	Yes	1	1	123	8,993
Total		187	123	33,301	8,675,424

* thousand KRW
Source: Prepared by the researcher based on data obtained through the information disclosure requests (the same applies below).

2021). Even after the amount corresponding to Seoul and Busan was subtracted from the central government's amount, the total amount of property tax reduction and exemption by local governments was still 6.3%, which was not considerably high. Seoul and Busan promoted the expansion of the GLM with non-tax break methods, and the percentage may differ if the amounts from these two cities are incorporated. To this end, the researcher separately requested Seoul and Busan to disclose information on February 3, 2022, and obtained major outcomes related to good landlords. It was confirmed that Seoul provided 1,267,353 thousand KRW to subsidize building repair costs and electrical safety inspections, while Busan provided 292 million KRW by applying the property tax reduction and exemption method on a mutatis mutandis basis. Therefore, the amount supported by local governments to expand the GLM in 2020 was 10,234,777 thousand KRW, which included 1,559,353 thousand KRW provided by Seoul and Busan. This accounts for approximately 4.3% of the country's tax breaks. These results suggest that it is necessary to analyze the introduction status and effectiveness of the GLPTRES comprehensively.

IV. Results and Discussion

A. Appropriateness of the Timing of a Resolution for GLPTRES Introduction

As in previous studies, damage to small businesses was severe at the beginning of the COVID-19 pandemic when substantial disease control and prevention protocols were instituted. Hence, the speed of support policies must be ensured to assist SBTs. Based on the above, this study analyzed how quickly 123 basic local governments made the resolution to introduce GLPTRES. The baseline date was set as January 20, 2020, when the first COVID-19 case was confirmed in Korea, to calculate the time taken to pass a resolution to introduce the system. The date of a resolution to introduce the system included the date of a resolution made by the basic local government on property tax reductions and exemptions for good landlords and the date of an ordinance established or amended by the basic local government.

As illustrated in Table 3, 59 (48.0%) passed a resolution in 91-120 days from January 20, 2020, followed by 37 (30.1%) in 121-150 days and 14 (11.4%) in 61-90 days. Only 2 (1.6%) made a resolution for tax reductions and exemptions within 60 days. Furthermore, the earliest and latest resolutions were made in 59 and 172 days, respectively. It took 113 days on average for 123 local assemblies to make a resolution to introduce the GLPTRES.

Next, this study examined the relationship between the date of the resolutions to introduce the GLPTRES and the phases of COVID-19 during 2020. COVID-19 in 2020 in Korea can be divided into five phases, and phases 2, 4, and 5 were applicable to the pandemic (Kim et al., 2021). Phase 3 was between the first and second waves of the pandemic and was also known as the first rest period (Sim & Kim, 2021).

As in Table 4, 78 (63.4%) of the 123 basic local governments passed a resolution to introduce the

Table 3. Number of days taken until the date of a resolution to introduce the GLPTRES (N= 123)

No. of days taken	Duration	n	%
1-30 days	January 21 to February 19, 2020	0	0.0
31-60 days	February 20 to March 20, 2020	2	1.6
61-90 days	March 21 to April 19, 2020	14	11.4
91-120 days	April 20 to May 19, 2020	59	48.0
121-150 days	May 20 to June 18, 2020	37	30.1
151-180 days	June 19 to July 18, 2020	11	8.9
181-346 days	July 19 to December 31, 2020	0	0.0

GLPTRES during the first rest period, and 45 (36.6%) did so during the first wave of the pandemic. A system enforced during a crisis must be introduced promptly, considering its urgency. However, most local governments made a resolution to introduce the GLPTRES during the first rest period long after the end of February, when small businesses suffered the most due to COVID-19, and in March, when the BSI hit the lowest (KFME, 2020b; MSS & SEMAS, 2021). These results contrasted with the fact that the GLPTRES was passed by the National Assembly on March 17, 2020, and suggested that the effectiveness of the system decreased despite efforts by local governments, as the resolution to introduce the system was made belatedly.

B. Relationship between Local Governments

As mentioned earlier, the tax items of metropolitan governments are also imposed when basic local governments impose a property tax. Therefore, local education tax is also reduced and exempted if property tax reductions and exemptions are provided. During the process of deciding whether to introduce the GLPTRES, regional local governments and their basic local governments may have had minor or major conflicts due to differences in financial conditions and awareness about whether the system was necessary. Considering this, this study examined whether basic local governments also decided to provide property tax reductions and exemptions if regional local governments decided to provide local tax reductions and exemptions or vice versa.

As reflected in Table 5, basic local governments were more likely to implement the GLPTRES when regional local governments decided to provide local tax reductions and exemptions (80.0%) than when they did not (56.3%). Conversely, they were less likely to do so when regional local governments did not provide local tax reductions and exemptions (43.8%) than when they did (20.0%). The chi-square test (chi-square= 11.255, p= 0.001) showed a statistically significant relationship between regional local governments implementing local tax reductions and exemptions and their basic local governments implementing property tax reductions and exemptions at the 5% significance level. These results show that if regional local governments and their basic local governments work together organically to address their current issues, the synergistic

Table 4. Date of a resolution to introduce the GLPTRES and phases of COVID-19 during 2020 (N= 123)

Phase	Duration	n	%
Phase 1	January 20 to February 17	0	0.0
Phase 2 (first wave of the pandemic)	February 18 to May 5	45	36.6
Phase 3	May 6 to August 11	78	63.4
Phase 4 (second wave of the pandemic)	August 12 to November 12	0	0.0
Phase 5 (third wave of the pandemic)	November 13 to December 31	0	0.0

Note: Phases were divided following Kim et al. (2021), and phase 5 is until January 20, 2021.

Table 5. Relationship between local governments (N= 187)

Regional local government	Basic local government		Total
	Implemented	Not implemented	
Implemented	60 (80.0)	15 (20.0)	75 (100.0)
Not implemented	63 (56.3)	49 (43.8)	112 (100.0)
Total	123 (65.8)	64 (34.2)	187 (100.0)

effect of this system will be produced.

C. Effectiveness of the GLPTRES

To ensure the effectiveness of the GLPTRES, rent discounted during any time in the year must be included in the eligible duration of tax reduction and exemption determined by local governments. Buildings and land should be applicable to tax reduction and exemption, and actual tax reduction and exemption benefits need to be sufficiently large to encourage potential good landlords to participate in this movement. In this respect, this study examined the eligible duration, applicable properties, and limits of tax reductions and exemptions.

If the eligible duration of tax reductions and exemptions was determined as too short, store building landlords might be outside the eligible duration of tax reduction and exemption, although they discounted rent. Subsequently, they might not receive tax reductions and exemptions. Moreover, although tax reductions and exemptions are decided simultaneously, differences in the system between local governments might lead to different local tax reductions and exemption benefits, causing potential conflicts. Considering the above, this study analyzed the eligible duration of property tax reductions and exemptions and provided the results in Table 6.

A total of 72 (58.5%) determined the eligible duration of tax reductions and exemptions as the entire year of 2020, followed by 27 (22.0%) as 6 months, 13 (10.6%) as 5 months, 4 (3.3%) as 11 months, and 2 (1.6%) as 3 months. To summarize, 45 (36.6%) out of 123 determined it as 6 months or less, and the average eligible duration of tax reductions and exemptions was approximately 9.5 months. These differences can cause problems in terms of fairness and serve as a constraint on the promotion of the GLM. Although such differences are inevitable in terms of local governments' financial conditions, they are factors that have a negative impact in terms of encouraging the GLM. Meanwhile, local governments that did not determine the eligible duration of tax reductions and exemptions as 12 months may or may not retroactively apply parts of the eligible duration of tax reductions and exemptions not reflected in the previous year when they continue the system into the next year. However, it is important to expand the eligible duration of tax reductions and exemptions as much as possible so that a rent discount for a particular year can be eligible for support for the year. Ultimately, store building landlords can have the opportunity to benefit from property tax reductions and exemptions.

Table 6. Eligible duration of tax reductions and exemptions (N= 123)

Duration	n	%
3 months	2	1.6
4 months	3	2.4
5 months	13	10.6
6 months	27	22.0
7 months	1	0.8
8 months	1	0.8
9 months	0	0.0
10 months	0	0.0
11 months	4	3.3
12 months	72	58.5

Next, this study reviewed properties applicable for tax reductions and exemptions. It was important to analyze whether tax reductions and exemptions provided to property tax only apply to buildings or buildings and land. Providing tax reductions and exemptions to both means that basic local governments bear an additional financial burden. However, it also clearly represents their commitment to expanding the GLM. Based on the above, this study examined how basic local governments determined properties applicable to tax reductions and exemptions. Table 7 provides the results.

Out of 123 basic local governments, 96 (78.0%) included only buildings for tax reductions and exemptions, while 27 (22.0%) included buildings and land. These results suggest that local governments had a somewhat lukewarm attitude in terms of expanding the GLM despite the seriousness of the situation.

Table 7. Properties applicable for tax reductions and exemptions (N= 123)

Property	n	%
Buildings	96	78.0
Buildings and land	27	22.0

Table 8. Tax reduction and exemption limits (N= 41)

Amount (KRW)	n	%
200,000	4	9.8
300,000	2	4.9
500,000	7	17.1
1,000,000	17	41.5
2,000,000	10	24.4
5,000,000	1	2.4

Finally, this study examined tax reduction and exemption limits. The amount of property tax reduction and exemption is calculated by multiplying property tax or rent by the reduction and exemption rate. This amount cannot exceed the least amount of the property tax or rent discount. This study analyzed the status of 41 basic local governments that set separate tax reduction and exemption limits in addition to property tax and rental discounts.

As in Table 8, 17 (41.5%) set the limits as 1 million KRW, followed by 10 (24.4%) with 2 million KRW, 7 (17.1%) with 500 thousand KRW, and 4 (9.8%) with 200 thousand KRW. The median was 1 million KRW, and the mean was 1,144 thousand KRW. These results suggest that different benefits for the same rent discount could lead to problems with fairness. However, this is not problematic if store building landlords discount rent in good faith regardless of the size of the tax break. Nonetheless, if they make a decision based on their calculation of profits and losses, they might be disappointed with fewer tax breaks. They might not discount rent again or reduce the amount, duration, or frequency of the discount even if they do.

V. Conclusions

The GLM began to support SBTs suffering during COVID-19, and one of the policies to support the movement was the GLPTRES. This study analyzed whether local governments in Korea introduced the GLPTRES in a timely and organic manner and examined the nature of system problems. Data were obtained from January 27 to February 25, 2022, from the MOIS's Information Disclosure System. The results are summarized as follows.

First, in terms of the status of property tax reductions and exemptions for good landlords, 123 out of 187 basic local governments under 15 regional local governments, except for Seoul and Busan, implemented the GLPTRES. The total number of tax reduction and exemption cases was 33,301. The total amount of tax reductions and exemptions was 8,675,424 thousand KRW, which accounted for only 3.7% of the tax breaks provided by the central government.

Second, 123 basic local governments which introduced the GLPTRES mostly did so long after the most difficult period of COVID-19 for small businesses and were therefore considered late.

Third, there was a relationship between regional local governments providing local tax reductions and exemptions and their basic local governments providing property tax reductions and exemptions.

Fourth, the effectiveness of the GLPTRES was considered poor overall, given that the average eligible duration of tax reductions and exemptions was approximately 9.5 months. Further, properties applicable for this benefit mainly included buildings, there were large deviations in tax reduction and exemption limits, and the number of tax reductions and exemptions was small.

Based on the above results, this study made the following suggestions to ensure the effectiveness of the GLPTRES and the expansion of the GLM.

First, a resolution must be made promptly during the early days of a disaster. Small businesses were directly hit when restrictions, including social distancing, were imposed after COVID-19 broke out. To minimize damages to SBTs, local governments should quickly make resolutions to introduce the GLPTRES early in disasters before paying cash directly.

Second, collaboration and communication between local governments are important. It was found that basic local governments were influenced by regional local governments in determining whether to introduce the GLPTRES. However, there were also many cases where regional local governments and their basic local governments made different decisions. Therefore, joint efforts are necessary to prevent conflicts between the two types of local governments during the introduction and implementation of the system.

Third, it is important to strengthen property tax reductions and exemptions for good landlords. Instead of providing fewer benefits to good landlords due to local governments' financial conditions and failing to expand this movement, it would be more cost-effective over the long term to solve the current problem (Kim, 2020). Hence, the introduction of the system should be considered actively, and the adoption of the GLM should be encouraged. If the system is already in place, it is necessary to standardize the eligible duration of tax reductions and exemptions for the GLPTRES as one year, include buildings and land as properties applicable for tax reductions and exemptions, and increase the limits above 1 million KRW if they are below 1 million KRW.

This is the first study to analyze the timeliness of resolutions made by local governments on the GLPTRES implemented in Korea for the first time in 2020 to support SBTs in trouble due to COVID-19, the relationship between local governments, and its effectiveness. This study also provides significant implications for government support for small businesses during crises. Suggestions for improved implementation have been recommended.

However, as the GLPTRES was introduced in 2020, it would have been more meaningful to conduct a study that included 2021, and the results may have garnered more general support. As of February 25, 2022, when this author was notified of decisions to disclose information or the non-availability of information, the application period for tax reductions and exemptions for 2021 was ongoing with some basic local governments. Hence, 2021 was excluded from this study's analysis. Another limitation of this study is that only 123 basic local governments (except for 64, which did not implement the GLPTRES) were analyzed. Therefore, a longitudinal study is required on the GLPTRES over the long term. Additionally, an in-depth follow-up study on the basic local governments to identify factors contributing to decisions to introduce this system and include post-tax break management is also required.

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General: All Manuscripts should be concisely written and should contain complete documentation of results. Manuscripts must be written in English. A typical manuscript should not exceed 10,000 words including tables and references. Authors should include a word count with their manuscript. Manuscripts should be conformed to the following order: title page; abstract; keywords; main text; acknowledgements; references; appendices (as appropriate); table(s) with caption(s) (on individual pages); figure caption(s) (as a list). Manuscript should be prepared using Microsoft (MS) Word and be typed in 12-point font size using Times New Roman. Single line spacing should be used throughout on one side of A4 paper. Manuscript will not exceed 10,000 words including tables and references. Except for units' measurement, abbreviations are strongly discouraged. The first time an abbreviation appears, it should be preceded by the words for which it stands.

Title: This should contain the title of an article, full names of authors, and institutional affiliation(s). If several authors and institutions are listed, it should be indicated clearly with which department and institution each author is affiliated. Also, address for correspondence, including the name of the corresponding author, degree, address (institutional affiliation, city, zip-code and country telephone and fax numbers, and email address) should be given. The title should not exceed 20 words and two lines.

Abstract: The structured abstract should contain the following six sections about the manuscript. It should include Purpose, Design/methodology/approach, Findings, Research limitations/implications, Originality/value, and Keywords. The structured abstract should contain no more than 500 words in total and up to five words can be added as the keywords. The first letter of each keyword should be capitalized.

[Structured Abstract Example]

Purpose: This section should contain the reason(s) for writing the paper or the aims of the research.

Design/methodology/approach: The author(s) should explain how the objectives of the research are achieved. This section should also include the main method(s) used for the research. Moreover, it is important to explain the approach to the topic and theoretical or subject scope of the paper.

Findings: In this section author(s) should describe what was found in the course of the research. This will refer to analysis, discussion, or results.

Research limitations/implications: If research is reported on in the paper this section must be completed and should include suggestions for future research and any identified limitations in the research process.

Originality/value: This section should mention what is new in the paper. In addition, the author(s) should state the value of the paper and to whom it can be valuable.

Keywords (limit 5 words): The keywords should be listed at the bottom of the abstract to be used as index terms. The first letter of each keyword should be capitalized.

Introduction: The main purpose of the study and the results achieved in the study should be described in a brief and concise style. Author(s) should include background information that is related to the purpose and omit irrelevant information in the text.

Literature Review: The purpose of the literature review is to analyze critically a segment of a published body of knowledge through summary, classification, and comparison of prior research studies, reviews of literature, and theoretical articles.

Methods: The description must be detailed to allow the replication. Procedures that have been published previously should not be described in detail. However, new or significant modifications of previously published procedures need full descriptions. Method of statistical analyses and criteria of significance level should be described.

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Discussions: The data should be interpreted concisely without repeating material already presented in the results section. It should be considered the results in relation to any hypotheses advanced in the introduction. This may include an evaluation of the methodology and of the relationship of new information to the knowledge in that field.

Conclusions: Conclusion should be clear to understand authors can combine the Conclusion and Discussion.

Acknowledgments: Specify contributions for the article, such as administrative support, technical assistance, critical review of the manuscript, and financial support.

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Figures and Tables: All body paragraphs should follow the following style guide throughout Figures and tables that should be placed in suitable spaces. All figures should be cited in the paper in consecutive order. Figures should be supplied in either vector art formats (Illustrator, EPS, WMF, FreeHand, CorelDraw, PowerPoint, Excel, etc.) or bitmap formats (Photoshop, TIFF, GIF, JPEG, etc.). Bitmap images should be of 300 dpi resolution at least unless the resolution is intentionally set to a lower level for scientific reasons. If a bitmap image has labels, the image and labels should be embedded in separate layers. Tables should be cited consecutively in the text. Every table must have a descriptive title and if numerical measurements are given, the units should be included in the column heading. Vertical rules should not be used. These should clarify or supplement the manuscript text, not duplicate the text. They should be sized as this page as illustrated as follows. Do not use suffix letters to number tables and figures; that is, label them as Table 5, Table 6, and Table 7 or Figure 5, Figure 6, and Figure 7 instead of 5, 5a, and 5b.

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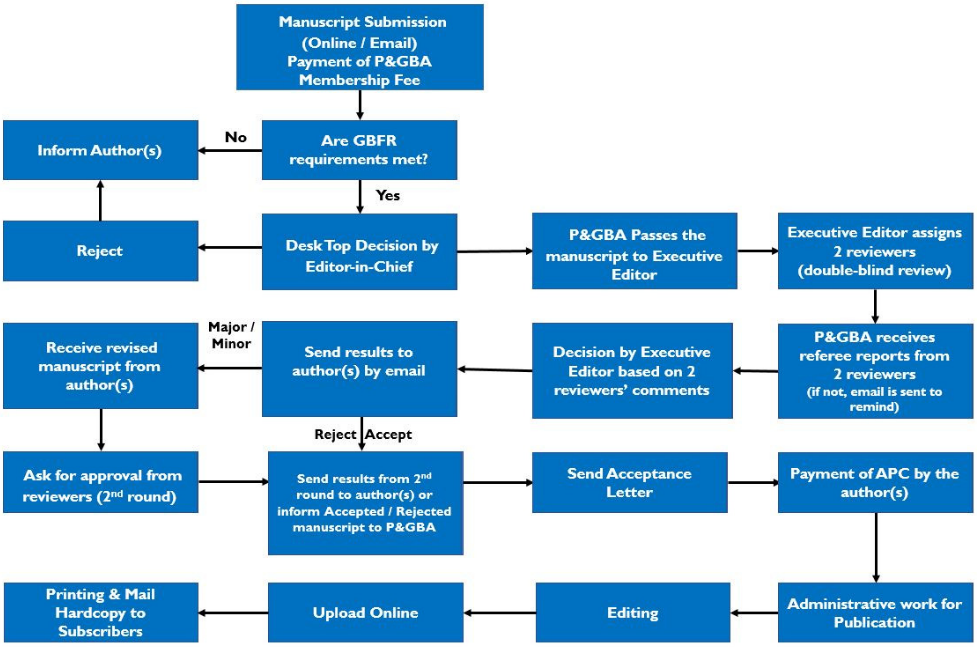
9. Manuscript Review Process Flowchart



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Title page (with author details) that includes author(s)' names, affiliations, acknowledgments, declaration of conflicting interests, as well as the corresponding author's address, contact number, and email.

Main document (without author(s) details) should not include any information that can help to identify the author(s) such as author(s)' names, affiliations, and contact information, but include a full manuscript with all the references, figures, tables, and acknowledgments if any.

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Ethical Guidelines

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■ Article 1 (Purpose)

The purpose of the following guidelines is to present the basic ethical principles to be adhered to by the authors, editors, and peer reviewers for the publication of Global Business and Finance Review (GBFR) by the People and Global Business Association (P&GBA). The journal is committed to taking all measures available against any publication malpractices. Research published in the GBFR must follow institutional, national, and international guidelines. GBFR follows the Committee on Publication Ethics (COPE) guidelines in promoting publication ethics and advising the editorial board and editorial and publishing staff members (http://publicationethics.org/resources/guidelines).

■ Article 2 (Subjects of the Enforcement)

The manuscripts submitted for publication must be previously unpublished research works written in English, which are not being considered for publication elsewhere. All the authors must have agreed to the submission and the order of their names on the title page. They must also have agreed that the corresponding author may act on their behalf throughout the editorial review and publication process. The corresponding author is responsible for obtaining such an agreement. Requests for changes in authorship (order of listing or addition or deletion of the name) after submission should be accompanied by signed statements of agreement from all the parties involved. GBFR follows COPE authorship and contributorship policy to ensure transparency on contributions to research as well as when dealing with authorship disputes (https://publicationethics.org/authorship).

■ Article 3 (Definition of Research Misconduct)

Research misconduct (refers to as the "Misconduct") as presented in the Regulation refers to fabrication, falsification, plagiarism, duplicate publication, and improper authorship. GBFR takes all forms of misconduct seriously and will take all necessary action based on COPE Guidelines to preserve the integrity of the scholarly publication (https://publicationethics.org/guidance)

① Fabrication refers to the act of creating false information about non-existent data or findings.

② Falsification refers to the act of distorting research information or results by artificially manipulating research materials, equipment, process, or by randomly transforming or deleting data.

③ Plagiarism refers to the act of fraudulent use of other people's ideas, research content, and results without appropriate approval or quotation (https://publicationethics.org/category/keywords/plagiarism)

④ Text recycling or self-plagiarism refers to the practice of reusing a large number of author's own work. COPE guidelines will be followed when dealing with such cases (https://publicationethics.org /resources/guidelines-new/text-recycling-guidelines-editors-0). To find out more detailed information on citation manipulation read (https://publicationethics.org/citation-manipulation-discussion-document)

⑤ Duplicate publication refers to the act of showing the same or substantially similar academic work as the researcher's previous findings in another journal or literary work, without permission of the copyright holders or journal editors who first published it, or without displaying appropriate sources. Improper authorship refers to when the person who has contributed to research contents or research results is scientifically and technically unqualified as an author or when the person who has not contributed to research contents or research results scientifically and technically is qualified as an author merely to express gratitude or courtesy.

⑥ Intentional acts to disturb a fraud investigation about themselves or others or the acts which can be harmful to informants.

⑦ Unfair evaluation regarding the research of others or disclosure or pirating of research ideas or research results acquired during the evaluation process.

■ Article 4 (Validity of Verification)

Information on prior Misconduct that occurred more than five years prior to the date of receipt shall be disregarded in principle. Even though the Misconduct was made five years ago, if the examinee performed subsequent research directly quoting the results of earlier Misconduct, it shall be considered exceptional.

■ Article 5 (The subjects of Research Misconduct Policy)

The research integrity committee of P&GBA can commence an investigation to examine the veracity of research for the following situations in accordance with COPE guidelines (https://publicationethics.org/guidance).

① When an investigation is judged to be necessary after the items in article 3 are reported.

② When the possibility of misconduct is recognized by an editorial board or an academic board.

③ When the need for re-investigation is recognized due to the significant defect in the verdict of an investigation.

④ When there is a request for an investigation from other organizations.

■ Article 6 (Rights Protection of Informant)

① The informant refers to the person who informed Misconduct or submitted the relevant evidence.

② The informant may report the information in any way possible, including orally, in writing, by phone, via e-mail, and so forth, so long as a real name is verifiable in principle. Even if anonymous, however, such information on the Misconduct specifically evidenced by the title of the research or thesis in writing or by e-mail should be handled on a real-name basis.

③ The personal information about an informant will not be disclosed.

④ If the informant wants to know the investigation procedures, schedule, and so forth after reporting the Misconduct, he or she should be able to request them.

⑤ The informant who submitted false information being aware of the fact will not be protected.

■ Article 7 (Right Protection of Examinee)

① The examinee refers to the person who is being investigated for any Misconduct or a person whose involvement in fraudulent activities was found out, during the course of the investigation. Any persons required for reference or witness during the course of the investigation should not be included.

② The research integrity committee of P&GBA should protect the examinee from unduly infringing his or her honor or rights during the course of the investigation.

③ The accusation of Misconduct must not be open to the public until the verdict is determined.

④ The examinee can enquire about the investigation about the accusation of misconduct, its process, and the schedule of the investigation.

■ Article 8 (Investigation Report of Misconduct)

Upon receipt of research ethics issues concerning the academic activities, the Committee of P&GBA should investigate the Misconduct and report the results within six months in principle. However, the Committee can extend the investigation period, if there are any difficulties to investigate within this period.

Each of the following paragraphs should be included:

① Contents of information
② The Misconduct subject to investigation
③ Names of Committee members and meeting minutes
④ Judgment of the investigation scope and whether it is true or not
⑤ Relevant evidence and witnesses

■ Article 9 (Principle of Verification)

The Research Ethics Committee of P&GBA should be responsible for verifying whether the Misconduct is true or not. The Committee should ensure that both the informant and the examinee's equal rights and opportunities for statements of opinion, appeals of objection and pleading are respected, and notify them of related procedures in advance.

■ Article 10 (Follow-up on Investigation Report)

If no research Misconduct is confirmed, the Committee of P&GBA should conduct appropriate follow-up action in order to restore the honor and reputation of related researchers. If on the contrary research Misconduct is confirmed, this should be published and each of the following actions should be taken:

① Demand for cancellation or modification of research results
② Cancellation of publication of research results (Official written notice for cancellation should be sent to relevant agencies)
③ Disqualification of membership for a reasonable period
④ Removal of the name of relevant persons
⑤ Names of persons involved should be provided to law enforcement authorities

■ Article 11 (The Record of an investigation and its Disclosure)

① All written records made during the whole process of investigation must be kept for more than 5 years.
② The report on the outcomes of an investigation can be opened to the public after the verdict.
③ The lists of witnesses, testifiers, and consultants may not be disclosed if they are requested.

■ Article 12 (Plagiarism Detection)

GBFR uses Turnitin plagiarism prevention software to prevent academic misconduct by detecting overlapping and simar text in submitted manuscripts for publication.

■ Article 13 (Duties and Responsibilities of Editors)

① Publication Decisions

The editor of GBFR is responsible for deciding which of the manuscripts submitted to the journal should be featured in the upcoming issue. The editor should publish clear instructions in their journals about submission and what they expect from authors and support initiatives designed to reduce academic misconduct. The editor may discuss with other editors or reviewers (or society officers) when deciding whether the manuscript should be accepted for publication. GBFR editors guidelines for journal editors (https://publicationethics.org/files/u2/Best_Practice.pdf).

② Ensuring Fairness

The editor must ensure academic fairness by evaluating the submitted manuscript for the scientific content and disregard race, gender, sexual orientation, religious belief, ethnic origin, citizenship, or political philosophy of the author(s).

③ Ensuring Confidentiality

The information on the corresponding author, reviewers, potential reviewers, other editorial advisers, the publisher, etc must be kept confidential.

④ Disclosure and Conflicts of Interest

Information and ideas gained through peer review must be kept strictly confidential and not used. All contributors should be required to disclose relevant information on conflicts of interest.

⑤ Involvement and Cooperation in Investigations

The editor should take appropriate measures when ethical complaints have been presented concerning a submitted manuscript or published paper. When investigating misconduct, unethical behavior, and complaints COPE guidelines must be followed (https://publicationethics.org/files/2008%20Code%20of%20Conduct.pdf).

■ Article 14 (Duties and Responsibilities of Authors)

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Author(s) should follow reporting standards and include sufficient details, references, permits to replicate work in the paper. Fraudulent and scientifically unethical behavior will not be tolerated.

② Data Access and Retention

Author(s) may be asked to provide the raw data used in the study for editorial review purposes if needed.

③ Originality and Plagiarism

The manuscripts submitted for publication must be unpublished original research works written in English, which are not being considered for publication elsewhere. Plagiarism in all its forms is unacceptable and will not be tolerated (https://publicationethics.org/case/plagiarism)

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Author(s) must make sure to properly acknowledge and cite the research papers and sources used in the manuscript.

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All the received and reviewed manuscripts must be kept strictly confidential.
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Reviewers should identify relevant published work that has not been cited by the authors as well as to inform the author(s) regarding the overlap with previously published research.
⑬ Disclosure and Conflict of Interest
All the information should be kept strictly confidential and cannot be used. Reviewers should not review the manuscript in which they have conflicts of interest.

■ Article 13 (Enforcement Date)

This policy is effective from January 1st, 2015.

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Please check below items as √ mark before submission of the manuscript.

■ General Guideline

□ A manuscript followed the journal template and was typed in MS word
□ Written in English
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□ Single-spacing, less than 10,000 words including references, tables and figures.

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□ Title is not more than 20 words
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□ Structured Abstract - no more than 500 words in total
□ Keywords - up to 5 words with capitalized the first letter of each word

■ Main Text

□ The order of the subtitle was described according to the journal template.
□ Figures and tables were cited in numerical order as they are first mentioned in the text.
□ Tables, Figures and Images should be editable and are in high resolution.

■ Reference

□ The reference style was followed by APA style.
□ All articles in References were cited in the main text.

■ Acknowledgment

□ There will be additional editorial service charge (USD 300) upon acceptance for the research supported and grant funded by any foundation or organization.

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