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Article

Modeling U.S. Air Carriers' Profitability Utilizing Hierarchical Multiple Regression: Financial Predictors of Net Income

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Abstract.

Hierarchical multiple regression (HRM) is applied to examine the incremental influence of aviation market identity, revenue generation, and cost structures on airline net income across U.S.-based carriers from 2022 to 2024. This study utilizes archival data obtained from an aviation database that complies with the U.S. Department of Transportation Form 41 airline financial disclosures (AviationDB, 2024). The analysis categorizes ten independent variables into three theory-informed sets aligned with the income statement equation: Set A (Aviation Market Identity), Set B (Revenues and Incomes), and Set C (Expenses and Costs). All regression assumptions were rigorously assessed and met, with model stability confirmed via multicollinearity diagnostics, linearity, reliability, validity, and residual analysis. Results demonstrated that aviation market identity alone explained a modest portion of the variance ($R^2 = 0.01$). The inclusion of revenue-related variables added 0.13 explanatory power, while the final step of introducing expense variables contributed an additional 0.81, resulting in a highly predictive model ($R^2 = 0.95$). Operating revenues and expenses emerged as the strongest predictors. The findings emphasize the dominant role of cost management in driving air carrier profitability and net income, reinforcing the strategic value of HMR in disentangling financial drivers within complex commercial systems. This research contributes to aviation financial modeling by offering empirical insight into income dynamics and supporting data-driven decision-making for air carrier executives, regulators, and aviation financial policy strategists.

Keywords: Air Carrier Net Income, Hierarchical Multiple Regression, Operating Revenues, Operating Expenses, Financial Modeling, Aviation Economics, Market Identity, Aviation Business Drivers, and Airline Costs.

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1. Introduction

1.1 Background

According to the International Air Transportation Association (IATA, 2023), global air carriers are expected to generate a record $964 billion in revenue in 2024. However, many carriers have failed to report or continue to struggle with consistent profitability, revealing a persistent disconnect between top-line performance and financial health. While conventional analyses often attribute airline net income to market structure or strategic positioning, this imbalance raises a fundamental question: What truly drives airline net income, and which internal factors matter most?

The aviation business is a complex and sensitive commercial sector marked by thin profit margins and high operational variability. Aviation organizations (including airlines, charters, flight schools, etc.) operate under the fluctuation of seasonality, fuel pricing, political factors, inflation, and global disruptions. Therefore, to address the raised fundamental question, this study organizes air carriers' financial and operational predictors into three theory-informed sets, consistent with the foundational "Income Statement Equation: Net income = Revenues and incomes – Expenses and costs" (Bilinski et al., 2019), and is structured as follows: Set A = Aviation Market Identity that included Air carrier types, Operating regions, and Fiscal quarters; Set B =Revenues and Incomes that included Operating revenues, and Non-operating incomes; and Set C = Expenses and Costs that included Operating expenses, Maintenance costs, Promotional sales, General administration costs, and Income taxes. Each set represents a distinct layer of profitability analysis and is introduced sequentially in a hierarchical multiple regression model to assess its incremental explanatory power.

The entry order of the sets A-B-C is theoretically grounded, drawing upon three theoretical frameworks. Industrial Organization Theory supports Set A by explaining the effect of market structure and firm strategies on the organization's behavior and performance (Scheraga, 2004). As discussed by Sun et al. (2024), air carrier classification, route networks, and fiscal quarters (seasonal cycles) have significant implications for both revenue opportunities and expense structures. Revenue Management (RM) Theory informs Set B by focusing on maximizing revenues through pricing, forecasting, and inventory control under uncertain demand conditions. Empirical findings suggest that RM optimization improves revenues by 1-2% through yield management and load factor improvements (Klein et al., 2020). Financial Decomposition Theory underpins Set C by evaluating how an organization generates value relative to its capital costs. A sustained positive ROIC-WACC (Return on Invested Capital - Weighted Average Cost of Capital) signals long-term financial health (Saxon et al., 2025).

By integrating these theories within a structured financial modeling approach, the study moves beyond descriptive financial comparisons to provide and test a multi-layered explanation of air carrier profitability. This research contributes to academic literature and managerial practice by offering a theory-grounded, evidence-based understanding of how financial levers shape airline net income. The findings have implications for executive decision-making, capital allocation, and financial forecasting across an industry defined by high volatility, thin margins, and intense cost pressures.

2. Literature Review

Profitability remains at the top of all challenges facing the airline industry, which is driven and operated under volatile demand, inflation, fluctuation of seasonality, political factors, and global disruptions. The ability to predict the net income, which is the bottom line of all financial decisions, is a necessary and challenging factor operationally and analytically in order to make financial decisions as well as support decision-making across accounting, budgeting, and operational departments (Choi et al., 2019). Therefore, understanding the factors that affect net income requires more than a descriptive analysis; it demands an integrated approach in order to capture how the market identity, revenue streams, and expense frameworks interact.

Accordingly, this review is structured around the three theory-informed sets utilized in the study's hierarchical multiple regression model: (Set A) Aviation Market Identity, (Set B) Revenues and Incomes, and (Set C) Expenses and Costs. Moreover, to clarify its conceptual role in shaping air carriers' net income, each set is grounded in a distinct theoretical lens: Industrial Organization (IO), Revenue Management (RM), and Financial Decomposition.

2.1 Aviation Market Identity

Air carriers differ in ways that shape both their operational models and financial outcomes. For example, Low-Cost Carriers (LCCs) structure and base their business model around minimizing expenses and maximizing revenues in order to optimize profit margins and net income (Doganis, 2019; Holloway, 2016). Moreover, the operating regions of air carrier operations (domestically or internationally) can influence their exposure to factors such as customer demand, fuel prices, airspace regulations (e.g., FIRs: Flight Information Rules). Furthermore, the aviation industry and air transportation network are inherently a seasonal market that fluctuates across different fiscal quarters throughout the year according to holidays, weather, tourism cycles, etc. (Holloway, 2016; ICAO, 2013). These factors collectively define the market identity, which in turn shapes both revenue opportunities and expense behavior, which directly influences the overall net income of air carriers (Bilinski et al., 2019).

This perspective is supported by Industrial Organization (IO) Theory, which justifies and focuses on how market structure and organization characteristics can shape competition behavior and economic performance.

2.2 Revenues and Incomes

The aviation industry operates on small profit margins, making its profitability highly sensitive to various internal and external operational factors that affect revenue streams. Between 2009 and 2018, profit volatility in the U.S. air carrier industry was attributed to fluctuating fuel prices, traffic demand, fare competition, ancillary charges, and exchange rates (Choi et al., 2019). According to Gillen (2023), the rapid growth of LCCs contributes to the overall market by attracting passengers from other modes of transportation, thus creating new revenue opportunities, rather than solely diverting traffic from other air carriers. Moreover, these air carriers have significantly influenced revenue dynamics by intensifying price competition, prompting traditional carriers to optimize their cost and revenue structures and diversify their income streams.

The evolution in generating revenues aligns with "Revenue Management Theory", which focuses on optimally selling a fixed and perishable inventory within a given time horizon (Klein et al., 2020). The core purpose of RM is to maximize the total obtainable revenue by dynamically controlling the availability of products and services, adjusting fares, and allocating inventory in real-time in response to fluctuating demands (Gillen, 2023). This involves sophisticated approaches to model, estimate, and forecast demand patterns (Klein et al., 2020).

2.3 Expenses and Costs

Cost control remains a defining factor in air carrier profitability (Doganis,2019; Holloway, 2016). This is particularly true given the volatility of jet fuel prices, which typically constitute between 20% and 40% of an airline's overall cost base (Holloway, 2016; IATA, 2023). In addition, increasing labor costs, especially for pilots and technical personnel, have placed growing pressure on operating models that were previously highly cost-competitive. Furthermore, maintenance liabilities have grown due to supply chain challenges, leading to fewer new aircraft deliveries, which in turn force some air carriers to keep older aircraft in service longer, necessitating more upkeep and consuming more fuel per seat (IATA, 2023; Saxon et al., 2025).

These cost dynamics are best interpreted through "Financial Decomposition Theory," where each factor of expenses and costs is analyzed separately in order to understand its contribution to overall profitability. Saxon and Bouwer (2025) argue that achieving a sustained positive difference between Return on Invested Capital (ROIC) and Weighted Average Cost of Capital (WACC) is vital for creating value. When a company's ROIC exceeds its WACC, it indicates that the entity or sector is generating positive economic profit, signaling financial resilience and long-term viability. Historically, the airline sector's overall ROIC has generally been below its cost of capital since at least 1996. However, recent data from 2022 and 2024 show improvement, with the gap between ROIC and WACC narrowing to its smallest in the history of research. In particular, in 2024, 41% of air carriers tracked and managed to earn their cost of capital, a significant improvement compared to pre-pandemic levels (Saxon et al., 2025).

2.4 Methodological Gap

While existing literature employs various statistical designs to investigate aspects of air carriers' performance, a significant methodological gap remains: the absence of a comprehensive, structured hierarchical regression model that integrates layers of financial and operational predictors, consistent with the foundational Income Statement Equation (Bilinski et al., 2019).

Cost-Focused Regressions (Zuidberg, 2014) specifically investigated aircraft operating costs per aircraft movement to identify factors influencing these costs. This study directly recommended that "future research can focus on factors affecting an air carrier's profitability by adding a revenue component, more than just a cost one" (Zuidberg, 2014).

Financial Risk Regressions (Lee & Hooy, 2012) aimed to estimate air carriers' systematic financial risk exposure across North America, Europe, and Asia. While profitability is included as a determinant, the primary objective of their research is to understand financial risk exposure rather than providing a direct, comprehensive decomposition of overall profitability drivers from an Income Statement perspective.

Growth-Profitability Regressions (Maung et al., 2022) investigated the causal relationship between airline growth and profitability. The specific focus in this study was the growth-profit trade-off. It did not aim to provide a systematic, layered decomposition of overall profitability.

Framework Analyses (O'Connell et al., 2020) evaluated the drivers of profitability for airlines in Latin America. Their research is a case study employing framework analysis. It identifies drivers but does not perform a direct, quantitative hierarchical multiple regression analysis of profitability across a broader sample of diverse airlines. It is not structured to decompose profitability systematically.

Therefore, this current study utilizes a hierarchical multiple regression model, which sequentially introduces three theory-informed predictor sets (Aviation Market Identity, Revenues and Incomes, Expenses and Costs) grounded in Industrial Organization Theory, Revenue Management Theory, and Financial Decomposition Theory, directly addressing this methodological gap. It offers a more integrated and theoretically grounded approach to understanding air carriers' profitability by providing a systematic decomposition that overcomes the limitations of previous studies that were either too narrow in scope, different in objective, or not structured to comprehensively decompose profitability in the proposed layered manner.

3. Research Objectives

Research Question 1. When examined from a hierarchical perspective with set entry order A-B-C (Aviation Market Identity - Revenues and Incomes - Expenses and Costs), what is the incremental knowledge gained at each step of the analysis relative to Net Income?

The corresponding statistical hypotheses are:

Hypothesis 1a

H_1: ρ^2Y.A > 0. At Step 1, Set A = Aviation Market Identity variables will explain a significant proportion of the variance in Y = Net Income.

Hypothesis 1b

H_1: ρ^2Y.AB − ρ^2Y.A > 0. At Step 2, when Set B = Revenues and Incomes variables enter the model in the presence of Set A = Aviation Market Identity, Set B will explain a significant proportion of variance in Y = Net Income.

Hypothesis 1c

H_1: ρ^2Y.ABC − ρ^2Y.AB > 0. At Step 3, when Set C = Expenses and Costs variables enter the model in the presence of Set A = Aviation Market Identity and Set B = Revenues and Incomes, Set C will explain a significant proportion of variance in Y = Net Income.

4. Methodology

4.1 Population and Sample

This study employed a quantitative, predictive correlation design utilizing financial performance data from U.S.-based commercial air carriers. The dataset was extracted from quarterly Form 41 financial disclosures, accessed via AviationDB.com, covering Q1 2022 through Q3 2024. After data cleaning and outlier exclusion, the final sample comprised 930 carrier-quarter observations. An IRB review exemption was approved (IRB-25-060).

4.2 Variables

Table 1. Independent and dependent variables with their operational definitions

Sets / Independent Variables	**Operational Definitions**
Set A = Aviation Market Identity	
X1 = Air Carrier Type (Low-Cost Carriers or Other Carriers)	This categorical variable refers to the business model of each air carrier. Air carriers are classified as low-cost carriers (LCCs) if they follow a cost-minimization strategy with simplified services and lower fares, and as other carriers if they follow traditional or hybrid models. Classification is based on carrier profiles and annual reports.
X2 = Operating Region (Domestic or International)	This categorical variable refers to whether the air carrier's operations were conducted solely domestically (within its country's borders) or internationally (within and outside its country's borders).
X3 = Fiscal Quarter	This categorical variable refers to a time-based period, which is a 3-month-long period from the 1st quarter (Q1: January to March), 2nd quarter (Q2: April to June), 3rd quarter (July to September), to 4th quarter (Q4: October to December).
Set B = Revenues and Incomes	
X4 = Operating Revenues	This continuous variable refers to the total quarterly income from primary air carrier activities, measured in U.S. dollars, as reported.
X5 = Non-operating Incomes (Low, Medium, or High)	This categorical ordinal variable refers to an air carrier's earnings that have no direct relation to operations, such as investments and asset disposals, which affect the net income financially but not operationally. It is classified as Low if any non-operating income is less than zero, Medium if any non-operating income is from zero to $100,000, or High if any non-operating income is more than $100,000, based on quarterly financial disclosures.
Set C = Expenses and Costs	
X6 = Operating Expenses	This continuous variable refers to the total quarterly costs from primary air carrier activities in order to deliver the air carrier's core services, as reported and measured in U.S. dollars per fiscal quarter.
X7 = Maintenance Costs	This continuous variable refers to all expenses, reported and measured in U.S. dollars, required to maintain the air carrier's fleet's airworthiness, including repairs, inspections, and regulatory compliance of all aircraft systems.
X8 = Promotional Sales	This continuous variable refers to air carrier offers, discounts, marketing campaigns, and loyalty programs to keep current customers and attract new ones to increase market share, as reported and measured in U.S. dollars.
X9 = General Administration	This continuous variable refers to indirect expenses, reported and measured in U.S. dollars, linked to the business, not the operations (e.g., human resources, corporate governance, and administrative operations).

X10 = Income Taxes (Taxed or Non-Taxed)	This binary categorical variable refers to whether an air carrier incurred income tax obligations during the reported period (taxed) or was exempt (non-taxed), as reported and measured in U.S. dollars.
Dependent Variable	
Y = Net Income	This continuous variable refers to the difference between revenues and expenses per the income statement equation (Net income = Revenues and incomes – Expenses and costs), as reported and measured in U.S. dollars.

Note. All variable values are sourced from AviationDB.com on a quarterly basis for the period 2022 to 2024, ensuring standardized and operational measurement. Definitions are conceptually adapted from the International Civil Aviation Organization (ICAO, 2013) to provide authoritative context.

4.3 Modifying the Data

Categorical variables were coded according to dummy and weighted effect coding strategies. Hierarchical multiple regression was conducted in three sets, aligned with the income statement logic in a set entry order of A-B-C. Jackknife distance was used to detect outliers (UCL = 4.92), and 79 extreme cases were excluded, leaving 930 cases for analysis. JMP Pro 17.1 was used for analysis.

JMP software was utilized to determine the extent of the presence of VIF (Variance Inflation Factor) in the dataset for a multicollinearity check. VIF was analyzed, where three independent variables had VIF values greater than 10, indicating a high multicollinearity value between these independent variables (Operating revenues X_4, Operating expenses X_6, and Promotional sales X_8). Accordingly, the correlation table was observed, and values were recorded to analyze the multicollinearity between all the variables to improve model stability, interpretability, and the reliability of statistical tests. Therefore, from a statistical perspective, the decision was made to continue the analysis, omitting the three other variables that had a high correlation (maintenance costs X_7, promotional sales X_8, and general administration X_9) and retaining both operating revenues X_4 and operating expenses X_6 in order to maintain the model's performance. This decision was made in part from a business perspective because both operating revenues and expenses (X_4 and X_6) are core financial components that directly affect the financial health and profitability of any organization. These two elements must be reported and presented in every organization's "Income Statement," which is a financial document that reflects the financial performance of an organization in a specific period. According to the income statement equation (Revenues – Expenses = Net income). The best practices of financial reporting encourage having both operating revenues and operating expenses presented separately in order to provide a clearer view of core business performance (Zoho, 2024).

4.4 Statistical Analysis

4.4.1 Descriptive Analysis

The data consist of one continuous dependent variable and ten independent variables: five are continuous, and the other five are categorical.

Table 2. Descriptive Statistics of Continuous Variables

Variables	*N*	*M*	*SD*	Range (H–L)
Net Income (Y)	930	2,821,017.1	81,205,316	8,046,871–-2,404,837
Operating Revenues (X_4)	930	368,604,879	727,798,948	415,441,357–321,768,402
Operating Expenses (X_6)	930	358,823,527	686,254,692	402,986,483–314,660,572
Maintenance Costs (X_7)	930	40,518,696	66,981,234	44,829,179–36,208,213
Promotional Sales (X_8)	930	15,327,668	38,425,352	17,800,478–12,854,859
General Administration (X_9)	930	33,384,844	70,792,482	37,940,594–28,829,093

Note. The total number of observations is N = 930.

All variables represent quarterly values sourced from AviationDB.com for the period 2022 to 2024, measured in U.S. dollars.

Table 3. Descriptive Statistics of Categorical Variables

Groups	*N*	%
Air Carrier (X_1)		
LCC	164	16.25%
Others	845	83.75%
Operating Region (X_2)		
Domestic	477	47.27%
International	532	52.73%
Fiscal Year		
1st Quarter (X_{3a})	282	27.95%
2nd Quarter (X_{3b})	278	27.55%
3rd Quarter (X_{3c})	269	26.66%
4th Quarter (X_{3d})	180	17.84%
Non-Operating Income		
Low (X_{5a})	700	69.38%
High (X_{5b})	174	17.24%
Medium (X_{5c})	135	13.38%
Income Taxes		
Taxed (X_{10a})	391	38.75%
Non-Taxed (X_{10b})	618	61.25%

Note. N = 930.

4.4.2 Inferential Analysis

A Hierarchical Multiple Regression (HMR) was utilized with set entry order A-B-C and conducted in JMP software. In the beginning, Set A entered the model, which consisted of five variables associated with the Aviation Market Identity, but, unfortunately, after eliminating four variables in the preliminary data analysis because of the "Independent Variables Correct Specification in The Regression Model Assumption", Operating Region (X_2) was the only variable left in this set. Then, in the presence of Set A, Set B entered the model, which consisted of Revenues and Income, which had two variables: Operating Revenues (X_4), Non-Operating Income (X_{5a} Low and X5b High). Finally, in the presence of Set A and B, Set C entered the model, which consisted of five variables associated with the Expenses and Costs, but, unfortunately, after eliminating three variables in the preliminary data analysis because of the multicollinearity and another one due to the sixth assumption, Operating Expenses (X_6) was the only variable left in this set. Accordingly, the hierarchical multiple regression model was run through JMP software in an entry order of A-B-C. Thus, set A entered the model in step 1, followed by set B in the presence of set A as step 2, and set C entered the model as step 3 in the presence of both set A and set B.

5. Ethical Considerations

Although the data utilized in this study were public and non-identifiable, ethical oversight was maintained by obtaining an Institutional Review Board (IRB) approval to ensure compliance with research standards. The study was reviewed, and an exemption was obtained under IRB protocol number (IRB-25-060). The authors have no conflict of interest with any airline included in the study.

6. Results

A hierarchical regression assessed the incremental variance in net income (see Table 4), which was explained by three predictor sets. All the null hypotheses were rejected, which means that every increment at each step of the hierarchical regression was significant as follows:

Table 4. Summary of Hierarchical Regression

Variables	*B*	*95% CI*		*SE*	*β*	***R*2**	**Δ*R*²**
		LL	**UL**				
Step 1						0.01***	
Constant	-7,203,987	-15,002,205	594,230.62	3,973,567	0		
X_2 = Operation Region	18,033,374***	7,574,339.6	28,492,408	5,329,380	0.11		
Step 2						0.14***	0.13***
Constant	-26,727,654***	-41,154,617	-12,300,692	7,351,199	0		
X_2 = Operation Region	16,643,138***	6,792,931.7	26,493,344	5,019,132	0.10		
X_4= Operating Revenues	0.04***	0.03	0.05	0.01	0.35		
X_{5a}= Low NOP Income	7,721,675.7	-6,419,438	21,862,789	7,205,546	0.04		
X_{5b}= High NOP Income	2,656,250.4	-15,168,112	20,480,612	9,082,330	0.01		
Step 3						0.95***	0.81***
Constant	1,911,101.9	-170,793	5,530,142.3	1,844,064	0		
X_2 = Operation Region	2,033,245.3	-428,306.2	4,494,796.8	1,254,272	0.01		
X_4= Operating Revenues	0.80***	0.79	0.81	0.01	7.17		
X_{5a}= Low NOP Income	-64,055,746***	-9,930,243	-2,881,249	1,795,890	-0.04		
X_{5b}= High NOP Income	7,401,482.3**	2,968,090.4	11,834,874	2,259,013	0.03		
X_6= Operating Expenses	-0.81***	-0.83	-0.80	0.01	-6.87		

Note. N = 930. *p < .05, **p < .01, ***p < .001.

All variables represent quarterly values and are measured in U.S. dollars.

- Set A (Aviation Market Identity) explained 1.22% of variance in net income, $R^2 = .01$, $F(1,928) = 11.45$, $p < .001$, with international carriers showing higher profitability (B = 18.03M).
- Adding Set B (Revenues and Incomes) increased R^2 to 0.14 ($\Delta R^2 = 0.13$, $F(3, 925) = 45.24$, $p < .001$). Operating Revenue was significant (B = 0.04), while Non-Operating Income categories were not.

- Adding Set C (Expenses and Costs) contributed a substantial $\Delta R^2 = 0.81$, producing a total $R^2 = .95$, $F(5, 924) = 3287.98$, $p < .001$. Operating Expenses were the most potent negative predictor ($B = -0.81$), and Operating Revenue remained significant. Non-operating income categories became statistically significant, while Operational Region lost predictive value.
- RMSE improved from $80.75M (Step 1) to $18.78M (Step 3), confirming model refinement. Post hoc power exceeded 0.99 at each stage (except Step 1, which was 0.92) with large effect sizes (see Table 5).

Table 5. Hierarchical Regression Post-hoc Power Analysis Using G* Power

Factors	Actual Value Actual Effect Size		Total Number of Predictors (*K*)	Number of Predictors Added	Approximate Power
All the Variables in the Model	*R²*	17.80	5	NA	>.99
Step 1	*sR²A*	0.01	1	1	0.92
Step 2	*sR²B*	0.15	4	3	>.99
Step 3	*sR²C*	15.19	5	1	>.99

Note. N = 930. R2 = 0.95

7. Discussion

The HRM results confirm that net income in the airline industry is primarily driven by operating revenues and expenses, which are the strongest predictors of net income, emphasizing the importance of core airline operations in financial health. The results validate the financial logic of the income statement and reaffirm prior findings that emphasize cost containment as the most impactful determinant of profitability (Gillen et al., 2003; Scheraga, 2022). Moreover, these results aligned with previous studies by Doganis (2019) and Holloway (2016), highlighting revenue optimization and cost structure as the central levers for profitability in the aviation industry.

The sharp increase in explained variance from Step 2 to Step 3 illustrates the dominant influence of expense management. The fading significance of Operational Region in the final model challenges assumptions that geographic scope inherently drives financial performance. Instead, results suggest that profitability is not structurally predetermined but operationally engineered.

This underscores the strategic importance of controlling cost levers and maintaining scalable financial structures for airline executives. The model provides researchers a replicable, theoretically grounded framework for further inquiry, potentially extended to incorporate environmental metrics, labor efficiency, or macroeconomic volatility.

The hierarchical regression proved effective not only for model structuring but also for clarifying where executive focus should lie. Future research may build on this approach with longitudinal data, nonlinear modeling, or international samples to test broader applications in aviation finance. Moreover, it provides a template for capital-intensive industries beyond the aviation market and business.

8. Practical Implications

This study offers immediate applications for airline executives, financial analysts, and aviation decision-makers. The hierarchical model presented can serve as a strategic diagnostic tool for quarterly profit forecasting, cost-sensitivity analysis, and capital allocation planning. By quantifying the relative impact of core financial variables, the model enables stakeholders to prioritize internal financial controls, particularly operating revenues and expenses, over generalized structural indicators such as operational region or carrier type.

9. Limitations and Delimitations

However, several limitations should be acknowledged. First, the study is limited to U.S.-based carriers and a three-year financial window (2022–2024), which may constrain the generalizability of findings to other markets or macroeconomic conditions. Second, the model is restricted to financial variables drawn from Form 41 reports; other influential factors, such as regulatory shifts, energy price volatility, or demand elasticity, were not incorporated. Third, the assumption of linear relationships may oversimplify the dynamic nature of financial performance, and latent or interactive effects were not explored.

Delimitations include the intentional exclusion of non-financial variables, the decision to structure predictors into three theoretically defined blocks, the order of set entry into the HRM, and the focus on archival financial disclosures. These choices align with the study's core objective, to isolate and evaluate financial drivers of net income, but inherently narrow the analytical scope. Moreover, the research was restricted to air carriers operating under profit-driven operations. Therefore, caution is required in generalizing the study to state-supported air carriers under the supervision and support of governments.

10. Conclusion

This research demonstrates that airline profitability is fundamentally driven by financial execution rather than structural classification. Using a theory-informed HRM, we found that operating revenues and, especially, expenses account for the overwhelming majority of the variance in net income. As recent industry and financial data affirmed, any organization's net income, even in the aviation sector, depends primarily on its operating revenues and expenses (IATA, 2024; U.S. Bureau of Transportation Statistics, 2024). Market identifiers, such as operational regions, while statistically relevant in isolation, lose explanatory value once financial variables are introduced. These results reaffirm the income statement as a reporting artifact and a predictive map of organizational performance and financial health. The model's structure also offers a practical framework for executives and analysts to isolate high-impact levels and optimize financial strategy. The design provides researchers a replicable pathway for investigating profitability across carriers, markets, or timeframes. In a capital-intensive, high-risk industry like aviation, such evidence-based insights are not only analytically valuable but also strategically essential.

11. Future Research and Recommendations

Future research may extend this model by incorporating operational efficiency metrics, ESG (environmental, social, and governance) factors, or macroeconomic variables. Cross-national studies could assess the replicability of these findings in different regulatory or economic contexts. At the same time, non-linear modeling techniques (e.g., SEM, random forest, or XG Boost) could offer more flexible insights into complex financial systems and/or be used to tailor the model to specific companies. Longitudinal studies may also reveal how the influence of financial drivers evolves under economic shocks or structural shifts within the aviation industry. Moreover, future studies may concentrate on finding statistical ways to control cost fluctuations on daily operational metrics, such as fuel prices, in short or long-term strategies.

Declaration of generative AI and AI-assisted Technologies

During the preparation of this work, the authors used "Chat GPT" to reformat the references section into the Elsevier style. After using this tool, the authors reviewed and edited the content as needed and took full responsibility for the content of the published article.

Author Contributions: Credits:

- Abdulaziz Alaqil: Conceptualization, Data curation, Formal Analysis, Methodology, Visualization, Writing – original draft, Writing – review and editing.
- Gender Peng: Writing – review and editing.
- Dr. Brooke Wheeler: Writing – review and editing, Supervision.
- Dr. Vivek Sharma: Project administration, Supervision, Writing, review and editing.

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