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Oil price and profitability: evidence from Southeast Asian countries

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Abstract: The paper explores the influence of macroeconomic variables on the profitability of the aviation sector in the Southeast Asia region. The panel corrected standard errors (PCSE) regression model was employed for the period 2011–2019 on a sample of six countries (i.e., Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam). The results revealed the positive effect of an increase in inflation whereas increases in government expenditure, lending, interest rate, profit tax, and the 2014 year associated with the decline in global oil prices, exert a statistically negative influence on the financial performance of the aviation sector in Southeast Asia region. The effect of changes in oil prices and population growth, 2015–2016 years as the continuation of global oil prices decreases, is statistically insignificant. The paper contributes to the understanding of important economic factors affecting the financial performance of the aviation industry in Southeast Asian countries in light of the COVID-19 outbreak and for further development of the economic sector.

Keywords: oil prices; airlines; profitability; return on assets; ROA; panel corrected standard error; PCSE; panel data.

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1 Introduction

The aviation industry helps in globalisation as it serves as the critical mean of international travel. For tourist countries, it is one of the main revenue streams contributing to overall gross domestic product (GDP) growth. Southeast Asia's aviation industry experiences a huge boom in population growth alongside digitalisation and globalisation, leading aviation to be the most preferred mode of transportation. The region includes Brunei, Cambodia, East Timor, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam. This region is often referred to as the Association of Southeast Asian Nations (ASEAN). However, the market is mostly dominated by foreign players such as the Boeing Company, Airbus SE, Lockheed Martin Corporation, Rostec, and Textron Inc., leaving room for market penetration by domestic investors. Major local players are Singapore Airlines, AirAsia, Garuda Indonesia and Thai Airways. As to airports, Singapore is considered the regional hub for air travel, and Changi Airport is one of the busiest airports in the world. Other important airports include Soekarno-Hatta International Airport in Jakarta and Suvarnabhumi Airport in Bangkok. During the economic expansion, it is necessary to consider the effects of macroeconomic factors, which are crucial.

Table 1 GDP estimates for 2023

Country	*Goldman Sachs real GDP estimates (percent), 2023*	*Consensus real GDP estimates (percent), 2023*
Singapore	1.5	2.6
Malaysia	4	4.3
Thailand	4	3.9
Indonesia	4.4	4.9
Philippines	5.8	5.7
Vietnam	5.8	6.5

Source: ASEAN Briefing

According to Mordor Intelligence (2022), the market size is expected to grow at a 4.5% CAGR until 2028, achieving 4 billion USD. However, the effect of COVID-19 was significant, reducing the number of commercial flights and leading to an economic

slowdown in this industry. The International Air Transport Association (IATA) expects the restoration of the industry by 2024.

Goldman Sachs predicts real GDP growth given the restoration of global tourism and travelling to pre-pandemic levels since tourism is one of the largest contributors to the economy of the ASEAN (ASEAN Briefing, 2023). Many programmes, such as the digital nomad visa programme in Malaysia and the second home visa scheme in Indonesia, have been launched. Indonesia set a target of 7.4 billion tourists for 2023, which is almost double the amount achieved in 2022.

This study aims to explore to what degree macroeconomic variables influence the profitability of aviation in Southeast Asia. This region has not been studied extensively so far; therefore, this study expects to bring new evidence for the policy makers, regulators, governments, and investors in the region.

The region has been attractive in terms of foreign direct investment (FDI) in recent years since these nations represent alternatives for investors looking to reduce their exposure to China given increasing trade barriers and cheaper production plants (ASEAN Briefing, 2023). Singapore received US $100 billions of FDI in 2021, while Indonesia received US $43 billions of FDI in 2022. FDI is also expected to improve the infrastructure of the aviation industry in the region.

This study employs empirical investigation through the use of the PSCE method, accounting for autocorrelation, heteroscedasticity, multicollinearity, and stationarity issues, thus validating the model. This study adds value to aviation sector in Southeast Asian countries.

2 Literature review

The profitability determinants have been studied for various industries, including aviation, around the globe, including both developed and developing countries. However, the Southeast Asia region (including Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam) has not been studied extensively, and most of existing studies ignores the multicollinearity, heteroscedasticity, autocorrelation, and endogeneity issues.

Based on numerous studies, the profitability of the aviation industry is positively impacted by fuel cost (Abebe, 2017), growth opportunities, asset structure (Kiracı, 2020), firm size, working capital, and liquidity (Alahyari, 2014), while negatively impacted by the tangibility of assets, lease cost, financial leverage and inventory turnover (Yildirim et al., 2021).

A study by Horobet et al. (2022) revealed that oil price has significantly negative impact on airlines' stock prices and is coupled with US dollar exposure. According to Yun and Yoon (2019), crude oil prices and airlines' stock prices experience a spillover return and volatility effect. The stock prices of airlines in South Korea and China are significantly impacted by the oil prices compared to transportation industry. In addition, airlines in China are more sensitive to changes in fuel prices compared to South Korea, concluding that the spillover effect is mostly influenced by the differences in the airline markets of these countries. Based on the study of Mollick and Amin (2021), the oil price becomes more important in the determination of profitability with asymmetry (moving up rather than down). Ranasinghe et al. (2022) reported that one way to deal with the oil price increase is to engage in financial hedging and decrease exposure.

The aviation industry is also susceptible to aggregate demand and precautionary demand shocks, leading to increases in oil and jet fuel prices, while supply shocks do not exert significant influence (Atems, 2021). Nevertheless, jet fuel demand and supply shocks cause the US jet fuel price to rise significantly, whereas jet fuel shocks (either demand or supply) have no significant effect on it. It was concluded that jet fuel demand shocks positively impact the US airline industry and jet fuel supply shocks are negative in general. The oil price uncertainty significantly affects the corporate social responsibility (CSR) (Arslan, 2020a; Phan et al., 2021).

As far as the UK and the USA are concerned, capital adequacy, capital structure, management efficiency, and corporate tax rate exert significant influence on the profitability of airlines (Faizulayev et al., 2022).

Scholars also argued that profitability also depends on operational factors such as better utilisation of resources, cut-off expenses, the quality of management functions in the products, customer services, comply with labour laws, goodwill, operations strategy, productivity, service measures and market share (Arslan, 2020b; Angayarkanni and Raja, 2015; Mantin and Wang, 2012). Zuidberg (2017) concluded that traffic routes, business model, and tourism season are significant to the determination of profitability. Aircraft leasing choice is another significant determinant of the airline sector's financial performance (Bourjade et al., 2017). It was also reported that the participation in code-sharing and global alliances increase profit margins in the airline industry with the tendency to increase with increases in the proportion of code-sharing partners in the same alliance (Zou and Chen, 2017). In the USA, the profitability of aviation mostly depends on intensified security measures after 9/11 (Mantin and Wang, 2012). However, CSR activities do not significantly influence the financial performance of the airline sector since they are not considered to be value-added in this market given the high sensitivity to prices and competition (Orazayeva and Arslan, 2022).

It was also revealed that global decrease in oil prices cause profitability to fall (Horobet et al., 2022) together with the exchange rate, annual average lending rate, and annual average inflation (Mwangi, 2013), whereas it is positively influenced by GDP growth rate and annual change in M3 money supply. In addition, growth in GDP and inflation generally are expected to have a positive effect on the profitability of aviation industry, and this relationship was tested positively for banks (Mwangi, 2013). It is also worth noting that pandemic outbreaks have a significant negative effect on the aviation industry among others (Orazayeva et al., 2023), and government support was crucial during that time, which is in line with Keynesian economics theory (Blinder, 2008).

The effect of the COVID-19 pandemic on the airline sector is still significant. Overall, the net loss was estimated to be $118 billion in 2020 and $38 billion in 2021 (IATA, 2020). It calls for the sector to implement capacity adjustments and request government support measures (Suk and Kim, 2021). In addition to that, the airlines tended to shift their focus to the cargo transportation of critical commodities such as medicines and medical equipment, given the restrictions on commercial flights. The most common responses of the airlines were fleet rationalisation, reduction in staff numbers, reconfiguration of network and capacity, and changes to flight operations (Budd et al., 2020). Despite these measures, government support is essential for the sector to recover to pre-pandemic levels. It is evident that the profitability of aviation can be impacted by many factors, including both macroeconomic and firm specific. However, we only considered the macroeconomic factors in this study.

3 Keynesian economics theory

According to Keynesian economics theory, government expenditure affects output, inflation and employment. In other words, government intervention in the economy by increasing spending and decreasing taxes is a way of stabilising it and can increase corporate profits, including in the aviation industry (Blinder, 2008).

3.1 Dependent variable

The goal of a firm under the traditional firm theory and David Ricardo's view is to maximise shareholder wealth, which is achieved mainly by increasing the profit. Various metrics can be selected to assess the company's profitability such as return on asset, return on equity and Tobin's Q (Arslan and Alqatan, 2020). For this study, return on assets (ROA) metrics is selected as a dependent variable that was previously used by Alahyari (2014). This metric measures how well a company uses its assets to generate income, which is especially applicable in the airline industry since airbuses are its main assets used for generating profits.

3.2 Independent variables

3.2.1 Macroeconomic determinants

- *Oil price change:* The oil price and its volatility are found to have a significant negative exposure on the airlines' stock returns and profitability (Abebe, 2017; Horobet et al., 2022). In other words, the increase in oil prices increases the cost of sales incurred by the aviation industry per flight, thus reducing net profit and cash flows.
- *Government expenditure:* Based on Keynesian economics theory (Blinder, 2008), government expenditure positively affects the output of the economy, including aviation industry. However, the study conducted by Hrubý (2021) revealed that government support reduced the probability of default for aviation companies in the post-pandemic period, whereas it had a minimal effect on profitability.
- *Population growth:* The relationship between population growth and the profitability of aviation has not been studied so far, but it is expected to have a positive impact since population growth would increase the demand and total number of flights both inside and outside the country.
- *Lending interest rate:* Based on the study of Mwangi (2013), the lending interest rate has an insignificant negative impact on the profitability of aviation since the high interest rate increases the finance costs, thus reducing the net profit and cash flows of aviation firms.
- *Inflation:* Inflation allows the aviation industry to adjust its prices, thus earning a higher profit. However, the effect is found to be insignificant (Mwangi, 2013).
- *Profit tax:* Based on Keynesian economics theory (Blinder, 2008), the tax on operating profit negatively affects the output of the economy, including aviation, by increasing the amount of tax to be paid to the budget, which negatively affects the

net profit and cash flows of the aviation industry. The study conducted by Faizulayev et al. (2022) supports this argument.

- *Time dummies 2014–2016:* The oil price declined by around 120% ($50 per barrel in January 2015 compared to $110 in July 2014) during 2014–2016 due to higher supply relative to demand as a result of increased production from the USA and Organization of the Petroleum Exporting Countries (OPEC) (especially Saudi Arabia), which is expected to have a positive influence on the profitability of the aviation industry since it decreases the cost of each flight.

3.3 Hypotheses of the study

Based on the existing literature, the following hypotheses are developed:

H1 Oil price changes have a significant negative influence on the profitability of aviation firms in Southeast Asia.

H2 Government expenditure has an insignificant positive influence on the profitability of aviation firms in Southeast Asia.

H3 Population growth has an insignificant positive influence on the profitability of aviation firms in Southeast Asia.

H4 The lending interest rate has an insignificant negative influence on the profitability of aviation firms in Southeast Asia.

H5 Inflation has an insignificant positive influence on the profitability of aviation firms in Southeast Asia.

H6 Profit tax has a significant negative influence on the profitability of aviation firms in Southeast Asia.

H7 Time dummies have a significant positive influence on the profitability of aviation firms in Southeast Asia.

4 Data and methodology

4.1 Data

The study used financial statements of aviation companies in Southeast Asia as well as data gathered from Orbis Data Stream and the World Bank for a period of nine years (i.e., 2011 to 2019). We have collected the data for all 13 airlines in these regions to run regression analysis on panel data. An econometric model with panel data was setup to explore statistically the relationship between ROA and the macroeconomic factors.

4.2 Methodology

Firstly, the data was converted to panel data for further analysis. The data was analysed using Stata software. Secondly, descriptive statistics were performed to learn the attributes of the data. Multicollinearity, autocorrelation, and heteroscedasticity tests were performed to check whether the data can be relied upon. The panel corrected standard

errors (PCSE) regression model was then employed to run the regression to account for heteroscedasticity and autocorrelation issues. The PCSE model (*TN*) was selected since ten variables were used (*N*) over nine years (*T*). The regression model is as follows:

$$ROE = \beta_0 + \beta_1(OPC) + \beta_2(GOVEX) + \beta_3(PG) + \beta_4(LIR) + \beta_5(DTI) + \beta_6(INFL) + \beta_7(PT) + \beta_8(2014) + \beta_9(2015) + \beta_{10}(2016) + \varepsilon$$

where

OPC	oil price change (%)
GOVEX	government expenditure (ln)
PG	population growth (annual %)
LIR	lending interest rate (%)
INFL	inflation, GDP deflator (annual %)
PT	profit tax (% of commercial profits)
2014–2016	time dummies
ε	error.

5 Empirical findings

5.1 Descriptive statistics

Table 2 presents the results of descriptive statistics such as the number of observations, and the mean, the minimum, maximum, and standard deviation of the dependent and independent variables for the selected companies within the Southeast Asia region. Most importantly, it provides information on the location measured by the mean and the variability of a variable measured by the standard deviation.

Table 2 Results of descriptive statistics

Variable	*Number of observations*	*Mean*	*Standard deviation*	*Min.*	*Max.*
ROA	94	0.426	7.771	(29.593)	16.730
Oil PC, %	95	0.005	0.25	(0.471)	0.40
GOVEX	95	0.713	0.905	(0.270)	2.24
Pop-n growth, %	95	1.115	0.508	0.089	2.453
LIR	95	6.951	2.969	4.084	16.954
Infl-n	95	2.496	2.727	(1.719)	21.42
PT	91	15.453	8.556	-	29.5
Y2014	95	0.116	0.322	-	1
Y2015	95	0.116	0.322	-	1
Y2016	95	0.105	0.309	-	1

Table 3 Multicollinearity test

	ROA	*Oil PC, %*	*GOVE-X*	*Pop-n growth, %*	*LIR*	*Infl-n*	*PT*	*Y2014*	*Y2015*	*Y2016*
ROA	1.0000	-	-	-	-	-	-	-	-	-
Oil PC, %	(0.0162)	1.0000	-	-	-	-	-	-	-	-
GOVEX	(0.2393)	(0.0164)	1.0000	-	-	-	-	-	-	-
Pop-n growth, %	(0.0331)	0.0648	0.2237	1.0000	-	-	-	-	-	-
LIR	(0.0017)	(0.0498)	(0.5021)	0.1243	1.0000	-	-	-	-	-
Infl-n	0.1188	0.0953	(0.3774)	(0.1231)	0.6449	1.0000	-	-	-	-
PT	0.1293	(0.0225)	(0.8089)	(0.2716)	0.1217	0.1763	1.0000	-	-	-
Y2014	(0.0889)	(0.1263)	0.0413	0.0354	0.0043	(0.0171)	(0.0132)	1.0000	-	-
Y2015	0.0079	(0.7016)	0.0240	(0.0009)	(0.0180)	(0.0936)	(0.0144)	(0.1392)	1.0000	-
Y2016	0.0675	(0.2293)	(0.0296)	(0.0053)	(0.0294)	(0.0817)	0.0646	(0.1319)	(0.1319)	1.0000

Based on the results of Table 2, the mean ROA is 4.2% with a variability of 7.707, which means there is high volatility, meaning the profitability of aviation companies in Southeast Asia is highly volatile. As to independent variables, oil price change, government expenditure, and inflation are also highly volatile, with their standard deviations higher than their mean values.

5.2 Multicollinearity

For an econometric model to be reliable, it should be free from the high correlation between the variables. This is important since one independent variable may affect another, which leads to skewed results.

To test the model for the multicollinearity issue, the variance inflation factor (VIF) function was employed.

Based on the results of the multicollinearity test, there is no correlation issue given a 10% significance level; however, government expenditure has a medium correlation issue, which can be accepted, but its level of correlation should be taken into account. The average mean VIF is 2.88, meaning the multicollinearity issue is under control in this model. Time dummies for 2014–2016 were introduced to separate the effects of a decline in global oil prices.

5.3 Autocorrelation

Autocorrelation is similar to the correlation issue discussed above; however, it differs in the way that it measures the relationship between a variable's current and past values. This should also be under control for the results not to be skewed and the error terms not to be correlated with each other.

Since the P-value is less than 1% level of significance, leading to the conclusion that there is strong evidence of autocorrelation absence.

5.4 Stationarity

The stationarity of a variable indicates that the values do not change due to variations in time. Before building an econometric model, it is necessary to check whether a variable is stationary or not. For this purpose, a unit root test called the Fisher-type test was conducted. Fisher-type was selected since the dataset is unbalanced and this should be accounted for.

Based on the results, all variables are stationary since they are lower than the 10% and 5% levels of significance and the null hypothesis is rejected; thus, they can be used for further analysis.

5.5 Heteroscedasticity

Heteroscedasticity refers to the error term not being normally distributed, which means the residual unobserved variables have high variability. If this issue is present, it can be concluded that the results are biased.

As prob. > chi2 is 0.9898, the null hypothesis is not rejected; thus, there is no heteroscedasticity.

Table 4 Results of VIF

Variable	*VIF*	*1 / VIF*
GOVEX	5.97	0.167533
PT	4.42	0.226321
LIR	3.26	0.307033
Oil PC, %	3.25	0.307795
Y2015	3.06	0.326962
Infl-n	1.94	0.515896
Y2016	1.50	0.668784
Y2014	1.30	0.768727
Pop-n growth, %	1.23	0.813923
Mean VIF	*2.88*	

Table 5 Results of autocorrelation

F(1, 11)	32.95
Prob. > F	0.0001

Table 6 Results of the Fisher test

P-value	*ROA*	*Oil price change*	*GOVEX*	*Population growth*	*Lending interest rate*	*Inflation*	*Profit tax*
Inverse chi-squared	0.0012	0.0155	0.0015	0.0476	0	0.0025	0.0385
Inverse normal	0.0011	0.0022	0.0012	0.0085	0	0.0004	0.0204
Inverse logit t	0.001	0.0052	0.0013	0.0164	0	0.001	0.0269
Modified inv. chi-squared	0	0.0047	0	0.0312	0	0.0001	0.0205

Table 7 Heteroscedasticity test

LR chi2 (104)	73.86
Prob. > chi2	0.9889

5.6 Regression results

As stated previously, the PCSE model was conducted to account for heteroscedasticity and autocorrelation issues since ten variables (*N*) were used over nine years (*T*).

R-squared is a statistical measure that indicates the percentage of how much the dependent variable is explained by the independent variables selected and whether the data fits the model. In this case, the result of 0.1836 means that 18% of changes in ROA are explained by changes in independent variables. The F-test is prob. > chi2, which is 0, meaning it is significant, which in turn means the whole model is best fitted or statistically validated and can be relied upon.

Table 8 Regression analysis

ROA	*Coef.*	*PCSE*	*z*	*P > [z]*	*[95 conf.*	*Interval]*
Oil PC, %	(5.154439)	3.363516	(1.53)	0.125	(11.74661)	1.43774
GOVEX	(7.722107)	1.555245	(4.97)	-	(10.77033)	(4.67388)
Pop-n growth, %	(0.950335)	1.352475	(0.07)	0.994	(2.74584)	2.55577
LIR	(1.190454)	0.312405	(3.81)	-	(1.80276)	(0.57815)
Infl-n	0.411417	0.182408	2.26	0.024	0.53904	0.76893
PT	(0.468947)	(0.022500)	(3.02)	0.002	(0.77284)	(0.16506)
Y2014	(1.748515)	0.654746	(2.67)	0.008	(3.03179)	(0.46524)
Y2015	(2.566694)	1.989006	(1.29)	0.197	(6.46507)	1.33169
Y2016	(0.332627)	1.441015	(0.23)	0.817	(3.15696)	2.49171
Cons	19.5774	3.916130	5.00	-	11.90192	27.25287
Rhos	(0.343023)	1	0.855786	0.464057	0.738684	0.198712
Estimated covariances		91	Min.		2	
Estimated autocorrelations		13	Avg.		6.9230769	
Estimated coefficients		10	Max.		9	
Number of obs.		90	R-squared		0.1836	
Number of groups		13	Wald chi2 (8) prob. > chi2		416.17	

The $P > [z]$ column is used to find out whether each independent variable exerts significant influence on the dependent variable, which is ROA. $P > [z]$ is used instead of the T-test here. Detailed explanations of each variable are provided below:

- *Constant variable:* Ceteris paribus, or all other things being equal, a 1% increase in the constant variable will increase the profitability of aviation in Southeast Asia by 19.57%, which is statistically significant. This implies that the average value of a dependent variable is 19.57% when all the independent variables are set to zero. Oil price change, population growth, and time dummies for 2015–2016 are statistically insignificant, and therefore, do not exert a significant influence on profitability.
- *Government expenditure:* A 1% increase in government expenditure will decrease profitability by 7.72%. This observation can be explained by the fact that increased government spending reduces private investments and sustainable economic growth. In addition to that, the government just reallocates resources from one party to another, and this intervention into the free economic market can disturb the work performed by the invisible hand introduced by Adam Smith. This is a controversial issue since the effect of government expenditure could be both positive and negative given various circumstances; however, it is observed to be negative for Southeast Asia from 2011–2019. This finding is inconsistent with the Keynesian economics theory, which states that government expenditure boots the output of the economy, and the hypothesis of a positive effect is rejected. However, it can be positive, as shown in the study conducted by Hrubý (2021), where he found out that government expenditure is highly important during the post-pandemic period, decreasing the probability of default in the aviation industry. As a potential topic for further

research, the effect of government support during the post-pandemic period or crisis can be researched.

- *Lending interest rate:* A 1% increase in the lending interest rate will decrease the profitability by 0.95%. The increased lending rate increases the cost of debt in aviation, leading to increased interest repayments. Additionally, it increases the weighted average cost of capital for aviation firms, resulting in an increased discount rate that is unfavourable. This is consistent with the hypothesis and the study of Mwangi (2013), where he states that increased finance charges decrease both the net profit and cash flow. Nevertheless, the increased finance costs provide a tax shield for the companies since they reduce profit before tax (PBT), resulting in lower amounts of tax to be paid to the budget.
- *Inflation:* A 1% increase in inflation will increase profitability by 0.41%, which is in line with the hypothesis. Although the overall prices of both services and goods increase in the economy, this allows the aviation companies to adjust their prices either in line with inflation or higher to earn a higher margin. This observation was also confirmed by the study of Mwangi (2013), where the positive effect of inflation on the profitability of aviation was revealed.
- *Profit tax:* A 1% increase in profit tax will decrease profitability by 0.46%, which is in line with the hypothesis. This decreases the tax burden levied on the taxpayers, resulting in higher profit after tax and saved cash flows. These saved cash flows could be used for reinvestment into the business, boosting its future performance, or distributed among the shareholders. Keynesian economics theory (Blinder, 2008) supports this result since such fiscal policy, by reducing tax rates, stimulates the economy. The study of Faizulayev et al. (2022) also supports this.
- *Time dummies:* Time dummy 2014 exerted a statistically significant negative influence on profitability by decreasing it by 1.74% during 2014. It was the beginning of the decline in global oil prices, mainly due to logistics issues and the supply being higher than demand given increased extraction from the side of OPEC and Saudi Arabia; however, the hypothesis was that it would positively influence the aviation industry by decreasing their costs on fuel. Nevertheless, the effect is negative since most of the Asian countries engaged in derivative contracts by hedging the risk and locking in the price given their sensitivity to changes in the oil price and foreign exchange rate, thus incurring losses on their positions during that time.

6 Discussion

The PSCE regression results revealed that the profitability of the airline sector in Southeast Asia during 2011–2019 depended by 18% on the macroeconomic variables tested. Oil price change, population growth, and the time dummy 2015–2016 are not significant as per the model and do not exert significant influence on the dependent variable. The following conclusions can be drawn based on the model:

- Increased government expenditure reduces profitability.
- An increase in the lending interest rate reduces profitability.

- An increase in inflation boosts profitability.
- An increase in profit tax decreases profitability.
- 2014 is the year associated with a global oil price decrease, which reduces profitability.

This implies that the government authorities should gradually decrease government expenditure in the airline sector by letting it grow sustainably and attracting private investments, including FDI. It is also important to stimulate banks by offering differentiated interest rates to the aviation industry or subsidising a part of it, maintaining a balance between monetary and fiscal policies to keep inflation sustainable and considering tax incentives for the aviation sector to maximise its contribution to GDP growth.

It is proposed to research the impact of the global oil decrease during 2014–2016 for Southeast Asia deeper by dividing the countries into groups such as oil-exporting countries, oil importers, and countries with low oil consumption to see the separate effects given individual characteristics of the countries and explore specifically the impact on the balance of payments, exchange rate, inflation, and fuel subsidies implemented.

7 Conclusions, recommendations, limitations and future research directions

7.1 Conclusions

The influence of macroeconomic variables such as oil price change, government expenditure, population growth, the lending interest rate, inflation, profit tax, and the decline in global oil prices from 2014 to 2016 on the profitability of the aviation industry in Southeast Asia for the period from 2011 to 2019 has been studied. Orbis Data Stream and the World Bank were the sources where the data for 13 companies were obtained for building the pooled dataset. The primary advantage of this study is that autocorrelation, stationarity, heteroscedasticity, and multicollinearity tests are performed, adding value to the reliability of the econometric model used.

The results of the PSCE model showed that government expenditure, lending interest rate, and profit tax have a statistically significant negative influence on the profitability of airlines in Southeast Asia, while inflation positively affects profitability. The 2014 year exerted a significant negative influence, while oil price change, population growth, and the 2015–2016 years are statistically insignificant, and thus, do not exert an influence on the income of the airline industry.

Government authorities and policymakers could use these results to boost and plan for the airline sector in their countries. Moreover, it is expected to be beneficial for investors and external users since it provides a deeper understanding of the industry and its relationship with the macroeconomic variables studied.

7.2 Recommendations

Policymakers can use the results for further analysis and decision-making processes. Based on the results, it is recommended to lower government expenditure so that private investments are made in a higher proportion, leading to sustainable economic growth. The government should stimulate banks to set differentiated lending interest rates based on each industry's current financial health. It is crucial to offer lower interest rates to the aviation industry so that its profitability boosts and it pays higher amounts of taxes by subsidising its loans. The government should keep inflation under control by maintaining a sustainable growth level to achieve overall economic benefits. If inflation becomes uncontrollable, the Central Bank should intervene. Companies may reconsider their use of derivatives by using more flexible instruments in the event of volatility in oil prices. The government may provide tax subsidies.

7.3 Limitations and future research directions of the study

This study has its drawbacks, as any study does. First of all, the period from 2011 to 2019 is selected without the most up-to-date information. Secondly, more macroeconomic variables could be used, and firm-specific factors should be studied as well. In addition to that, the statistical and financial information for Southeast Asia is scarce, with time lags and some data omitted. Future research can be conducted with an updated date and a longer period. Future research can also be expanded to other regions or countries, and more variables can be added.

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