Research Article

The Informativeness of the Efficiency Ratio: The Case of the Financial Sector in the Thai Settings

Dr.Prawat Benyasrisawat

Assistant Professor of School of Accounting, Bangkok University

Dr.Nontawan Yomchinda

Assistant Professor of Accounting Department,
Thammasat Business School, Thammasat University
(Corresponding Author)

Received: *February 17, 2025*
Revised: *March 15, 2025*
Accepted: *April 11, 2025*

ABSTRACT

This study is the first attempt to investigate the characteristic and informativeness of efficiency ratio in the Thai settings. Rather than constructing the efficiency ratio based on the economic factors, the efficiency ratio employed in this study is obtained from firms' financial statements. It is a proxy to capture overhead expenses spending. By using the Heckman 2-step model to estimate the moderating effects, our findings reveal that the efficiency ratio is positively associated with agency costs. On the other hand, the efficiency ratio tends to be lower with the increase of sustainability and negative cash flow in firms. We evidence the moderating effect of sustainability and negative cash flow on the association of efficiency ratio and agency costs. Our additional results suggest that in the Thai setting, efficiency ratio information is of high quality. It can be used to predict future firms' performance and be a useful information for stock market participants. Overall results are applicable for other emerging markets. In terms of practical implications, we argue that the business process of each industry is unique. It will be more useful for the public to gain insight firms' performance when a specific information of firms in specific industry is released. Policy makers should seriously consider the information variability in each industry.

Keywords: Agency Cost, Cash Flow, Efficiency Ratio, Moderating Effect, Sustainability

บทความวิจัย

สารัตถประโยชน์ของอัตราส่วนประสิทธิภาพสถาบันการเงิน : กรณีศึกษาจากสถาบันการเงินในประเทศไทย

ดร.ประวัฒน์ เบญญาศรีสวัสดิ์
ผู้ช่วยศาสตราจารย์ประจำคณะบัญชี มหาวิทยาลัยกรุงเทพ

ดร.นนทวรรณ ยมจินดา
ผู้ช่วยศาสตราจารย์ประจำภาควิชาการบัญชี
คณะพาณิชยศาสตร์และการบัญชี มหาวิทยาลัยธรรมศาสตร์
(ผู้ประพันธ์บรรณกิจ)

วันที่ได้รับต้นฉบับบทความ : *17 กุมภาพันธ์ 2568*
วันที่แก้ไขปรับปรุงบทความ : *15 มีนาคม 2568*
วันที่ตอบรับตีพิมพ์บทความ : *11 เมษายน 2568*

บทคัดย่อ

งานวิจัยนี้เป็นการศึกษาลักษณะและสารัตถประโยชน์ของอัตราส่วนประสิทธิภาพสถาบันการเงินในประเทศไทย เป็นงานแรกที่ใช้การคำนวณอัตราส่วนประสิทธิภาพ ซึ่งเป็นตัวแปรที่ใช้แสดงการใช้จ่ายค่าใช้จ่ายในการบริการของสถาบันการเงินจากข้อมูลในงบการเงินแทนการใช้อัตราส่วนประสิทธิภาพที่สร้างขึ้นจากปัจจัยทางเศรษฐกิจ การศึกษาโดยใช้โมเดล 2 ขั้นของ Heckman พบว่า อัตราส่วนประสิทธิภาพมีความสัมพันธ์เชิงบวกกับต้นทุนที่เกิดจากตัวแทน (Agency Costs) ทั้งนี้ อัตราส่วนประสิทธิภาพมีแนวโน้มลดลงเมื่อกิจการมีความยั่งยืนและมีการขาดดุลกระแสเงินสด งานวิจัยนี้แสดงหลักฐานเชิงประจักษ์เกี่ยวกับอิทธิพลของตัวแปรกำกับ ได้แก่ ความยั่งยืน และการขาดดุลกระแสเงินสด ต่อความสัมพันธ์ระหว่างอัตราส่วนประสิทธิภาพและต้นทุนที่เกิดจากตัวแทน ผลการศึกษาเพิ่มเติมยังแสดงว่า ในตลาดทุนของประเทศไทย ข้อมูลอัตราส่วนประสิทธิภาพมีคุณภาพระดับสูง สามารถใช้พยากรณ์ความสามารถในการดำเนินงานในอนาคตของกิจการ และเป็นข้อมูลที่มีสารัตถประโยชน์ต่อนักลงทุน ผลการศึกษานี้สามารถประยุกต์กับตลาดทุนใหม่โดยทั่วไป และเนื่องจากกระบวนการดำเนินงานของอุตสาหกรรมที่แตกต่าง ผู้ใช้ข้อมูลจะได้รับประโยชน์เพิ่มขึ้นหากได้ศึกษาข้อมูลเพิ่มเติมเฉพาะกิจการที่ได้มีการเปิดเผยต่อสาธารณะ นอกจากนี้ หน่วยงานกำกับดูแลควรพิจารณาให้มีการเปิดเผยข้อมูลเฉพาะสำหรับอุตสาหกรรมที่แตกต่างอย่างจริงจัง

คำสำคัญ: ต้นทุนที่เกิดจากตัวแทน กระแสเงินสด อัตราส่วนประสิทธิภาพ อิทธิพลของตัวแปรกำกับ ความยั่งยืน

INTRODUCTION

Banking and finance is one of major industries in every country (Nittayakamolphun et al., 2022). Their information released to the public is important and has significant roles in economies they belong. As required by Thai regulators, certain information, in particular financial ratios, has been regularly released to the public. Unlike US banks, Thai financial firms are not required to provide the efficiency ratios explicitly. The efficiency ratio, the ratio of a non-interest expense and the total of net interest income and non-interest income, reflects firms' non-core business expenditure. Basu et al. (2023) demonstrate significant roles of efficiency ratios in terms of their informativeness and predictability. Hays et al. (2009) illustrate that efficiency ratios are important information for the firm. The efficiency ratio can be used as proxy to estimate business operating efficiencies because they capture significant information relating to business operations such as business expansion, market competition, and other managerial decisions. Since Thai regulators do not require Thai financial firms to provide the efficiency ratio information, it is our interest to study characteristics of efficiency ratios in Thai settings and to investigate whether the efficiency ratio conveys important information to the Thai stock market participation.

In this study, we postulate that agency problems can be reflected by the efficiency ratio because it captures non-core business expenses that may be exploited by the firms' management. To study the characteristics of efficiency ratio, we propose our first analysis that efficiency ratio is directly related to agency costs. The increase of agency costs induces the increase of efficiency ratios. On the other aspect, firms may have high non-core spending to promote their sustainability rather than to deteriorate their business future. We anticipate that sustainability policy has an influence on the abuse of firms' available resources. Thus, we investigate the moderating role of sustainability on efficiency ratios and agency costs. In addition to the sustainability, we argue that the misuse of firms' available resources is more likely to be limited by negative cash flows that firms are currently facing as suggested by Cai et al. (2022) that the company's high cash level is associated with the high agency cost. We, therefore, examine the moderating role of negative cash flow on the association of efficiency ratios and agency costs. We use Heckman 2-step model to estimate the moderating effect of sustainability and negative cash flow. In sum for our first analysis, we project that efficiency ratio should relate to agency costs and sustainability, and negative cash flow has moderating roles on the efficiency ratio and agency cost.

We further explore the quality of efficiency ratio information. We investigate the predict ability of efficiency ratios by investigating whether the efficiency ratio can be used to predict firms' future earnings. In addition, we assume that if the efficiency ratio has predictability quality, the efficiency

ratio information should be useful for stock market participants. The stock market should respond to the efficiency ratio information. We attempt to provide empirical evidence based on our analyses in Thai settings.

We contribute to literature of financial sector in the Thai settings by illustrating preliminary evidence about efficiency ratio information measured by financial information obtained from firms' financial statements in an emerging market country. Our analyses can be applicable to not only Thai regulators but also regulators in other emerging markets. We believe that policy makers have required firms to disclose an important information such as financial ratios. Nevertheless, the business process of each industry is unique. We suggest that policy makers should require an extra information disclosure for a specific industry. More insight information released to the public, more usefulness for information users.

Next, we organize remaining sections as follows. The next section is prior studies and hypothesis development. The following sections are data and methodology and results. The last section concludes.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

The efficiency ratio is calculated by dividing a company's non-interest expense (also known as overhead expenses) by the total of its net interest income and non-interest income (or fee income) (Basu et al., 2023; Hays et al., 2009). The efficiency ratio reflects how well the management controls its overhead expenses. A low efficiency ratio is preferable. A high efficiency ratio indicates that a financial firm is spending more to generate each dollar of income. It is a measure of how effective a financial firm is in using non-core expenses including salaries, employee benefits, and other operating expenses in generating income. The efficiency ratio can be a short-term spike expense. For example, expanding business of a firm adds to overhead costs such as staffing and incomes will be slowly generated from the new business expansion.

Efficiency ratio reflect direct costs directly controlled by firms such as staffing expenses while expenses related to interest income are influenced by market forces; i.e., market interest rate. Taken as a whole, the efficiency ratio captures overall picture of how well a financial firm is as to managing noninterest expenses and noninterest income to optimize the overall profitability. Hays et al. (2009) discuss that firms' manager may attempt to reduce non-core expenses to maximize either profits or utility instead of profitability. The expense preference theory views that firms' manager tends to increase staffing related expenses rather than maximizing profits. These decisions may or may not contribute to long-run profitability. This study supports the argument that the efficiency ratio echoes firms' agency cost. According to the agency theory (Jensen, 1986), the principal-agent conflicts

induce costs to a firm. Since non-core expenses are firms' direct overhead cost, they can be entirely controlled by the firm. This study, therefore, attempts to investigate the relation between agency costs and the efficiency ratio.

To our knowledge, no prior literature studies the relationship between agency costs and the efficiency ratio especially in the Thai settings. Most prior studies (Chansarn, 2014; Chunhachinda & Srisawat, 2007; Issa et al., 2024; Nasim et al., 2024; Nittayakamolphun et al., 2022; Takahashi & Vasconcelos, 2024) measure the efficiency ratio based on the data envelopment analysis (DEA) rather than using the ratio of a non-interest expense and total of net interest income and non-interest income (Basu et al., 2023) as employed in this study. Based on DEA measurement, prior research studies find the relationship between the DEA-based efficiency ratio and many factors including: non-performing loans (Takahashi & Vasconcelos, 2024), economic growth, monetary factors, government debt and exchange rate (Nasim et al., 2024; Wang et al., 2024), board gender diversity (Andries et al., 2024; Issa et al., 2024), and accounting ratio such as return on equity (Mihai Nitoi & Cristi Spulbar, 2016), liquidity ratio and capital ratio (Bitar et al., 2018), and total asset (Halkos & Salamouris, 2004). Based on DEA approach, input and output factors are selected to construct an efficiency ratio. The DEA-based efficiency ratio is ranging from 0 to 1. Drawback of DEA-based efficiency ratio has twofold. 1) The efficiency ratio obtained from DEA has been depended on the selection of inputs and outputs. For example, Nittayakamolphun et al. (2022) use savings and shareholders (operating expense and non-current assets) while Chunhachinda & Srisawat (2007) use salary expense, operating expense, interest expense and other non-interest expense (interest income and non-interest income) as inputs (outputs). 2) Information loss is a potential issue when manipulating financial data to be ranging from 0 to 1. To mitigate the selection bias and information loss, a financial ratio presented in this study is directly constructed to capture the firm's efficiency (Basu et al., 2023; Hays et al., 2009).

Hays et al. (2009) evidence the determinants of efficiency ratios measured by dividing a non-interest expense by the total of its net interest income and non-interest income including: equity capital to total asset ratio, net charge-offs to loans, salaries to average assets, return on average assets, the liquidity ratio and the one year GAP ratio. Using the similar measurement for the efficiency ratio, Basu et al. (2023) find the determinants of efficiency ratios including: profitability, stock return volatility and book-to-market ratios. In addition, they evidence that the informativeness and predict ability of efficiency ratio are observed. They suggest that efficiency ratios are useful for assessing bank performance.

According to the prior studies, we investigate the efficiency ratio in three aspects. First, we attempt to explore the relationship between the efficiency ratio and agency costs. Since the efficiency ratio is arisen from non-core business expenses, we expect that the efficiency ratio is more likely to associate with agency cost. Therefore, our first hypothesis is as follows.

H_1: The efficiency ratio is positively related to agency cost.

Second, since the efficiency ratio comprehensively captures non-core business costs that are potentially related to agency costs, exploiting firms' resources conceivably deteriorates firms' performance (Canarella & Miller, 2022; Hoang et al., 2022). Thus, we argue that to manage efficiency ratios, sustainability (Tao et al., 2024) and cash flow (Behbahaninia, 2024; Dabboussi, 2024) should be potential factors influencing firms' non-core expenses. We propose that sustainability and cash flow have moderating effect on the association between the efficiency ratio and agency cost. We postulate that firms are less likely to make large spending on agency cost when they have enacted sustainability policy or the large spending on agency cost should aim at achieving sustainable business. The other concern is about cash management measured by cash flow. We expect that firms are less likely to abuse limited resources when their cash flow is negative. Thus, we hypothesize these moderating effects as follows.

H_{1a}: Sustainability has a moderating effect on the association between efficiency ratio and agency cost.

H_{1b}: Negative cash flow has a moderating effect on the association between efficiency ratio and agency cost.

Third, based on the prior studies, we explore the predict ability of efficiency ratios to provide empirical evidence for Thai settings. Basu et al. (2023) suggest that the efficiency ratio captures predictability characteristics. Therefore, our second hypothesis is as follows.

H_2: The efficiency ratio has predictability characteristic for future performance.

Last, we estimate the information content of efficiency ratios to determine its informativeness. Following the prior studies, we expect that the efficiency ratio provides information content to stock market participants. Thus, we hypothesize as follows.

H_3: The efficiency ratio provides information content to stock market.

DATA AND METHODOLOGY

This section describes research methods, including data derivation, variables calculation and statistical models used.

Data

The empirical analysis carried out in this research paper employs firm-level data from SETSMART – information database system developed by the Stock Exchange of Thailand and firm's financial statements. This paper focuses on Thai listed firms in banking and financial sector and utilizes all the available data during 2018–2023. We obtain the initial data of 216 firm-year observations. We employ a series of analyses including correlation matrix and regressions to pull out important insights. Table 1 presents description of variables employed in this study.

Table 1 Variable descriptions

	Description
EFR	Non-interest expense ÷ (Net interest income + Non-interest income)
AGEN	Total asset divided by total revenue
SPREAD	The difference between bid and ask stock prices
PE	Price to earnings ratio
SIZE	Natural logarithm of market capitalization
ESG	Environmental, social, and governance (ESG) indicator if the firm has been evaluated ESG scores by Security Exchange of Thailand (SET)
SD	12-month stock price volatility 5-month after the firm's year-end
DE	Debt to equity ratio
ROA	Return on assets
NegCF	Indictor if net operating cash flows are negative.
RISK	Firm risk estimated by using the market model $R = \alpha_i + \beta_i (R_m - R_f) + \varepsilon_i$, where $R_m - R_f$ is risk premium. Idiosyncratic risk (firm risk) is the standard deviation of the residuals from the regression of the market model.
DY	Dividend yield
GRW	Price to book ratio
EPS	Earnings per share at year t+1

Table 1 Variable descriptions (Cont.)

	Description
TA	Natural logarithm of total assets
AAR	Average abnormal returns based on 12-month stock returns
CAR	Cumulative abnormal returns based on 12-month stock returns
R	12-month stock return from 5-month after financial year-end
YR	Year indicator during 2018–2023.

Empirical Models

We first investigate the factor that affect efficiency ratio in banking and finance sector. The factor that we focus on is agency cost. Two different measures representing the agency cost are 1) the asset-to-sales ratio (Alves & Meneses, 2024) and 2) bid-ask spread of stock price (Lei et al., 2013). We regress efficiency ratio on agency costs with controlling variables including debt and firm's size. Untabulated results obtained from fixed effect and random effect are further compared and evaluated by Hausman test. This comparison outcome, $Chi^2 = 32.05$ ($p\text{-}value < 0.01$) and 29.94 ($p\text{-}value < 0.01$), indicating that the model estimation with fixed effect is preferred. However, endogeneity issues arisen from the unobserved heterogeneity, selection bias, or reverse causation are potentially suspected. Saleh et al. (2020) and Ullah et al. (2018) suggest that fixed effect can partly mitigate endogenous issues and will mislead interpretation. To deal with these issues, we postulate that the association between efficiency ratio and agency costs is more likely influenced by firms' sustainability or cash management policy. It is of our interests in further exploring the moderating effect of sustainability and cash management on characteristics, efficiency ratio and agency costs. We control for this potential endogeneity by using a 2-step model. In particular, the Heckman 2-step model (Chasiotis et al., 2024; Foerster et al., 2008) is applied to evidently model the interaction. In the Heckman model, the first step of the model examines how different factors influence the likelihood of firms' sustainability issues and cash management. In the second step, the estimated likelihood of firms' sustainability issues and cash management is introduced into the model to offset both the discrete nature of sustainability and cash management policy in a firm (i.e., a firm either does or does not have intention to perform sustainability policy or manage cash liquidity) and the factors which may influence those policies and therefore may also influence the measures of efficiency ratio that we concern about. The model comprises of the following two steps:

$$Z' = W_i'Y + U_i \quad \text{(a)}$$

where a probit model is estimated using maximum likelihood to obtain estimates of ω as follows.

$$\text{Probability (Sustainability or Cash)} > 0) = \omega(W_i'Y) \quad \text{(b)}$$

For each observation in the sample, the non-selection hazard or Inverse Mills ratio (λ) is computed:

$$\lambda = \frac{\phi(-W_{it}'Y)}{\Phi(-W_{it}'Y)} \quad \text{(c)}$$

where ϕ is a standard normal density function and Φ is a normal cumulative density function. Inverse Mills ratio is the probability that a firm with non-censored outcomes having Y characteristics would have applied or not applied sustainability policy (or had negative or positive cash flows). We propose that the Y characteristics included in the model for the sustainability policy analysis (*ESG*) are *SD* which captures stock volatility suggesting that whether the stock market responds to sustainability policy, *DE* which captures the risk from debt policy that probably affects company's financial costs, *ROA* which captures firm's performance, and *YR* which captures time variants. The characteristics included in the model for cash management analysis are *RISK*-to capture firm risk, *DY*-to capture the use of cash for dividend payment, and *YR*-to capture time variants. The estimated probability (λ) of a firm sustainability policy (or cash management) is inserted into the model to estimate the moderating effect of sustainability and cash management. Our main interests are λ and agency costs proxied by *AGEN* and *SPREAD*. The model is operationalized as follows.

$$EFR = f(\lambda, AGEN, SPREAD, PE, DE, SIZE, YR) \quad (1)$$

Second, we estimate the predict ability of efficiency ratio. We use the following empirical model to estimate the efficiency ratio predictability. We expect the statistical significance of *EFR*-coefficient.

$$EPS = f(EFR, DE, TA, YR) \quad (2)$$

To mitigate potential endogeneity issues arisen from unobservable heterogeneity, selection bias, and reverse causation, we employ 2-stage least square to estimate the predict ability of efficiency ratio. We operationalize instrument variables as follows:

$$EFR = f(AGEN, RISK, GRW, YR) \quad (3)$$

Third, following a prior study (Basu et al., 2023), we investigate whether stock market responds to efficiency ratio information. Our main interests are *EFR***ESG*- and *EFR***NegCF*-coefficient. The

examination is performed by using two models. Firstly, we examine the information content of efficiency ratio. We employ fixed effect to estimate the following models.

$$AAR \text{ (or } CAR) = f(EFR, ESG, EFR*ESG, TA) \quad (4)$$

$$AAR \text{ (or } CAR) = f(EFR, NegCF, EFR*NegCF, TA) \quad (5)$$

Secondly, we test the value relevance of efficiency ratio. We operationalize the model as follows:

$$R = f(EFR, ESG, EFR*ESG, TA) \quad (6)$$

$$R = f(EFR, NegCF, EFR*NegCF, TA) \quad (7)$$

RESULTS

Descriptive Statistics

Table 2 presents the descriptive statistics revealing that the mean of efficiency ratio is 0.81 and efficiency ratio is slightly different among firms with standard deviation at 0.98. The higher efficiency ratio suggests that higher non-core business expenditure has been disbursed by firms. Agency costs among firms are also slightly different while size of sample firms is relatively similar. Table 3 presents results of correlation based on both Pearson and Spearman that are qualitatively similar and multicollinearity is not an issue for this sample settings (Gujarati, 2004).

Table 2 Descriptive Statistics

	Mean	Median	SD	Min	Max
EFR	0.81	0.70	0.98	0.08	13.08
AGEN	11.79	7.09	12.30	0.03	118.63
SPREAD	0.21	0.10	0.35	0.01	3.90
PE	27.19	12.23	81.32	3.48	972.15
SIZE	23.62	23.81	1.84	19.82	27.04
ESG	0.34	0	0.47	0	1
SD	0.10	0.08	0.06	0.02	0.57
DE	3.36	2.15	2.90	0.02	9.83
ROA	5.53	4.78	5.41	–29.46	24.16

Table 2 Descriptive Statistics (Cont.)

	Mean	Median	SD	Min	Max
NegCF	0.48	0	0.50	0	1
RISK	–0.01	–0.01	0.04	–0.13	0.35
DY	4.19	3.44	3.17	0.01	21.68
GRW	2.01	1.12	2.36	0.39	18.39
EPS	3.21	1.01	4.84	–1.65	21.81
TA	17.71	17.34	2.40	13.54	22.23
AAR	–1.13	–1.05	0.92	–6.29	0.83
CAR	–13.46	–12.34	10.98	–75.45	8.43

Table 3 Pearson Lower Diagonal and Spearman Upper Diagonal

	EFR	AGEN	SPREAD	PE	SIZE	ESG	SD	DE	ROA
EFR		0.186***	–0.149**	–0.077	–0.044	0.051	–0.196***	0.036	–0.622***
AGEN	0.503***		–0.111	–0.312***	0.461***	0.378***	–0.176**	0.666***	–0.731***
SPREAD	–0.028	–0.086		–0.098	0.517***	0.322***	–0.032	0.162**	0.194***
PE	0.082	0.319***	–0.072		–0.235***	–0.246***	0.326***	–0.435***	0.201***
SIZE	–0.120	0.331***	0.218***	–0.081		0.691***	–0.180**	0.660***	–0.175**
ESG	–0.056	0.259***	0.114	–0.123	0.681***		–0.215***	0.521***	–0.260***
SD	0.006	0.073	–0.095	0.168**	–0.224***	–0.234***		–0.232***	0.227***
DE	–0.066	0.517***	0.043	–0.173**	0.657***	0.533***	–0.265***		–0.470***
ROA	–0.179**	–0.574***	–0.021	–0.097	–0.125	–0.175**	0.102	–0.527***	

*** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$

Regression Results

Table 4 and 5 shows that agency costs measured by *AGEN* and *SPREAD* are positively related to efficiency ratio. The resulting sign of *SPREAD* is positive and counters to the efficiency ratio but is not significant. The results from both tables suggest that firms spending more on non-core business expenses are more likely caused by agency problems. When information asymmetry is larger, it will reflect in the higher efficiency ratio or higher non-core business expenses. These results support the notion that non-core business expenses are a potentially major channel for firms to abuse available resources, leading to agency problems. As expected, the statistically significant association between the efficiency ratio and inverse mills ratio is observed. For the sustainability moderating effect presented in Table 4, the significantly negative relationship between EFR and inverse mills ratio - the estimated value for the sustainability policy correcting for external factors - suggests that efficiency ratio or non-core business expenses tends to be lower in firms having concerns or implementing sustainability policies relative to firms without sustainability employments. Based on our analysis constructs, we set a variable (*NegCF*) defined as 1 if a firm has negative net operating cash flow and zero otherwise. To capture the important role played by cash management policy, the estimated value for the cash management correcting for external characteristics or inverse mills ratio obtained from Heckman treatment model as displayed in Table 5 is included in the model. Results show a positive association between inverse mills ratio and the efficiency ratio. It indicates that relative to firms with positive net operating cash flows, the efficiency ratio tends to be lower in firms with negative net operating cash flows. This implies that cash management plays a significant role when firms attempt to manage their non-core business spending. The results clearly indicate that the efficiency ratio is associated with agency problems. In addition, high sustainable firms are associated with a lower spending for non-core business expenses and firms are more likely to spend less for their non-core business expenses when they face difficulties about their cash flows.

Table 4 Sustainability Policy

	EFR	
Constant	0.623	(1.03)
Inverse Mills ratio (λ)	**–0.130**	**(–1.72)***
AGEN	0.013	(3.86)***
SPREAD	0.233	(2.48)**
PE	0.006	(1.95)*
SIZE	–0.007	(–0.32)
	Year indicators included	
N		216
Wald Chi2		36.47***

*** p < 0.01, ** p < 0.05, and * p < 0.10

Table 5 Cash Management

	EFR	
Constant	0.826	(1.84)*
Inverse Mills ratio (λ)	**0.185**	**(1.81)***
AGEN	0.018	(3.47)***
SPREAD	0.184	(1.63)
DE	–0.034	(–2.46)**
SIZE	–0.015	(–0.77)
	Year indicators included	
N		185
Wald Chi2		21.68**

*** p < 0.01, ** p < 0.05, and * p < 0.10

We examine the predict ability of efficiency ratio as our results presented in Table 6. We attempt to perform the analysis of 1-year lead variable of *EPS* and efficiency ratio. As expected, results show the significantly negative association between future earnings per share and efficiency ratio. This

suggests that firms with higher spending in non-core business expenses are more likely to have lower earnings in the next year. The result in Table 6 supplements the above findings. Taken together with the findings from our tests above, agency problems can dwindle earnings of the firm.

Table 6 Predict Ability of EFR

	EPS	
Constant	–26.544	(–6.71)***
EFR	**–1.001**	**(–1.79)***
DE	–0.772	(–4.53)***
TA	1.933	(7.56)*
	Year indicators included	
N		169
R^2		0.347

*** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$

We further consider whether or not the stock market captures information of efficiency ratio. The results in Table 7 Panel A present the market reaction on efficiency ratio. *EFR* coefficient is positive and statistically significant. This suggests that the higher efficiency ratio is more likely leading to the higher abnormal returns due to the higher spending of non-core business expenses. Consistent with a prior study, Kim & Sharma (2024) evidence that firms with high agency costs are more likely to have high abnormal returns in developing countries. When interacting the efficiency ratio and sustainability, the interacted coefficients are negative and significant for both dependent variables measured by *AAR* and *CAR*. It indicates that the stock market significantly reacts to firm sustainability information, suggesting that abnormal returns of firms with high efficiency ratio tends to be lower with the increase of sustainability implementation in the firm. Additionally, the interacted coefficient of *EFR*∗*NegCF* is positive and statistically significant when using *AAR*. However, the interacted coefficient shows positive sign but not statistically significant when using *CAR*. The results support the above findings which suggest that cash flow is an important information captured by the stock market participants. The results suggest that abnormal returns of the firm with high efficiency ratio firm tend to be increased with the rise of negative net operating cash flow. Our results are consistent with the notion that sustainability and cash flow create value for outside shareholders. Particularly, the results can be

interpreted as the stock market participants expect the positive role of sustainability and cash flow policies to mitigate the conflict of interests between firms and shareholders.

These analyses suggest that efficiency ratio, sustainability, and net operating cash flow convey valuable information to stock market participants. The higher efficiency ratio is more likely to induce more agency problems, accordingly introducing higher abnormal returns (La Porta et al., 2000). We evidence that firm's efficiency ratio is to exhibit a positive signal to the public and the moderating role of sustainability and cash flow information is clearly observed.

To supplement the above findings, in the Panel B of Table 7, we present results by regressing stock return on efficiency ratio. Consistent with a prior study, (Basu et al., 2023), *EFR* coefficient is negative and statistically significant. This supports the result shown in Panel A. These results are qualitatively similar to the result presented in Panel A except the coefficient of *EFR*∗*ESG* that has a negative sign but it is not significant. Taken together with the findings from our tests, we find strong support for our hypothesis H3. It appears that the informativeness of sustainability and net operating cash flow are observed and they provide valuable information beyond the efficiency ratio information.

Table 7 Stock Market Participation

Panel A Information Content

	AAR				**CAR**			
	ESG		**NegCF**		**ESG**		**NegCF**	
Constant	1.63	(0.48)	−0.07	(−0.02)	13.52	(0.33)	−4.73	(−0.10)
EFR	0.30	(5.21)***	0.29	(4.04)***	3.53	(5.17)***	3.47	(3.91)***
ESG or NegCF	1.08	(3.15)***	−0.23	(−1.04)	12.29	(2.99)***	−2.36	(−0.88)
EFR∗ESG	**−0.99**	**(−1.78)***			**−11.22**	**(−1.71)***		
EFR∗NegCF			**0.41**	**(1.89)***			4.50	(1.62)
TA	−0.20	(−1.09)	−0.10	(−0.5)	−2.09	(−0.95)	−1.01	(−0.4)
	Fixed effect				Fixed effect			
N	217		217		217		217	
R^2	0.1798		0.1982		0.1743		0.1891	
F	15.17***		3.95***		17.33***		3.60***	

*** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$

Table 7 Stock Market Participation (Cont.)

Panel B Value Relevance

R	EFR		ESG		NegCF	
Constant	0.85	(0.85)	0.86	(0.86)	0.82	(0.78)
EFR	–0.02	(–2.8)**	–0.02	(–2.96)**	–0.01	(–1.65)
ESG or NegCF			0.15	(2.49)**	–0.06	(–1.41)
EFR*ESG			–0.10	(–0.86)		
EFR*NegCF					**0.11**	**(4.29)*** **
TA	–0.05	(–0.88)	–0.05	(–0.91)	–0.05	(–0.82)
	Fixed effect		Fixed effect		Fixed effect	
N	215		215		215	
R^2	0.10		0.12		0.13	
F	10.09***		9.82***		41.98***	

*** $p < 0.01$, and ** $p < 0.05$

CONCLUSION

In this study, we provide empirical evidence of efficiency ratios in Thai settings. We investigate the relationship of efficiency ratios and agency costs. We find strong empirical evidence that the efficiency ratio is positively related to agency costs, suggesting that the higher efficiency ratio, the higher agency cost. However, the efficiency ratio tends to be lower when firms' non-core spending is used to improve their sustainability. In addition, the efficiency ratio is more likely to be declined when firms have negative cash flow. The efficiency ratio information is of high quality as it captures predictability quality for future firm's performance and conveys useful information to the stock market.

Our findings are applicable for Thai regulators in different aspects. First, Thai regulators should search for more information to be released by firms in certain industry and such information is useful for the public. Second, Thai regulators should require firms to release more information that can convey useful information beyond information shown in firm's financial statements such as specific financial ratios in a certain industry. Third, Thai regulators should regularly revise its authorized law and regulation relating to information disclosure to enhance quality of information released by firms. In addition, we add our empirical evidence to existing literature for emerging market countries in terms of the characteristic and informativeness of efficiency ratio information. These results can be

applicable to other emerging market countries. Based on our findings, efficiency ratio adds quality to the information disclosed by banking and financial industry. Our suggestion is that policy makers require efficiency ratio as an extra information to be disclosed by the banking and financial industry. This study employs only unique data disclosed within financial sector in the Thai market. It does not include disclosures in other industries in the analysis. Future research should extend the investigation by searching for additional information disclosure specifically released in other industries.

REFERENCES

Alves, C. F., & Meneses, L. L. (2024). ESG scores and debt costs: Exploring indebtedness, agency costs, and financial system impact. *International Review of Financial Analysis, 94*, Article 103240. https://doi.org/10.1016/j.irfa.2024.103240

Andries, A. M., Căpraru, B., Minguez-Vera, A., & Nistor, S. (2024). Gender diversity on boards and bank efficiency across Emerging Europe. *Romanian Journal for Economic Forecasting, 27*(3), 24–64.

Basu, S., Gomez, E., & Su, B. (2023, December 22). Banks' efficiency ratio disclosure. SSRN. https://doi.org/10.2139/ssrn.4958255

Behbahaninia, P. S. (2024). Agency costs and auditor choice: Moderating role of board's expertise and internal control. *Journal of Financial Reporting and Accounting, 22*(4), 1014–1038. https://doi.org/10.1108/JFRA-11-2021-0406

Bitar, M., Pukthuanthong, K., & Walker, T. (2018). The effect of capital ratios on the risk, efficiency and profitability of banks: Evidence from OECD countries. *Journal of International Financial Markets, Institutions and Money, 53*, 227–262. https://doi.org/10.1016/j.intfin.2017.12.002

Cai, W., Hu, F., Xu, F., & Zheng, L. (2022). Anti-corruption campaign and corporate cash holdings: Evidence from China. *Emerging Markets Review, 51*, Article 100843. https://doi.org/10.1016/j.ememar.2021.100843

Canarella, G., & Miller, S. M. (2022). Firm size, corporate debt, R&D activity, and agency costs: Exploring dynamic and non-linear effects. *The Journal of Economic Asymmetries, 25*, Article e00233. https://doi.org/10.1016/j.jeca.2021.e00233

Chansarn, S. (2014). Total factor productivity of commercial banks in Thailand. *International Journal of Business and Society, 15*(2), 215–234.

Chasiotis, I., Gounopoulos, D., Konstantios, D., & Patsika, V. (2024). ESG reputational risk, corporate payouts and firm value. *British Journal of Management, 35*(2), 871–892. https://doi.org/10.1111/1467-8551.12745

Chunhachinda, P., & Srisawat, T. (2007). Productive efficiency of Thai commercial banks: Pre- vs. post-1997 economic crisis. *Journal of Business Administration, 30*(113), 49–72.

Dabboussi, M. (2024). Does debt structure explain the relationship between agency cost of free cash flow and dividend payment? Evidence from Saudi Arabia. *Journal of Risk and Financial Management, 17*(6), Article 223. https://doi.org/10.3390/jrfm17060223

Foerster, S., Sapp, S., & Shi, Y. (2008, August 30). The impact of management earnings forecasts on firm risk and firm value. *AAA 2010 Financial Accounting and Reporting Section (FARS) Paper*. https://doi.org/10.2139/ssrn.1464897

Gujarati, D. (2004). *Basic econometrics* (4th ed.): New York: The McGraw-Hill.

Halkos, G. E., & Salamouris, D. S. (2004). Efficiency measurement of the Greek commercial banks with the use of financial ratios: A data envelopment analysis approach. *Management Accounting Research, 15*(2), 201–224. https://doi.org/10.1016/j.mar.2004.02.001

Hays, F. H., De Lurgio, S. A., & Gilbert, A. H., Jr. (2009). Efficiency ratios and community bank performance. *Journal of Finance and Accountancy, 1*, 1–15.

Hoang, K., Doan, H. T., Tran, T. T., Nguyen, T. X., & Le, A. Q. (2022). Anti-corruption campaign and firm financial performance: Evidence from Vietnam firms. *Evaluation Review, 46*(2), 103–137. https://doi.org/10.1177/0193841X211072707

Issa, A., Sahyouni, A., & Mateev, M. (2024). A path to success: Educational board diversity and its influence on MENA banks' efficiency and stability. *Corporate Governance: The International Journal of Business in Society, 24*(6), 1283–1313. https://doi.org/10.1108/CG-08-2023-0339

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review, 76*(2), 323–329.

Kim, I., & Sharma, B. (2024). Agency cost and debt financing: Evidence from developing countries. *SSRN*. https://doi.org/10.2139/ssrn.4727352

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (2000). Investor protection and corporate governance. *Special Issue on International Corporate Governance, 58*(1), 3–27. https://doi.org/10.1016/S0304-405X(00)00065-9

Lei, Q., Lin, B., & Wei, M. (2013). Types of agency cost, corporate governance and liquidity. *Special Issue on Accounting and Corporate Governance, 32*(3), 147–172. https://doi.org/10.1016/j.jaccpubpol.2013.02.008

Nitoi, M., & Spulbar, C. (2016). The relationship between bank efficiency and risk and productivity patterns in the Romanian banking system. *Journal for Economic Forecasting, 0*(1), 39–53.

Nasim, A., Nasir, M. A., & Downing, G. (2024). Determinants of bank efficiency in developed (G7) and developing (E7) countries: Role of regulatory and economic environment. *Review of Quantitative Finance and Accounting*. https://doi.org/10.1007/s11156-024-01272-6

Nittayakamolphun, P., Bejrananda, T., Autchariyapanitkul, K., & Kuson, S. (2022). The operating efficiency measurement of Thai commercial banks in digital era. *Journal of Accountancy and Management, 14*(3), 134–157.

Saleh, M. W. A., Latif, R. A., Bakar, F. A., & Maigoshi, Z. S. (2020). The impact of multiple directorships, board characteristics, and ownership on the performance of Palestinian listed companies. *International Journal of Accounting, Auditing and Performance Evaluation, 16*(1), 63–80. https://doi.org/10.1504/IJAAPE.2020.106774

Takahashi, F. L., & Vasconcelos, M. R. (2024). Bank efficiency and undesirable output: An analysis of non-performing loans in the Brazilian banking sector. *Finance Research Letters, 59*, Article 104651. https://doi.org/10.1016/j.frl.2023.104651

Tao, J., Shan, P., Liang, J., & Zhang, L. (2024). Influence mechanism between corporate social responsibility and financial sustainability: Empirical evidence from China. *Sustainability, 16*(6), Article 2406. https://doi.org/10.3390/su16062406

Ullah, S., Akhtar, P., & Zaefarian, G. (2018). Dealing with endogeneity bias: The generalized method of moments (GMM) for panel data. *Industrial Marketing Management, 71*, 69–78. https://doi.org/10.1016/j.indmarman.2017.11.010

Wang, H., Sua, L. S., & Dolar, B. (2024). CAMELS-DEA in assessing the role of major factors in achieving higher efficiency levels: Evidence from Turkish banks. *Applied Economics*, 1–18. https://doi.org/10.1080/00036846.2024.2339186