

Original Paper

Relationship between Fuel Price Volatility with Earnings
Management in African Airlines: The Perspective of Real
Activities Earnings Management

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Abstract

This study examines data from the COMPUSTAT database, and annual reports for the period from 2002Q1 to 2018Q4 in African Airlines. The results show that fuel price volatility positively influenced real earnings management such as cash flow from operations and discretionary expenditures. In addition, fuel price volatility also positively to real earnings management such as product costs (but this variable is non-significant).

Keywords

oil price, airline, African, earnings, African enterprise

1. Introduction

Compared with firms in traditional industries, those in the airlines industry typically need to predict **fuel cost** through their strategies. Thus, **fuel price** plays a lead role in strategic decisions. Furthermore, **fuel cost** is deducted as an expense from the fiscal year's earnings; therefore, they can have an instantaneous effect on the level of earnings. First, managers can perform earnings management based on real operating decisions (referred to as real-based earnings management ; REM). Empirical studies have examined the effects of manipulate real activities on a firm's earnings management such as cash flow from operations, production costs, discretionary expenditure (Roychowdhury, 2006; Gunny, 2010), R&D expenditure (Seybert, 2010), and sales manipulation (Ge & Kim, 2014; Stubben, 2010). Second, IATA's (1992) also showed that airline managers can exercise discretion over six choices for unrealized foreign-exchange differences, frequent-flyer liabilities, fleet depreciation, revenue recognition, maintenance costs, and lease to attain the desired level of earning This method measures

discretionary items by examining airlines -specific characteristics.

Because earnings is also an incentive for managers of airline companies. Previous studies analyzed manipulate earnings in the airline industry (Tan et al., 2002; Baik et al., 2011; Jorissen & Otley, 2010). However, these studies have adopted only the certain factors to predict earnings management in airlines, which does not provide an overview of fuel price volatility. Furthermore, these studies have not adopted the African airlines to predict this relationship, which does not provide a comprehensive overview of African listed airlines. Therefore, in this study, we employ the fuel price volatility to predict airlines earnings management. We adopted cash flow from operations, product costs and discretionary expenses to measure earnings manipulation and West Texas Intermediate, Brent oil and Dubai oil to measure fuel price volatility. These findings provide evidence regarding how airlines behave after manipulating the financial data to reflect fuel cost and highlights the difference between these firms.

2. Literature Review

2.1 Motivations and Earnings Management

Empirical studies have examined the motivations underlying real earnings management include several factors such as corporate governance (Hadani et al., 2011; Krishnan et al., 2011; Mard & Marsat, 2012; Hsieh & Wu, 2012; Sun et al., 2013; Badolato et al., 2014; Hsieh et al., 2014; Shawver & Clements, 2015; Francis et al., 2016; Obigbemi et al., 2016; Shayan-Nia et al., 2017; Gao et al., 2018; Goel, 2018; Lel, 2019; Buchholz et al., 2020; Jang & Lee, 2022; Amin & Cumming, 2021; Fan et al., 2021), corporate social responsibility (Hong & Andersen, 2011; Martinez-Ferrero et al., 2015; Gras-Gil et al., 2016; Kim et al., 2019); executive compensation (Lee et al., 2011; Hossain & Monroe, 2015; Holderness et al., 2019); financial distress (Campa & Camacho-Minano, 2012; Li et al., 2020); regulation (Hu et al., 2012;); geographic area (Nam et al., 2012; Shi et al., 2015) ; profitability (Wang & Lin, 2013); stock markets or investors (Simpson, 2013; Fung et al., 2013; Sawicki & Shrestha, 2014); financial reporting (Doukakis, 2014; Sohn, 2016; Kim et al., 2019) ; executive gender (Duong & Evans, 2016; Rennekamp et al., 2020); environment (Zhu et al., 2017), financing (Kim et al., 2017; Wang et al., 2018); R&D activities (Dumas, 2017), finance (Wasiuzzaman, 2018); internal control (Heninger et al., 2018); policy uncertainty (Yung & Root , 2019); ethical (Viana et al., 2022); religion (Grabinski & Wojtowicz, 2022).

Hadani et al., (2011) investigated the effect of shareholder activism (as expressed by the proxy proposals sponsored by shareholders), and monitored by the largest institutional owner on earnings management. They indicated that the number of shareholder proposals received by firms is positively related to subsequent earnings management, yet concurrently, monitoring by the largest institutional owners is negatively related to earnings management. Krishnan et al., (2011) examined the relation between CFO/CEO-board social ties and earnings management over the 2000-2007 time period and

suggested a positive relation between CFO/CEO-board social ties and earnings management. Mard and Marsat (2012) examined the link between ownership structure and earnings management among French companies. They find that ownership concentration has negatively relationship with earnings management until a certain threshold, and positively over the threshold (curvilinear relationship) and the fraction owned by the second shareholder seems to be negatively associated with earnings management. Hsieh and Wu (2012) investigate: whether the borrowers accrual-based earnings management behavior is more negatively associated with the magnitude of their bank loans after the government strengthens the monitoring on banks, and whether the enhanced supervision is more effective for firms controlled by the state, the major economic player in most emerging markets. They found that borrowers earnings management behavior becomes more negatively associated with loan size after the reform. The association is more significant for state-owned borrowers and lenders. Overall, the findings suggest that such reform is effective in enhancing banks role in corporate governance in a transition economy. Sun et al., (2013) investigate the effect of shareholder activism on earnings management. Using a US sample of shareholder pay-for-performance proposals sponsored by institutional investors and find that when compared to control firms, firms targeted by shareholder proposals have a greater magnitude of Discretionary Accruals (DA) in their reported earnings. In addition, they also find that the likelihood of meeting or beating earnings benchmarks through the use of DA is higher for targeted firms whose managers have job security concerns due to the firms' inferior stock performance in the past or have plans to sell company stock. Their results are consistent with the notion that pay-for-performance proposals have unintended consequences by introducing or exacerbating incentives to manage earnings for short-term gains. Badolato et al., (2014) find that audit committees with both financial expertise and high relative status are associated with lower levels of earnings management, as measured by accounting irregularities and abnormal accruals. Their results speak to benefits and limitations of financial expertise, which have been the focus of considerable debate. Hsieh et al., (2014) showed that before the Sarbanes Oxley Act of 2002 (SOX), companies of overconfident CEOs were more likely than other CEOs to engage in managing earnings through accelerating the timing of cash flow from operations and achieving analyst forecast benchmarks. After SOX, they find that overconfident CEOs are more likely to have income-increasing discretionary accruals and remain more likely to engage in real activities management through abnormally high cash flows, and also have abnormally low discretionary expenses. These results are consistent with overconfident CEOs feeling less constrained by SOX, and suggest that this individual characteristic works against regulators' attempts to constrain earnings management by corporate executives. Shawver and Clements (2015) found that there are no significant differences between male and female professional accountants when they make an ethical evaluation involving earnings management by shipping product early to meet a quarterly bonus and male and female professional accountants made similar moral intensity evaluations when product is shipped early to meet a quarterly bonus. Francis et

al., (2016) investigated how firms' Real-activities-based earnings Management (RM) varies with the strength of a country's legal environment and reveal that RM increases with country-level legal strength, however the paper also reports that stronger legal system discourages Accrual-based earnings Management (AM). The overall evidence strongly suggests that legal environment plays a crucial role in firm's choice of earning management technique. Obigbemi et al., (2016) evaluated the role board structure plays in curtailing earnings management practices in Nigerian companies. In addition, earnings management was measured using the magnitude of the discretionary accruals as estimated by the performance matched modified Jones model. They showed that there is a negative significant relationship between board size, gender, and board composition with earnings management; a positive significant relationship between board meeting and earnings management practices and a positive non-significant relationship between the presence of a remuneration committee and the dualization of CEO and chairman positions with earnings management practices. Shayan-Nia et al., (2017) used a sample of 1180 firm-year observations of financially distressed companies, over the investigation period 2001-2011 and suggest that the degree of real earnings management is not associated with ownership by management or institutional investors. Conversely, the evidence indicates that foreign shareholders are able to constrain upwards real earnings management related to discretionary expenditure but not the operating cycle. A contribute to the importance of diversity of ownership structures in monitoring income manipulation among firms. Gao et al., (2018) tested exploit U.S. state courts' staggered recognition of the Inevitable Disclosure Doctrine (IDD), which reduces employees' ability to switch employers and found a significant decrease in upward earnings management for firms headquartered in states that recognize the IDD, relative to firms headquartered elsewhere. The effect of the IDD is stronger for firms relying more on human capital and for firms whose employees have higher ex-ante turnover likelihood, confirming the employee retention channel. Overall, their results support the view that retaining employees is an important motive for corporate earnings management. Goel (2018) analyzed the EM practices (i.e., DeAngelo model) of corporate enterprises in India about multi-nationality, reputation and related determinants. Their results show that multi-nationality is the driving force for EM and significantly affects the accounting choices of management in the sample units. The firm's reputation and other related determinants, except size, vary with accruals. The earnings behavior of the corporate is influenced by other factors, like growth and leverage as well. Lel (2019) investigates the role of Foreign Institutional Investors (FIIs) in restraining earnings management activities of firms under varying levels of investor protection. Their results find firms manage their earnings less when independent FIIs are among their shareholders, especially for firms in which monitoring is more valuable - firms in weak investor protection countries and when firms have greater growth opportunities. Buchholz et al., (2020) showed that highly narcissistic CEOs engaging in accrual-based earnings management and not only for income-increasing but also for income-decreasing. The results imply that highly narcissistic CEOs' accounting choices are driven by self-serving behavior

rather than by the intention to provide additional information to the market. Jang and Lee (2022) found that when overall earnings management motives are held fixed, firms in which long-term investors hold large stakes are more likely to manage earnings by adjusting operational decisions than by manipulating accruals. The preference for real earnings management is more pronounced when long-term investors face performance pressures and when they have a strong influence on managers. Overall, their evidence suggests that firms choose earnings management methods to meet the earnings expectations of institutional investors, who have different earnings target windows. Amin & Cumming (2021) examine the mechanisms through which block holders engage with the managers to manipulate corporate earnings and show that powerful family blockholders develop a coalition to manipulate the board strategic decision making in their favour which leads to a higher level of REM. They also investigate the extent to which country-level institutional and regulatory arrangements influence the block holders ability to mitigate REM and find that the higher quality institutional and regulatory arrangements endogenously determine the better corporate financial reporting which effectively mitigates the REM. Fan et al., (2021) examine the causal effects of corporate governance on earnings management using shareholder-sponsored proposals that pass or fail by a small margin of votes in annual shareholder meetings. They find that firms whose shareholder proposals pass the threshold by a small margin exhibit a significantly lower level of earnings management (they used the propensity to just meet or beat analysts' forecasts by one cent as a proxy for earnings management).

Hong and Andersen (2011) explored the relationship between Corporate Social Responsibility (CSR) and Earnings Management (EM). CSR index is measured by community, corporate governance, diversity, the product, employee relations, the environment, and human rights. Their results showed that more socially responsible firms have higher quality accruals and less activity-based EM, both of which impact financial reporting quality. Martinez-Ferrero et al., (2015) used of the GMM method for an international sample of 1960 international listed non-financial companies from 26 countries for the period 2002 to 2010 highlights the existence of an inverse bi-directional relationship between CSR and EM through discretionary accruals. It implies CSR as a result of their greater stakeholder protection and also in countries with greater investor protection. Gras-Gil et al., (2016) found a negative impact of corporate social responsibility practices on earnings management. Their results show that corporate social responsibility practices may be an organizational device that leads to more effective use of resources, which then has a negative impact on earnings management practices. Kim et al., (2019) examined the relationship between Chinese firms' Corporate Social Responsibility (CSR) and their Earnings Management (EM) practices and measure the level of EM using accrual-based EM and real activity-based EM. Their results showed that Chinese firms' enhanced CSR generally decreases their EM practices. On the contrary, state-controlled firms and firms operating in more institutionally developed regions are more likely to engage in REM, while increasing their CSR activities.

Lee et al., (2011) examine higher values and price incentives for executive stock options were associated with higher earnings management when executives sell the acquired stocks after exercising the stock options because information asymmetry reinforces the association between both the values and price incentives of exercised executive stock options and earnings management; These results also imply that executives manage firms reported earnings to maximize their own gains around stock option exercises. Hossain and Monroe (2015) examined the association between chief financial officers' (CFOs) short (the CFO's cash bonus) and long-term (shares plus options) compensation and discretionary current and non-current accruals. The results show a significant and positive association between CFOs' short-term compensation and the absolute value of discretionary current accruals. Their results also show a significant and positive association between CFOs' long-term compensation and the absolute value of discretionary non-current accruals. Holderness et al., (2019) found that increases in rank and file employees' option-based compensation-our proxy for equity-based compensation-are associated with increases in earnings management and that this relation is attributable to real activities (as opposed to accrual) earnings management. They also explored the role of cash constraints and overvaluation as potential alternative explanations for this relation and find that neither accounts for our results.

Campa and Camacho-Minano (2012) investigate whether the pressure caused by the non-temporary level of financial distress, conditions the choice between real activity and discretionary accrual manipulation and empirical results suggest that firms with higher levels of financial distress show more extensive signs of upward earnings management through real transaction manipulation rather than accruals and vice versa. It imply real activity earnings management is preferred over accruals when managers are under significant levels of "pressure" such as being close to face a bankruptcy procedure, despite its implications for the firm in the long term. Li et al., (2020) investigated how financial distress influences the choice of earnings management methods and how internal control quality moderates the above relation. The empirical results find that financially distressed firms tend to undertake more accrual earnings management and less real earnings management and internal control exerts a moderation effect on the relation between financial distress and earnings management by restraining both accrual and real earnings management.

Hu et al., (2012) detect the effect of government policies on managers' earnings management behavior. They found that policies issued by the China Securities Regulatory Commission (CSRC) can induce managers of listed firms to engage in manipulate earnings management through discretionary accrual to either avoid negative consequences (e.g., delisting) or to meet requirements (e.g., refinancing). Nam et al., (2012) found that firms located in Seoul (the capital city of Korea) or its surrounding metropolitan area (i.e., urban areas) are more likely to manage earnings than firms located in other areas (i.e., rural areas). Discretionary accruals are larger for urban firms than rural firms after controlling for variables that affect the level of accruals. Their findings suggest that due to greater attention from large numbers

of investors and other market participants, urban firms face greater pressure to manipulate earnings to satisfy market expectations. Shi et al., (2015) used a sample of U.S. listed firms in the period from 1994 to 2011, and show that geographically dispersed firms have lower accrual based management but higher real earnings management, when compared to geographically concentrated firms. Wang and Lin (2013) used Taiwanese firms as a sample and showed that higher group profitability reduces its member firms' sensitivity of earnings management to debt levels. Among business groups, earnings management in pyramidal groups is less sensitive to debt levels. They also find that the debt-abnormal accrual curve becomes smoother as group profitability increases when considering the non-monotonic relationship between firm leverage and earnings management. Simpson (2013) analyses reveal that firms whose stock returns co-move more with investor sentiment are more (less) likely to manage earnings upward via abnormal accruals in quarters of higher (lower) sentiment. The findings of managers' strategic use of abnormal accruals show the need for increased attention from boards of directors, auditors and regulators to heightened managerial incentives to overstate earnings and to report optimistic earnings numbers during periods of high investor sentiment. Fung et al., (2013) find that H-shares are associated with higher earnings management than local Hong Kong firms after controlling for disparity in economic development, types of controlling shareholders and other factors. The results are robust after considering the dual-listing status of H-shares and board characteristics. Their results provide direct evidence showing the effect of investor legal protection on financial reporting quality. Sawicki and Shrestha (2014) investigate the incentives that mis-valuation creates for: (1) insider trading; and (2) concurrent earnings management through both accruals and real activities. They indicate that managers of both over- and under-valued firms act opportunistically, managing earnings upward (downward) with accruals while selling (buying) shares, however, they do not find evidence of a relationship between managerial trading and real earnings management. Doukakis (2014) suggest that mandatory IFRS adoption had no significant impact on either real or accrual-based earnings management practices. Additional analysis on a sub-sample of firms with relatively strong earnings management incentives supports a dominant role for firm-level reporting incentives over accounting standards in shaping financial reporting quality. Sohn (2016) found that managers' Real Earnings Management (REM) increases whereas their Accrual-based Earnings Management (AEM) decreases with the degree of their firms' accounting comparability with other firms and this opportunistic behavior to "escape" from AEM to REM facing higher accounting comparability is mitigated when firms' information environment and/or audit quality are better. Kim et al., (2019) examine whether the use of XBRL for financial reporting (i.e., interactive data submissions) reduces earnings management during the period of XBRL implementation by the SEC and compare the magnitude of absolute discretionary accruals in the XBRL adoption quarters with that in the non-adopting quarters. Their results show that absolute discretionary accruals decrease significantly from the pre- to the post-XBRL period, suggesting that XBRL adoption constrains earnings

management via discretionary accrual choices. Rennekamp et al., (2020) showed that when reporting is transparent, managers are more likely to use real earnings management relative to accrual earnings management when short selling restrictions are relaxed. This is consistent with the idea that real earnings management activities are more defensible as the result of legitimate operating decisions and are therefore more likely to hold up to scrutiny from short sellers.

Duong and Evans (2016) find female CFOs are more conservative and deliver higher reporting quality compared to male CFOs. They engage substantially less in both accruals based and real-based earnings management than their male counterparts. The difference in behavior of earnings management and in the selected compensation structures between male and female CFOs can be possibly explained by the gender-based difference in personal risk preference. Kim et al., (2017) find that female presence in top management is negatively associated with discretionary accruals, suggesting that gender diversity in senior management deters opportunistic financial reporting even in a highly male-dominant corporate environment and this association is primarily observed in firms with stronger (weaker) female (male) dominance. This finding is consistent with the idea that female executives can exert more influence on corporate decisions in a more female-friendly environment. Zhu et al., (2017) analyzed the influence of the haze-related exogenous events before and after the APEC Conference Blue on earnings management of heavy-polluting enterprises from a new perspective of negative social attention. Their results indicated that heavy-polluting enterprises have stronger preference for downward earnings management, especially in those enterprises that are large in scale, non-state owned, or have a direct relationship with consumers. Kim et al., (2017) find that this evidence is not robust when controlling for firms' tendency to manage earnings upward to avoid reporting earnings declines; only firms with high leverage exhibit a statistically weak tendency to manage earnings to close deficits of pre-managed earnings relative to dividends and they also further report that the decision to cut dividends depends on whether reported earnings fall short of past dividends, but not on earnings management that eliminates a shortfall in pre-managed earnings relative to dividend payments. Overall, their evidence suggests that firms that face dividend constraints are more likely to cut dividends than to manage earnings to avoid dividend cuts.

Wang et al., (2018) examined the impact of external financing activities on earnings management decisions and further explores the role of Enterprise Risk Management (ERM) as a potential moderating factor in this association. They find that managers use both real-activities and accrual-based earnings management when engaging in equity financing activities. In addition, when firms have weaker ERM systems, they also find that managers are less likely to use real-activities earnings management in their equity financing efforts. Overall, their findings suggest that weaker ERM systems can signal poor control mechanisms and attract additional investor scrutiny, thus constraining managers' use of real-activities earnings manipulation to harm long-term firm value. Dumas (2017) examine whether both techniques are used by French firms to meet earnings thresholds (zero earnings

and prior year earnings) and show that R&D spending is capitalized in order to meet these thresholds, and managers reduce R&D in order to meet them. Wasiuzzaman (2018) detected variations in earnings management activity across industries and the possible influence of various industry variables on these variations in Malaysian. Among industry-level variables, capital intensity, volatility and profitability are found to influence aggregate earnings management. However, industry competitiveness and leverage are not able to explain the variations in earnings management across industries. Heninger et al., (2018) examine the relationship between Information Technology-related internal control Material Weaknesses (ITMWs) as reported by public companies between 2004 and 2012, and earnings management. They find a significant positive association between ITMWs and income-increasing abnormal accruals and a positive relation between poor financial condition and material weaknesses in these companies. Yung and Root (2019) use global data to extend the nascent empirical finance literature on policy uncertainty by examining corporate earnings management and find overwhelming evidence that policy uncertainty is associated with earnings management. Firms increase (decrease) Earnings Management (EM) when policy uncertainty is high (low). Their results also show that uncertainty induced earnings management is not influenced by national culture or other country-level institutional characteristics. Further, they find that policy uncertainty induced earnings management harms firm value. It implies that low-quality financial reporting impairs firm value. Viana et al., (2022) examine the association between country-level ethical judgement and earnings management and collect 45,889 firm-year observations from 34 countries between 1998 and 2018. Their empirical findings suggest that firms from countries where ethically suspect behaviours are less acceptable are associated with lower levels of accruals-based earnings management. Grabinski and Wojtowicz (2022) investigate the impact the Catholic religion has on earnings management and find that Catholicism positively (negatively) influences the level of accrual (real) earnings management, or a firm's preferred earnings management strategy depends heavily on the values shared by the national community.

Compared to other industries, Eldenburg et al., (2011) examined a sample of California nonprofit hospitals based on their earnings management incentives and found that expenditures on non-operating and non-revenue-generating activities appear to decrease in hospitals with incentives to engage in such behavior, while core patient care activities remain unchanged. They also found evidence of earnings management in non-core operational expenses and hospitals with stronger performance incentives exhibit a significant incremental decrease in expenditures. Overall, their results provide evidence of the use of real operating decisions to manage earning in nonprofit hospitals. Gim et al., (2019) investigated whether franchising as a firm characteristic causes any meaningful differences in the earnings management behavior of restaurant firms. The results show that during the growth phase, franchise restaurants engage more actively in earnings management than non-franchise restaurants. Furthermore, the deterrence effect of leverage on earnings management is weaker for franchise restaurants than

non-franchise restaurants. Overall, their study suggests that franchise restaurants are generally more inclined towards earnings management.

In additional, Kanagaretnam et al., (2015) indicated that religiosity is negatively related to income-increasing earnings management for loss-avoidance and just-meeting-or-beating prior year's earnings and also find that religiosity reduces income-increasing earnings management through abnormal loan loss provisions in banks. Fan et al., (2019) examined how women on boards influence bank earnings management. They used the likelihood of a board appointing women directors based on a Blau index of gender diversity in each director's total employment connections outside their sample banks for identification. The find an inverted U-shaped relation between women on boards and bank earnings management. Specifically, when there exists only a marginal number of women directors, banks are more likely to manipulate earnings, however when the number of women directors reaches three or more, bank earnings management declines. Alam et al., (2020) investigated the impact of the Board characteristics, Chief Executive Officer's (CEO) power and Shariah supervision on Earnings Management (EM) within conventional and Islamic banks and provide evidence that EM levels do not significantly differ between Islamic and conventional banks. Furthermore, board size, firm size and leverage have a significant negative influence on EM of both Islamic and conventional banks.

2.2 Relationship between Fuel Price Volatility and Airlines' Real Earnings Management

With fuel price volatility, airlines companies face a higher level of competition. Ndung'u and Mouni (2016) indicated that volatile fuel prices have a significant relationship with airlines' bottom performance. Signaling theory states that signals are informational cues sent out by one party to another to influence desired outcomes. Consequently, insiders focus on sending out positive signals to outsiders and avoid sending negative information to reduce information asymmetry, which helps firms reach their ultimate goal of positively influencing their desired outcome (Taj, 2016). In addition, Halaoua et al., (2017) revealed that managers who convey their private information to investors reduce information asymmetry about future firm prospects and increase willingness to sustain future performance by manipulating earnings to achieve a certain earnings level threshold. Furthermore, Cassar et al., (2015) noted that borrowers reduce information asymmetry with lenders by improving their financial reporting. Therefore, if a firm in airline would like to avoid fuel price volatility caused lower earnings by manipulating real operating activities such cash flow from operations, product costs and discretionary expenses may reduce information asymmetry and send a positive signal; thus, investors may ask for a lower return. Consequently, the firm's cost of debt is lower. Therefore, a significant positive relationship may exist. We set up the related hypotheses in the airline industry as follow as:

H1: Fuel price volatility has a positive relationship with airlines manipulate cash flow from operations

H2: Fuel price volatility has a positive relationship with airlines manipulate product costs

H3: Fuel price volatility has a positive relationship with airlines manipulate discretionary expenses

3. Methodology

Data was used to predict earnings management in African airlines by using data from the COMPUSTAT database, and annual reports (2002Q1 to 2018O4). The study comprised 85 samples (Comair, Ethiopian Airlines, Kenya airlines, South African Airways, Egypt air Airlines, Air Mauritius). We also collected fuel price for the period from the <https://www2.moeaboe.gov.tw/oil102>. Variables and research model of this research are as follows:

3.1 Dependent Variables: Real Activities Earnings Management (REM)

We followed Roychowdhury (2006) and estimated a version of the sales manipulation model as follow as:

$$\frac{CFO_{it}}{TA_{it-1}} = \alpha_1 + \alpha_2 \frac{1}{TA_{it-1}} + \alpha_3 \frac{SALES_{it}}{TA_{it-1}} + \alpha_4 \frac{\Delta SALES_t}{TA_{it-1}} + \varepsilon_{it} \quad (1)$$

$$\frac{PRDO_{it}}{TA_{it-1}} = \alpha_1 + \alpha_2 \frac{1}{TA_{it-1}} + \alpha_3 \frac{SALES_{it}}{TA_{it-1}} + \alpha_4 \frac{\Delta SALES_{it}}{TA_{it-1}} + \alpha_5 \frac{\Delta SALES_{it-1}}{TA_{it-1}} + \varepsilon_{it} \quad (2)$$

$$\frac{DISP_{it}}{TA_{it-1}} = \alpha_1 + \alpha_2 \frac{1}{TA_{it-1}} + \alpha_3 \frac{SALES_{it-1}}{TA_{it-1}} + \varepsilon_{it} \quad (3)$$

CFO_{it} = cash flow from operations in African Airlines at current year; $PRDO_{it}$ = sum of the cost of goods for sales and the change in inventory in African Airlines at current year; $DISP_{it}$ = sum of advertising, R&D, general and administrative expenses in African Airlines at current year; $SALES_{it}$ = sales in African Airlines at current year; $\Delta SALES_t$ = change in sales in African Airlines at current year; $\Delta SALES_{it-1}$ = change in sales in African Airlines at last year; TA_{it-1} = assets in African Airlines at last year. We used the absolute value of ε multiplied by the assets for the last year to reflect the real numbers.

3.2 Independent Variables: Fuel Price Volatility

In this study, we used the West Texas Intermediate, Brent oil and Dubai oil for the fuel price (measured by oil per barrel in USD). To measure fuel price volatility, the following method proposed by Treanor et al. (2014) is used. We adopted the change in the fuel price, and the standard deviation of fuel price changes measure fuel price volatility.

3.3 Control Variables:

Kang and Kim (2012) revealed that the better the firm is, the lower real activity- based earnings management about the firm will be. Furthermore, Dhole et al., (2016) and Ge and Kim (2014) reported that larger firms are less likely to manipulate through real activities. Finally, Zamri et al., (2013) and

Dhole et al., (2016) showed that high leverage is less likely to manipulate through real activities. Following Kang and Kim (2012) and Zamri et al. (2013), ROA is measured as the firm performance at t-1 year. Size is measured as the logarithm of assets at t year. Leverage is measured as the total debts scaled by total assets at t year.

3.4 Empirical Model:

$$ABCFO_{it} = \alpha_0 + \alpha_1 CFP_{it} + \alpha_2 ROA_{it-1} + \alpha_3 SIZE_{it} + \alpha_4 LEV_{it} + \varepsilon_{it} \quad (4)$$

$$ABCFO_{it} = \alpha_0 + \alpha_1 SCFP_{it} + \alpha_2 ROA_{it-1} + \alpha_3 SIZE_{it} + \alpha_4 LEV_{it} + \varepsilon_{it} \quad (5)$$

$$ABPC_{it} = \alpha_0 + \alpha_1 CFP_{it} + \alpha_2 ROA_{it-1} + \alpha_3 SIZE_{it} + \alpha_4 LEV_{it} + \varepsilon_{it} \quad (6)$$

$$ABPC_{it} = \alpha_0 + \alpha_1 SCFP_{it} + \alpha_2 ROA_{it-1} + \alpha_3 SIZE_{it} + \alpha_4 LEV_{it} + \varepsilon_{it} \quad (7)$$

$$ABDE_{it} = \alpha_0 + \alpha_1 CFP_{it} + \alpha_2 ROA_{it-1} + \alpha_3 SIZE_{it} + \alpha_4 LEV_{it} + \varepsilon_{it} \quad (8)$$

$$ABDE_{it} = \alpha_0 + \alpha_1 SCFP_{it} + \alpha_2 ROA_{it-1} + \alpha_3 SIZE_{it} + \alpha_4 LEV_{it} + \varepsilon_{it} \quad (9)$$

$ABCFO_{it}$ = discretionary cash flow from operations in African Airlines at current year by using Model (1); $ABPC_{it}$ = discretionary production costs in African Airlines at current year by using Model (2); $ABDE_{it}$ = discretionary expenditures in African Airlines at current year by using Model (3); CFP_{it} = change in the fuel price in African Airlines at current year (the value is 1 if the fuel price for current year is above that for last year, or 0 otherwise); $SCFP_{it}$ = standard deviation of fuel price changes in African Airlines at current year; ROA_{it-1} = return of assets of African Airlines at last year (i.e., earnings before interest and tax for current year divided assets for last year); $SIZE_{it}$ = logarithm of assets in African Airlines at current year; LEV_{it} = debts divided by assets in African Airlines at current year.

4. Results

4.1 Descriptive Statistics

Table 1 showed that the descriptive statistics of real activities earnings management and the estimated cross-section of the discretionary of cash flow from operations, discretionary of product costs, and discretionary of expenses, the mean of discretionary cash flow from operations are positive, indicating that airlines in African have adopted cash flow from operations to earnings management to increase their adjusted income, however the mean of discretionary product costs and discretionary of expenses are negative, indicating that airlines in African have adopted product costs and expenses to earnings management to decrease their adjusted income (see Chen et al., 2011). Moreover, the mean of Return of Assets (ROA) is only 0.39%, showing that airlines in African may have lower level of earnings or they have more assets than other industries, causing lower operating ability. The debt ratio of 55.21% shows that airlines in African may prefer to obtain funds from debts.

Tables 2 to 4 showed descriptive statistics for the discretionary real activities earnings management models. Table 2 (cash flow from operations model) shows that the $\frac{1}{TA_{it-1}}$ is significantly positive related

to the cash flow from operations, $\frac{SALES_{it}}{TA_{it-1}}$ is non-significantly positive related to the cash flow from operations, and $\frac{\Delta SALES_{it}}{TA_{it-1}}$ is significantly negative related to the cash flow from operations. The empirical results indicate that assets at year t-1 and change in sales at year t have an impact on cash flow from operations at year t, implying these items may likely involve efficiently controlling cash flow from operations in African airlines. Table 3 (product costs model) shows that the $\frac{1}{TA_{it-1}}$ is non-significantly positive related to the product costs, $\frac{SALES_{it}}{TA_{it-1}}$ is non-significantly positive related to the product costs, $\frac{\Delta SALES_{it}}{TA_{it-1}}$ is significantly negative related to the product costs, and $\frac{\Delta SALES_{it-1}}{TA_{it-1}}$ is significantly positive related to the product costs. The empirical results indicate that change in sales at year t and change in sales at year t-1 have an impact on product costs, implying these items may likely involve efficiently controlling product costs in African airlines. In additional, Table 4 (discretionary expenses model) shows that the $\frac{1}{TA_{it-1}}$ is significantly positive related to the discretionary expenses and $\frac{SALES_{it-1}}{TA_{it-1}}$ is significantly negative related to the discretionary expenses. The empirical results indicate that assets at year t-1 and sales at year t-1 have an impact on cash flow from operations at year t, implying these items may likely involve efficiently controlling discretionary expenses in African airlines. Compared to these models, assets at year t-1 has significantly positive related to the operating activities (include cash flow from operations and discretionary expenses), sales at year t has non-significantly positive related to the cash flow from operations and product costs, change in sales at year t have significantly negative related to the cash flow from operations or product costs. In addition, the $\frac{1}{TA_{it-1}}$ coefficient was positive, suggesting that when the previous year have less assets, African's airlines may manipulate earnings through cash flow from operations and discretionary expenses in the current year. Besides it, the $\frac{SALES_{it}}{TA_{it-1}}$ coefficient was non-significantly, suggesting that when the current year have more sales, African's airlines may not manipulate earnings through cash flow from operations and product costs in the current year. Furthermore, the $\frac{\Delta SALES_{it}}{TA_{it-1}}$ coefficient was significantly negative, suggesting that when the current year have less change in sales, Africa's airlines may not manipulate earnings through cash flow from operations or product costs in the current year. Overall, discretionary product costs model is highest and discretionary expenses is lowerest explanatory power of Roychowdhury (2006) models. Thus, we found also that managers in African's airlines earnings management behavior.

Table 1. Descriptive Statistics (all samples)

	Max	Min	Avg
$ABCFO_{it}$ (%)	0.20	-0.33	0.0036
$ABPC_{it}$ (%)	0.15	-0.29	-0.0848
$ABDE_{it}$ (%)	0.06	-0.05	-0.0014
ROA_{it-1}	21.00%	-55.22%	0.39%
$SIZE_{it}$	25.33	20.36	22.80
LEV_{it}	94.05%	40%	55.21%
Sample	85		

Table 2. Descriptive Statistics for the Estimated cross Section: Cash Flow from Operations Model (Roychowdhury, 2006)

$$\frac{CFO_{it}}{TA_{it-1}} = \alpha_1 + \alpha_2 \frac{1}{TA_{it-1}} + \alpha_3 \frac{SALES_{it}}{TA_{it-1}} + \alpha_4 \frac{\Delta SALES_{it}}{TA_{it-1}} + \varepsilon_{it}$$

α_1	α_2	α_3	α_4	R^2	F-value
0.447*	0.318**	0.155	-0.198**	0.254	13.551**

*:p<0.1, **:p<0.05, ***: P<0.01

Table 3. Descriptive Statistics for the Estimated cross Section: Product Costs Model (Roychowdhury, 2006)

$$\frac{PRDO_{it}}{TA_{it-1}} = \alpha_1 + \alpha_2 \frac{1}{TA_{it-1}} + \alpha_3 \frac{SALES_{it}}{TA_{it-1}} + \alpha_4 \frac{\Delta SALES_{it}}{TA_{it-1}} + \alpha_5 \frac{\Delta SALES_{it-1}}{TA_{it-1}} + \varepsilon_{it}$$

α_1	α_2	α_3	α_4	α_5	R^2	F-value
-0.156**	0.058	0.038	-0.237***	0.337***	0.272	17.512***

*:p<0.1, **:p<0.05, ***: P<0.01

Table 4. Descriptive Statistics for the Estimated cross Section: Discretionary Expenses Model (Roychowdhury, 2006)

$$\frac{DISP_{it}}{TA_{it-1}} = \alpha_1 + \alpha_2 \frac{1}{TA_{it-1}} + \alpha_3 \frac{SALES_{it-1}}{TA_{it-1}} + \varepsilon_{it}$$

α_1	α_2	α_3	R^2	F-value
-0.147*	0.258**	-0.186**	0.224	12.449**

*:p<0.1, **:p<0.05, ***: P<0.01

4.2 Empirical Test

Table 5 shows that **fuel** price volatility through the change in the fuel price and the standard deviation of fuel price changes has a significant positive relationship with airlines manipulate cash flow from operations (i.e., a proxy of sales). H1 is supported. Table 6 shows that **fuel** price volatility through the change in the fuel price and the standard deviation of fuel price changes has a non-significant relationship with airlines manipulate production costs. H2 is not supported. In addition, Table 7 shows that **fuel** price volatility through the change in the fuel price and the standard deviation of fuel price changes has a positive relationship with airlines manipulate discretionary expenses (only the change in the fuel price has a significant relationship). H3 is supported. It is likely that when **fuel** price volatility, African airlines manipulate earnings through cash flow from operations or discretionary expenditures to maintain profitability and not manipulate earnings through production costs. In addition, outside investors may not focus on the effect of fuel price volatility on product costs. Overall, we also demonstrated that airlines managers in African may focus on sending out positive signals (i.e., manipulate earnings to maintain profitability when **fuel** price volatility), which helps firms convey private information reduce information asymmetry to investors or debtors about future firm prospects and increase willingness to sustain future performance thus, investors may ask for a lower return (i.e., the firm's cost of debt is lower). This is consistent with signaling theory.

Table 5. Regression Results for the Estimated cross Section: Manipulate Cash Flow from Operations

Dependent variable: $ABCFO_{it}$						
	West Texas Intermediate		Dubai oil		Brent oil	
intercept	-3647.1	-2002.2	-2813.4	-4373.7	-3031.3	-5218.6
CFP_{it}	8546.4***		8490***		8532.4***	
$SCFP_{it}$		8318***		8321.9***		8296.1***
ROA_{it-1}	-1196.1	-1095.9	-1242.1	-1068.3	-1218.4	-1074.8
$SIZE_{it}$	-409.3***	-400.6***	-407.5***	-401.3***	-409.0***	-400.6***
LEV_{it}	58.4	71.9	43.4	78.3	51.2	74.4
R^2	0.234	0.222	0.232	0.223	0.233	0.223
F-value	4.431***	4.125***	4.394***	4.223***	4.421***	4.226***
sample	85					

*, p<0.1 ; **, p<0.05 ; ***, P<0.01

Table 6. Regression Results for the Estimated cross Section: Manipulate Production Costs

Dependent variable: $ABPC_{it}$						
	West Texas Intermediate		Dubai oil		Brent oil	
intercept	6.773***	6.659***	6.764***	6.683***	6.774***	6.661***
CFP_{it}	-1.434		-1.328		-1.276	
$SCFP_{it}$		5.618		2.995		4.408
ROA_{it-1}	-0.734	-0.681	-0.763	-0.674	-0.746	-0.674
$SIZE_{it}$	-0.249***	-0.246***	-0.249***	-0.246***	-0.249***	-0.245***
LEV_{it}	0.524***	0.520***	0.532***	0.514***	0.528***	0.517***
R^2	0.394	0.388	0.396	0.386	0.395	0.388
F-value	8.312***	8.127***	8.365***	8.083***	8.337***	8.119***
sample	85					

*:p<0.1, **: p<0.05, ***: P<0.01

Table 7. Regression Results for the Estimated cross Section: Manipulate Discretionary Expenditures)

Dependence variable: $ABDE_{it}$						
	West Texas Intermediate		Dubai oil		Brent oil	
intercept	-0.088	-0.079	-0.086	-0.078	-0.087	-.079
CFP_{it}	0.046***		0.049***		0.051***	
$SCFP_{it}$		0.221		0.063		0.234
ROA_{it-1}	-0.002	-0.006	-0.000	-0.006	-0.001	-0.005
$SIZE_{it}$	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003
LEV_{it}	0.177	0.047***	0.134	0.047***	0.141	0.047***
R^2	0.380	0.350	0.374	0.349	0.376	0.350
F-value	7.891***	7.050***	7.711***	7.028***	7.779***	7.066***
sample	85					

*:p<0.1, **: p<0.05, ***: P<0.01

5. Solutions

In the 21st century, airline fuel costs have increased rapidly. Higher fuel prices eat into airline profit margins, not just because of the absolute price increase but also the rate of the increase. A gradual increase gives the airlines time to adjust, thus fuel prices play an important role in airline operations. For example, United States of department of transportation (2011) showed that the rise in the cost of

fuel since 2000 has resulted in fuel becoming one of aviation's largest operating expenses. In 2000, the cost of labor was 2.5 times that of fuel, but in 2010, the cost of labor and fuel were nearly identical with each accounting for about 25 percent of all operating expenses. We examine the association between fuel price and manipulate earnings in African Airlines and show that **fuel** price volatility (i.e., the proxy of fuel price) has a positive relationship with REM (but product costs is non-significant). We suggest airline managers in African may focus more on how to reflect the changes in fuel prices through financial statements.

However, many airlines have programs to hedge fuel costs. They buy futures contracts to lock in their costs for a set period of time, turning it into a fixed expense or they may look to cut labor costs by laying off workers or reducing their pay or benefits to maintain operating costs. In addition, airlines may adjust the expenses maintenance, the share of fixed costs by using part-time labor, handling luggage, airport fees, taxes, marketing, promotions, travel agent commissions and passenger expenses, changes in capacity (i.e., increased available seat miles), changes in productivity (i.e., decrease the number of available seat miles per gallon of fuel consumed, or improved fuel efficiency (i.e., decrease the number of gallons consumed per block hour reduce exposure to fuel price volatility. Since growing profits is difficult, companies are forced to cut costs to be more profitable. Furthermore, they may have also passed along increased costs to consumers by raising airfares; consequently, airfares have tended to rise and fall with the price of fuel. Finally, airlines may adopted a various of operational strategies to maintain their net income when **high fuel price volatility** such as alliances, route networks, flight procedures; diversifying revenue, outsourcing work, leasing aircraft, obtaining shorter-term leases for real estate, or adding fuel oil surcharges. It is likely that when the fuel price changes **volatility**, airlines do not manipulate earnings to maintain profitability. A advanced research examine the relationship between these stragesies or programs and real activities earnings management. On the other hands, most of airlines in African are non-listed firms or low-cost carriers, therefore the researcher can't show that overall airlines in African.

Compared with airlines in other countries, African aviation has some challenges. Some operators use older airplanes and the maintenance is not up to global standards. The environment can be problematic and some airports on the continent lack good infrastructure. These elements in combination result in a higher accident rate than in other parts of the world. Although there are many good airlines operating in Africa such as South African Airways and Ethiopian Airlines. As we know pilots from both of these airlines and both are committed to safety. Statistically, both of these airlines are on par with other global operators and are highly respected. Skytrax revealed its 2021 World Airline Awards, naming Ethiopian Airlines as the number one airline in Africa. The top African three airlines were Ethiopian Airlines, South African Airways, and Kenya Airways. Despite these challenges, aviation safety in Africa has improved over the years. There are some very dedicated safety professionals at work continuing the improvements. However we still would say that aviation in Africa is improving, but

significant challenges remain. High quality operators and regulators working together can make a big difference. Therefore, airlines operate in African with various different governing practices, operating controls, environments, systems, strategies, financial situations, hence, the other researches may not be considered equivalent.

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