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Exploring the determinants of domestic air travel across Africa

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ABSTRACT

This study examines the determinants of domestic air travel demand within African countries, a region underrepresented in existing literature, which has predominantly focused on international routes or domestic travel in other continents. Using a gravity model, the study provides a comprehensive analysis that incorporates socio-economic variables and service-related factors. The findings indicate that domestic air travel demand is significantly influenced by socio-economic factors; specifically, larger educated populations and higher GDP per capita are positively associated with travel demand. The effect of government ownership of airlines on passenger demand is inconclusive: state ownership positively influences demand in Algeria, Ethiopia, and Morocco, but has a negative impact in Kenya, South Africa, and Nigeria. Service-related aspects also play a crucial role: higher flight frequencies, lower airfares, the presence of low-cost carriers (LCCs), and better connectivity positively influence domestic travel demand. These findings vary across countries, reflecting the diverse economic and infrastructural landscapes of Africa. The study highlights the importance of economic and infrastructural development in boosting domestic air travel across the continent. It suggests that policies aimed at supporting LCCs, enhancing airport connectivity, and promoting economic growth could effectively stimulate domestic air travel.

1. Introduction

Domestic air travel is vital to the global aviation industry. In 2024, domestic traffic surged by 13.2 % compared to 2023, exceeding pre-pandemic levels (IATA, 2025). This segment represented approximately 40 % of global passenger traffic, emphasizing its significant role in boosting local economies through business, tourism, and regional development.

In Africa, domestic air travel is equally crucial. In 2024, African airlines carried around 36 million passengers on domestic routes, accounting for 37 % of the region's total traffic, according to the African Airlines Association (AFRAA). Domestic flights are essential for regional connectivity and economic activity. Major airlines operate extensive domestic networks: Ethiopian Airlines serves 22 destinations, Air Peace covers 20 routes within Nigeria, and Royal Air Maroc connects 24 cities in Morocco. Additionally, TAAG Angola Airlines and LAM Mozambique Airlines each offer 12 domestic routes. Air Algérie has the largest domestic network with 35 destinations, while AB Aviation operates 5 routes, and Jambojet covers 8 routes in Kenya (AFRAA, 2024).

Despite the significant role of domestic air travel in Africa's aviation sector, there is a notable scarcity of research on this topic. While domestic air travel has been extensively studied in international contexts and more developed regions such as North America (e.g., Dargay and Hanly, 2001; Bhadra and Wells, 2005; Bhadra and Kee, 2008), Europe (e.g., Fridström and Thune-Larsen, 1989; Dobruszkes et al., 2011; Steiner et al., 2008; Kopsch, 2012; Russo et al., 2021), and Asia (Austria, 2000; Miyoshi, 2007; Yamaguchi, 2007; Park and Ha, 2006), the unique dynamics of African domestic markets remain underexplored. Much of the literature on Africa focuses on international air travel, even though similar determinants affect domestic air travel. Limited studies specific to African countries, such as Aderamo (2010) on Nigeria and Luke and Walters (2013) on South Africa, highlight the importance of economic conditions, deregulation, and geographic challenges in shaping domestic air travel demand.

This paper seeks to fill a gap in the literature by examining the key factors driving domestic air travel demand in African countries through the use of a gravity model. By focusing on domestic air travel within Africa, the study sheds light on the unique socio-economic and service-related dynamics at play in a developing region, offering a fresh perspective compared to studies conducted in more developed markets.

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A deeper understanding of these factors can guide policy decisions aimed at improving connectivity and fostering economic growth across Africa. The findings also provide valuable insights for airlines and stakeholders aiming to optimize routes and services to better accommodate the growing demand. Moreover, this research contributes to the broader academic discourse by contextualizing the determinants of air travel within the specific context of emerging markets.

The remainder of the paper is structured as follows: Section 2 presents a detailed literature review, summarizing the key determinants of air travel demand identified in previous studies. Section 3 outlines the methodology used in this study, including the formulation of the gravity model, the selection of variables, the data collection process, and the sources of data used in the analysis. Section 4 presents the empirical findings, offering insights into the socio-economic and service-related factors that drive domestic air travel demand in the selected African countries. Finally, Section 5 concludes the paper with a discussion of the policy implications of the findings, recommendations for airlines and stakeholders, and suggestions for future research directions.

2. Determinants of air travel demand - a review of previous studies

Air travel demand is determined by a complex interplay of economic, demographic, geographic, regulatory, and social factors. These determinants vary in intensity across different markets, especially between developed and emerging economies. While the majority of existing research focuses on international travel, there is a growing body of literature examining domestic air travel, including in African contexts. This review synthesizes findings from global and regional studies to frame the key determinants of domestic air travel demand, providing a foundation for understanding the African case.

2.1. Economic and demographic determinants

Economic indicators such as GDP, income, airfares, and consumer prices are consistently identified as essential to explaining air travel demand. Air travel is a normal good, and its consumption increases with economic prosperity. In a seminal study, Marazzo et al. (2010) used pooled time series cross-sectional data to establish a strong GDP-passenger correlation in Brazil, reporting an elasticity of 0.8. This suggests that air traffic volume grows nearly proportionally with GDP increases. Similarly, Dargay and Hanly (2001) linked rising air travel in the U.S. to growth in per capita income, consumer spending, and disposable income.

Fare levels also influence demand significantly. Studies such as Alperovich and Machnes (1994) and Fridström and Thune-Larsen (1989) highlighted the negative elasticity of demand with respect to airfares and suggested that proxies like CPI (Consumer Price Index) could effectively represent price trends. Dargay and Hanly (2001) further segmented demand by purpose, finding that leisure travellers are more responsive to price changes, while business travellers respond more to income changes. This distinction supports the argument for market-specific pricing strategies and demand forecasting.

Demographic factors, particularly population size, urbanization, and income distribution, also play important roles. Bhadra and Kee (2008), examining the U.S. domestic air market, found that air traffic correlates with the size and density of urban populations. Similarly, Dobruszkes et al. (2011) emphasized the concentration of air travel demand in large, urbanized regions, affecting airport location selection. Urbanization, especially in developing countries, acts as a catalyst for increased air travel, not only through higher income levels but also due to rising migration, employment shifts, and the growing cultural normalization of flying.

2.2. Geographic and infrastructure conditions

Geography and the availability of alternative modes of transport can significantly influence air travel demand. Countries with difficult terrain, large landmass, or poorly developed road and rail networks often have higher per capita air travel rates. For example, Park and Ha (2006) examined the effect of Korea's high-speed rail introduction and found a notable decline in domestic air travel, demonstrating substitution between modes. Similarly, Dobruszkes et al. (2011), studying Europe, emphasized how the accessibility of high-speed ground transport influences the volume and structure of air travel demand.

2.3. Deregulation and market liberalization

Deregulation and liberalization of air transport markets are recognized as pivotal policy shifts that reshape demand dynamics. Across various global contexts, deregulation has consistently resulted in fare reductions, greater route competition, increased carrier entry, and higher passenger volumes.

Globally, the European Union provides a well-documented example. Steiner et al. (2008) and Austria (2000) linked EU air transport liberalization with fare reductions and increased demand, particularly from low-cost carriers post-enlargement. In Japan, however, Miyoshi (2007) reported mixed results, while deregulation allowed for market entry, demand declined and fares increased, reflecting market saturation and operational inefficiencies.

In Africa, deregulation has progressed unevenly, with some countries implementing liberal market reforms earlier than others. Luke and Walters (2013) documented the case of South Africa, where deregulation led to the growth of low-cost carriers, such as Kulula and Mango, and encouraged the development of secondary airports. This reform stimulated air traffic movements and diversified the air travel landscape. Similarly, Daramola and Jaja (2011) investigated Nigeria's deregulated market and identified a shift toward core-periphery connectivity, increased regional dispersion of passenger traffic, and more frequent entry and exit of carriers. These findings suggest that deregulation influences not just total demand but also spatial and network structures. Njoya and Isah (2023) argue that the Yamoussoukro Decision, aimed at liberalizing intra-African air services, remains only partially implemented. Countries that have embraced liberalization more fully tend to have more dynamic domestic air markets. Nonetheless, institutional inertia and protectionist policies continue to limit the effectiveness of deregulation in some regions.

2.4. Social factors

Although less studied quantitatively, social determinants such as education, perceptions of safety, environmental awareness, and generational attitudes also shape air travel demand. Steiner (1967) and Graham (2000) observed long-term changes in travel behaviour, noting that air travel is increasingly perceived as a normal part of life, especially among younger, more educated populations. More recently, environmental concerns have gained prominence. Gössling et al. (2020) explored how the "flight shame" movement, especially in Europe, has affected traveller behaviour. They found evidence of reduced demand in certain markets and growing public support for policies aimed at reducing aviation emissions.

While these effects are more pronounced in developed countries, increasing environmental awareness and climate activism in Africa, particularly among younger populations, may influence demand patterns in the future. Moreover, higher education levels correlate with greater air travel frequency, as educated individuals often have higher incomes, increased mobility for education and business, and broader exposure to international travel norms.

2.5. Market maturity and elasticity of demand

As air transport markets evolve, they exhibit characteristics of maturity, reflected in diminishing marginal growth rates, decreasing price elasticities, and segmented demand behaviour. According to Bhadra and Kee (2008), U.S. markets can be categorized into thick, semi-thick, and super-thin routes, each displaying different responses to fare and income changes. Thick markets are typically more elastic and demonstrate robust demand growth, while thin markets are more sensitive to external shocks. Similarly, Kopsch (2012) assessed Sweden's domestic air market and found demand to be elastic in the short run and more so in the long run, especially among leisure travellers. The cross-price elasticity with rail travel indicated that travellers substitute between air and ground modes when prices shift.

In African markets, many domestic air markets remain immature, offering high growth potential. However, income elasticities may vary by country and route. For example, Demirsoy (2012) found that despite substantial growth in Turkey's domestic market, the potential for future expansion remained high, especially in underserved regions. In Nigeria, Aderamo (2010) identified GDP, inflation, and sector-specific indicators (e.g., agricultural production) as key predictors of domestic air travel growth.

2.6. Domestic air travel in emerging economies

While most air transport literature focuses on international travel, several studies provide insight into domestic demand in emerging economies, offering lessons for African markets. In Saudi Arabia, Ba-Fail (2000) used time-series analysis to link domestic passenger numbers to non-oil GDP, imports, population size, and consumer expenditure. Similarly, Sivrikaya and Tunç (2013) found that competition among airports, spatial characteristics, and tourism activity significantly influenced Turkey's domestic demand.

Demirsoy (2012) also examined Turkish domestic air travel post-deregulation (2003), reporting income and population as major drivers, while factors like crude oil prices and high-speed rail were statistically insignificant. The study noted untapped growth potential, especially in regional markets. In Europe, Russo et al. (2021) investigated air transport demand at a secondary airport in an underdeveloped region, employing a hierarchical logit model. Their findings underscore the importance of public service obligations and frequency of service in sustaining demand in less-developed areas, a point especially relevant to rural African regions.

In general, while extensive literature exists on the determinants of air travel demand, most studies focus on international markets or domestic markets in developed and emerging economies outside Africa. African domestic air travel remains under-researched, particularly in terms of multi-country comparative analyses. This study addresses this gap by offering a cross-country investigation into the determinants of domestic air travel across Africa.

Building on the reviewed literature, the determinants of domestic air travel in Africa can be conceptualized within a gravity modeling framework. As shown in Fig. 1, air passenger flows are driven by economic mass (e.g., population, income, and economic output) at both the origin and destination, moderated by spatial frictions and intervening variables. This schematic integrates key theoretical constructs from spatial interaction theory and consumer utility maximization, and forms the basis for the empirical model developed in the following section (see Fig. 2).

3. Methodology

This study investigates the determinants of domestic air travel demand across seven African countries, with a focus on the spatial interaction between specific origin and destination airports. A spatial interaction analysis can be used to estimate air transportation demand, whether existing or potential, over a defined geographical space. The gravity model is a common formulation of the spatial interaction method. Named after Newton's law of gravity, the model posits that the attraction between two objects is proportional to their respective masses and inversely proportional to the distance between them (Stewart, 1948; Tinbergen, 1963). Accordingly, air travel demand between two airports is influenced by the characteristics of the origin airport's location, the attributes of the destination airport's location, and the friction of distance between the airports.

The gravity model employed in this study is theoretically grounded in spatial interaction theory and consumer utility maximization. In spatial interaction theory, flows between the origin and destination

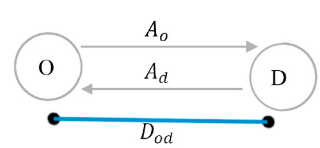


Fig. 2. The framework of gravity model.

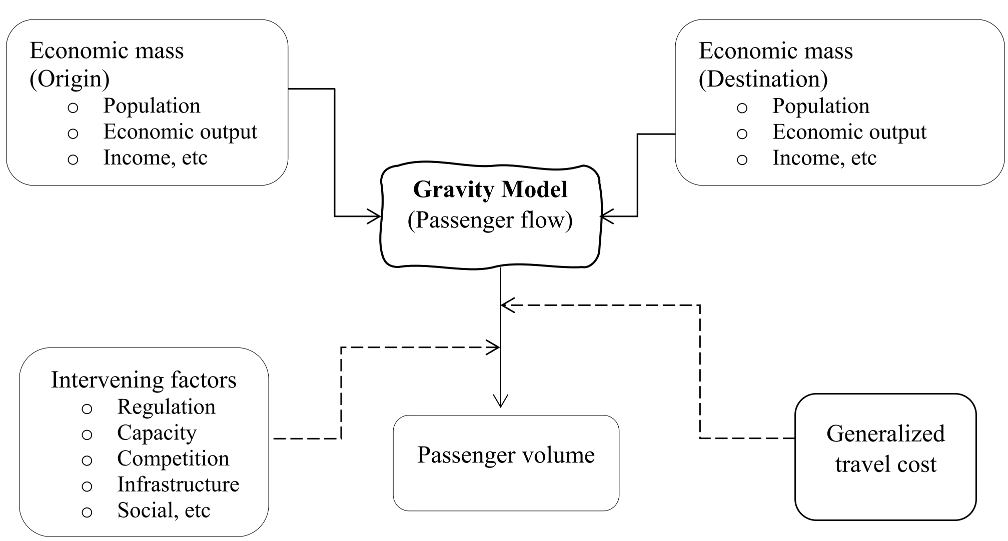


Fig. 1. Stylized gravity model of domestic air travel demand.
(Sources: authors)

depend on the "mass" of activity at each location (such as population, income, or economic output) and the "friction" of distance or travel cost between them. Travelers, conceptualized as utility-maximizing agents, choose destinations that balance the benefits of travel (e.g., economic opportunities, social interactions, or tourism attractions) against generalized travel costs. This formulation is consistent with the spatial interaction perspective articulated by Button and Vega (2008), where air passenger movements represent spatial choices influenced by accessibility and opportunity. The resulting aggregate flow pattern reflects the probabilistic outcome of individual utility-maximizing decisions, consistent with the entropy-maximizing foundations of spatial interaction models (Grosche et al., 2007). In air transport contexts, the gravity specification therefore captures the core behavioural mechanism underlying domestic air travel demand, the trade-off between the benefits of interaction and the costs of spatial separation (Boonekamp et al., 2018).

Accordingly, the theoretical form of the gravity model is given as:

$$TD_{o,d} = k.\frac{(A_o{*}A_d)^{\beta}}{D_{od}^{\alpha}} \tag{1}$$

Where, $TD_{o,d}$ is the traffic volume between airports o and d, A_o and A_d represent the attractiveness of the respective airport locations, D_{od} is the distance between the airports, k is constant, β controls the influence of the attributes of airports, and α is a parameter that controls the influence of the distance on travel demand.

The attractiveness and deterrence of air travel are typically influenced by a combination of factors. The standard determinants of air travel demand have largely been identified (Verleger, 1972; Graham, 2000; Valdes, 2015; Doganis, 2019). According to Jorge-Calderón (1997) and Boonekamp et al. (2018), air travel demand is driven by two primary types of factors: the socio-economic characteristics of the area where transportation occurs, and service-related variables shaped by airline attributes.

In the empirical application, the attractiveness of airport locations is modelled through socio-economic and service-related characteristics. A standardized set of variables was used to analyse the socioeconomic characteristics of the regions surrounding each airport (see Table 1). This assessment is limited to the administrative boundaries of an airport's catchment area. Since the air transport market in Africa is regulated and citizens are not free to travel across national borders, regional statistics at the administrative level were preferred over standardized catchment areas. The socioeconomic variables included in this study are population, GDP per capita, and the education index, as air travel to particular destinations, is likely to be influenced by these factors.

- Population: This refers to the population size of the city where each airport is located. The population data for these cities is sourced from the statistical offices of their respective countries. Airport catchment areas outside the city, within a certain driving distance, are not considered due to the unavailability of data.
- GDP: Refers to the GDP per capita of the country where the airport is located. Since income distribution data are not available, GDP per capita is used as a representative indicator of economic activity.
- Education index: The education index estimates relative levels of education by considering adult literacy rates and combined gross enrolment rates, with higher levels indicating greater accumulation of human capital and improved quality of well-being (Ogundari and Awokuse, 2018).

Service-related factors can influence the business environment of the air transport market. An efficient air transportation system reduces travel costs and boosts air travel demand (Grosche et al., 2007). Distance and airfare can be considered deterrent factors in the air transport market.

Table 1
An overview of the data.

Variable name	Description	Source
Population	Number of people living in the city where airport is located.	Statistical offices of the countries
GDP	GDP per capita of respective country.	The World Bank
Education index	Relative levels of adult literacy rate and estimates the country's human capital.	UNDP
Frequency	Number of flights offered between the respective airports.	SRS Analyser
Airfare	Average air fare offered by airlines on the respective route.	
Distance	Distance between origin and destination airports in kilometres.	SRS Analyser
Airport connectivity	Total number of flights offered from the airport.	SRS Analyser
Low-cost carriers	The market share of LCCs on the route in terms of flight frequency.	SRS Analyser
Airlines ownership	The market share of state-owned airlines on respective route in terms of flight frequency.	SRS Analyser
Liberalization	Whether the country allow multiple carriers to operate freely on domestic routes without capacity, frequency, or fare restrictions.	Aviation authority reports, and African Airlines Association
Aircraft size	The average number of available seats per flight operated on a route.	SRS Analyser
Inflation	Constructed as the annual national Consumer Price Index (CPI) rate to captures the cost pressures faced by airlines that influence fare-setting.	UNDP
Operators	Number of distinct carriers operating scheduled passenger services on the route.	SRS Analyser

- Frequency: Refers to the number of flights offered between the paired airports. It may also reflect the flexibility of passengers with their travel plans.
- Airfare: The demand for air travel is influenced by customers' willingness to pay, which is primarily expressed through airfare. In this study, airfare is measured using the average fare on each route.
- Distance: Refers to the great circle distance in kilometres between the origin and destination airports.
- Airport connectivity: This term represents the total number of flights on each side of the connected route. According to Boonekamp et al. (2018), the total number of flights at a particular airport reflects the size of the airport. Larger airports are more likely to attract more traffic due to economies of scale and synergy effects associated with the concentration of airline activities.
- Low-Cost Carriers: This indicates the market share of low-cost carriers (LCCs) on a specific route. This market share was proxied by the number of flights offered by LCCs relative to the total number of flights on the route. Although the number of passengers might provide a better representation of this market share, such data is not available at the route level.
- Airline ownership: Indicates whether the operating airlines are privately owned or government-owned. Allowing private capital into the air transport market has positive effects on industry efficiency (Finger and Button, 2017). Additionally, airline ownership affects market structure, which influences airline pricing and, ultimately, consumer welfare (Wang et al., 2018). In this study, airline ownership is measured by the market share of state-owned airlines on the route.

The analysis is based on a panel dataset of domestic air travel routes across 7 African countries (refer Appendix 2) covering the period

2012–2021. The sample consists of 4254 Origin-Destination pairs across sample countries, each with at least 500 passengers per year. Observations with fewer than 500 annual passengers were excluded from the analysis. This approach ensures that the estimated relationships capture actual market dynamics rather than imputed activity.

To estimate the elasticity of passenger volume with respect to these determinants, we begin with a log-linear transformation of the gravity model:

$$\begin{aligned}\ln(PAX_{od}) = {} & \beta_0 + \beta_1 \ln(PoP_{od}) + \beta_2 \ln(GDP_{od}) + \beta_3 \ln(EI_{od}) \\ & + \beta_4 \ln(Frequency_{od}) + \beta_5 \ln(Fare_{od}) + \beta_6 \ln(Dist_{od}) \\ & + \beta_7 \ln(Conn_{od}) + \beta_8 \ln(LCC_{od}) + \beta_9(AO_{od})\end{aligned} \tag{2}$$

Where,

PAX_{od} - the annual passenger volume between airport o and d

PoP_{od} – population in the city where airport o and d located

GDP_{od} – GDP per capita of the country

EI_{od} – Education Index of the country

$Frequency_{od}$ – Annual flight frequency between paired airports

$Fare_{od}$ – Average fare offered on flights between paired airport

$Dist_{od}$ - Geodetic distance between the airports in kilometres

$Conn_{od}$ – Total direct flights available at specific airport

LCC_{od} – Market shares of low-cost carriers on the route in terms of flight frequency

AO_{od} – The ownership of the operating airlines on the route.

In this formulation, the dependent variable is the logarithm of the number of passengers on each domestic route. Independent variables capture both demand-side socio-economic factors (population, GDP per capita, and education index) and supply-side service characteristics (fare, flight frequency, distance, connectivity, low-cost carrier market share, and airline ownership).

The specification considers the potential endogeneity of airfare and flight frequency with respect to travel demand. Airlines may adjust pricing and capacity in response to latent factors that simultaneously shape passenger demand, induce potential simultaneity bias and compromising the consistency of standard regression estimators. To address this, the study adopts an instrumental variables (IV) approach, implementing a two-stage least squares (2SLS) estimation strategy to obtain consistent parameter estimates.

In the first stage, the potentially endogenous regressors, airfare and frequency, are modelled as functions of exogenous instruments and other predetermined variables. Specifically, airfare is instrumented using national inflation rates, along with the control variables route distance, the degree of domestic air transport liberalization, and market structure. The inflation instrument is constructed as the annual national Consumer Price Index (CPI) inflation rate, expressed in logarithmic form. CPI data are sourced from the World Bank's World Development Indicators (WDI) database for each country in the sample. This variable captures macroeconomic cost pressures faced by airlines that influence fare-setting but do not directly affect passenger demand beyond their effect on ticket prices. The domestic liberalization indicator is a binary variable equal to 1 if, in a given year, the domestic aviation market of the country was deregulated to allow multiple carriers to operate freely on domestic routes without capacity, frequency, or fare restrictions. Information on the liberalization is compiled from national civil aviation authority reports, ICAO documentation, and African Airlines Association. Market structure is proxied by the market share of low-cost carriers on the route, measured in terms of flight frequency.

Flight frequency is instrumented using average aircraft size, along with the control variables the number of competing operators on the route and liberalization status. Average aircraft size influences the supply of flights but is not expected to have a direct causal effect on demand after controlling for fare and other variables. It is calculated as the mean number of available seats per flight operated on a route within a given year, obtained by dividing the total available seat capacity on the route by the total number of flights during the year. The data on seat capacity and number of flights are sourced from the SRS Analyser database, which contains aircraft-type-specific seating configurations for all scheduled services. Larger average aircraft sizes generally indicate greater supply-side capacity per departure, which may influence the frequency of flights but does not directly shift passenger demand once other demand determinants are controlled for.

The number of competing operators is defined as the count of distinct airlines providing scheduled passenger services on a given route within a given year. The count is based on the unique carrier identifiers in the SRS Analyser database. Only airlines operating regularly scheduled services are included; occasional charter flights and seasonal one-off services are excluded to avoid inflating competition measures. This variable reflects the degree of competition on the route, which can influence the frequency of services offered by each airline.

Let r represents the domestic route within a country c, and t index the year. The first-stage regression equations are as follows:

$$\begin{aligned}lnFare_{rct} = {} & \gamma_0 + \gamma_1 \; ln \; \text{Inflation}_{ct} + \gamma_2 \text{Liberalization}_c + \gamma_3 lnDistance_r \\ & + \gamma_4 \text{MktStruct}_{rct} + u_{rct}\end{aligned} \tag{3}$$

$$\begin{aligned}lnFrequency_{rct} = {} & \theta_0 + \theta_1 \; ln \; AircraftSize_{rct} + \theta_2 \text{Liberalization}_c \\ & + \theta_3 lnDistance_r + \theta_4 Operators_{rct} + v_{rct}\end{aligned} \tag{4}$$

Where, $lnDistance_r$ is the natural logarithm of the great-circle (geodesic) distance between the origin and destination airports of route r, measured in kilometers. MktStruct represents the share of low-cost carrier (LCC) flights on route r in country c during year t, calculated as the proportion of total flights on the route operated by LCCs. $AircraftSize_{rct}$ denotes the average seat capacity per flight on route r in year t, computed as the total available seats divided by the total number of flights on that route. $Operators_{rct}$ captures the number of distinct carriers operating scheduled passenger services on route r during year t.

The predicted values of airfare and frequency from these regressions are then used in the second-stage demand model:

$$lnPAX_{rct} = \alpha_0 + \alpha_1 \widehat{lnfare}_{rct} + \alpha_2 \widehat{lnfrequency}_{rct} + X'_{rct}\delta + \mu_r + \lambda_t + \varepsilon_{rct} \tag{5}$$

Where, $lnPAX_{rct}$ denotes the logarithm of passenger volumes on route r in country c at time t. The variables $\widehat{lnfare}_{rct}$ and $\widehat{lnfrequency}_{rct}$ represent the predicted values obtained from the first-stage regressions. The term X_{rct} indicates the vector of control variables included in the model. Route fixed effects, denoted by μ_r, account for time-invariant characteristics specific to each route, while λ_t captures year-specific effects.

The relevance and validity of the instruments are evaluated using a series of established diagnostic tests. First-stage F-statistics, including the Cragg-Donald and Sanderson-Windmeijer statistics, are examined to ensure that the instruments are sufficiently strong, thereby mitigating concerns of weak identification that could bias the estimates. Hansen's J-test is employed to assess the validity of the overidentifying restrictions, providing evidence on whether the instruments are jointly exogenous and uncorrelated with the structural error term. In addition, the Durbin-Wu-Hausman test is applied to confirm the endogeneity of airfare and frequency.

4. Findings

4.1. Descriptive statistics results

Table 2 summarizes the descriptive statistics of the variables used in our study, highlighting the significant variability in key determinants of domestic air travel. The sample consists of 4254 Origin-Destination pairs across seven countries, each with at least 500 passengers per year. Observations with fewer than 500 annual passengers were excluded from the analysis.

The average number of passengers across domestic air routes in the seven sample countries, combined with the high standard deviation,

Table 2
Descriptive statistics of the variables.

Variable	Observation	Mean	St. deviation
Passenger	4, 254	62, 226	192, 332
Distance (Km)		520	353
Total average fare $		100	71
Frequency		478	749
Available seats		44, 814	100, 052
Connectivity (total flights)		13, 631	21, 884
Government share		59.8%	37.1%
LCC share		46.5%	38.5%
Population		2, 115, 390	2, 922, 092
GDP per capita $		3, 651	1, 933
Liberalization		0.53	0.2
Aircraft size		44, 100	1067.4
Operators		4.52	1.78
Inflation		149.18	1.44
Education index		0.68	0.17

indicates significant variability in passenger numbers across different routes. This variation may stem from differences in population sizes, economic conditions, or the level of air service development in various regions. Gwilliam (2011) emphasizes that air travel demand in Africa is often concentrated in a few major hubs, leading to disparities in passenger numbers across different routes. This concentration reflects the high variability observed in the passenger data.

Approximately 60 % of the airlines operating domestic flights in these countries are government-owned. However, this figure varies significantly among the sampled countries. For instance, a state-owned airline holds around 34 % of the domestic market share in South Africa, compared to 95 % in Ethiopia. This indicates a mix of government-dominated and privatized airlines across Africa. While government ownership in African airlines has traditionally been common, there has been a trend towards privatization, as noted by Schlumberger (2010). The variability in government ownership may reflect this transitional phase.

The average share of low-cost carriers (LCCs) is 46.5 %, but there is a high standard deviation, indicating significant variation in LCC penetration across the continent. Some markets have a substantial LCC presence, while others are dominated by traditional carriers. The varying presence of LCCs across Africa is documented by Budd and Ison (2017), who note that while some regions have seen a rise in LCCs, others remain underserved by these cost-effective alternatives.

Fig. 3 indicates that the number of flights, the education index, and GDP all have a positive correlation with travel demand. Conversely, passenger demand and airfare appear to be negatively related. The positive correlation between the number of flights and passenger demand suggests that as the number of flights increases, passenger demand also increases. This is intuitive, as more flight options typically enhance accessibility and convenience, leading to higher demand for air travel. Graham and Dennis (2010) highlight that an increase in the number of available flights generally correlates with higher passenger demand due to improved connectivity and flexibility. A positive correlation between passenger demand and the education index suggests that higher levels of education are associated with greater demand for air travel. Educated individuals are often more likely to travel for business, education, and leisure. Valdes (2015) found that higher education levels are linked to increased travel propensity, as educated individuals tend to have more disposable income and travel for professional and educational purposes. The negative correlation between passenger demand and airfare aligns with economic theory, which suggests that higher prices tend to reduce demand. As airfare increases, the cost of travel becomes prohibitive for some passengers, leading to a decrease in demand.

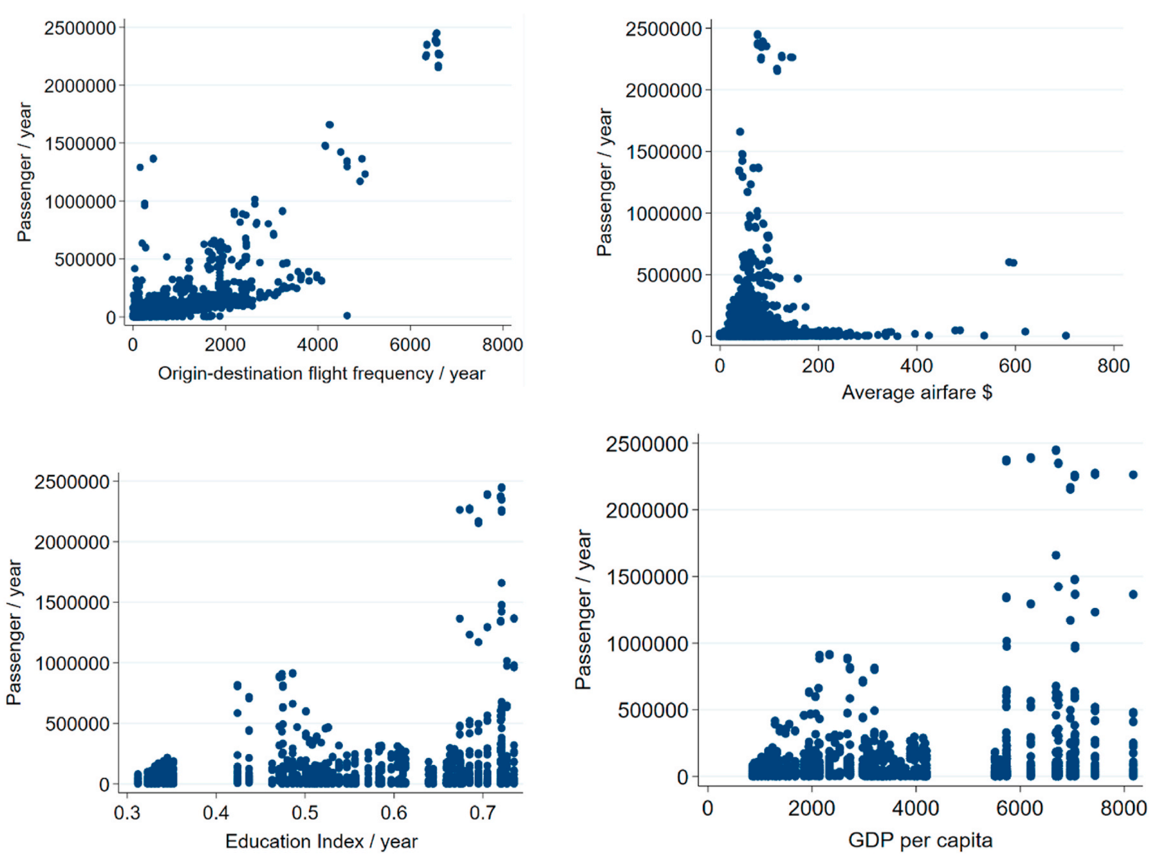


Fig. 3. Scatter plots of passenger demand and independent variables.

4.2. Estimation results

Table 3 presents the 2SLS estimate of the passenger demand equation. Across the model specifications, the estimated price elasticity of demand lies between −0.51 and − 0.46, statistically significant at the 1 % level, and consistent with price-inelastic demand in markets with a relatively high proportion of essential or business travel. The magnitudes are in line with Cristea et al. (2025), once differences in route coverage, market structure, and control variables are taken into account.

To address concerns of spatial dependence, we clustered standard errors at the route level. This approach is widely adopted in transport and regional economic studies, as it captures potential intra-route correlation across observations sharing common network or market characteristics. Additionally, we calculated Variance Inflation Factors (VIF) for all explanatory variables in the baseline model; the results (refer Appendix 3) show VIF values well below the conventional threshold of 5 (mean = 2.4; maximum = 3.5), showing that the explanatory variables are sufficiently independent for reliable estimation.

Flight frequency has a positive and statistically significant elasticity between 0.66 and 0.70. These values indicate that schedule convenience is an important determinant of demand, with a somewhat larger proportional effect than price changes. While Cristea et al. (2025) reports higher frequency elasticities (≈1.3), the result in line with Schipper et al. (2002) in which frequency is recognized as a demand driver and a decision variable influenced by demand.

Table 3
Two-stage least squares (2SLS) estimate of domestic air passenger demand.

	Dependent variable: *lnPassenger*		
	Model 1	*Model 2*	*Model 3*
ln(*Fare*)	− 0.51*** (0.198)	− 0.48*** (0.186)	− 0.46*** (0.179)
ln(*Frequency*)	0.70*** (0.272)	0.68*** (0.264)	0.66*** (0.256)
ln(*GDP*)	0.29** (0.148)	0.27** (0.138)	0.26** (0.133)
ln(*Population*)	0.21** (0.107)	0.22** (0.112)	0.19** (0.097)
ln(*Connectivity*)	0.69** (0.268)	0.71** (0.276)	0.68*** (0.264)
LCC Share	0.33** (0.168)	0.41** (0.209)	0.38** (0.194)
Government Share	0.33 (0.210)	0.41 (0.249)	0.37 (0.225)
lnDistance	0.16 (0.218)	0.201 (0.327)	0.17 (0.429)
$\ln\text{Distance}^2$	− 0.103 (0.181)	− 0.11 (0.159)	0.106 (0.136)
Education Index	0.14 (0.212)	0.16 (0.329)	0.13 (0.134)
Constant	0.87 (0.530)	0.72 (0.438)	0.69 (0.419)
Route FE	*YES*	*YES*	*YES*
Year FE	*YES*	*YES*	*YES*
Observations	4,254	4,254	4,254
$R-$ *squared*	0.70	0.72	0.73
$F-$ *stat*	24.8	26.1	27.4
Hansen J ($p-val$)	0.31	0.34	0.29
Hausman ($p-val$)	0.013	0.011	0.009

Notes: The first-stage regression results are reported in Appendix 1. Robust standard errors clustered at the route level are reported in parentheses. Significance levels: $p < 0.10$*, $p < 0.05$**, $p < 0.01$ ***.

Among the control variables, macroeconomic factors behave as expected. Income (*lnGDP*) and market size (*lnPopulation*) both have positive and significant elasticities, consistent with standard gravity-type effects in air transport. Network connectivity also shows a strong and significant positive association, reflecting the role of hub structures and interline connections in enhancing route attractiveness. The share of low-cost carrier services is positive and significant, indicating the traffic stimulating role of increased competition and lower fares. Government share in airline ownership has a positive but statistically insignificant effect across specifications, suggesting that direct state involvement in carriers is not a primary determinant of demand after accounting for fare, frequency, and other controls. Education index effects are also statistically insignificant, consistent with limited short-run variation in this indicator.

In general, the findings suggest that policies facilitating increases in flight frequency are likely to stimulate demand as effectively than fare reductions alone. The significant roles of connectivity and LCC penetration further imply that route development and market entry policies could have substantial demand enhancing effects. These conclusions align with the literature on African (Cristea et al., 2025) and European (Schipper et al., 2002) markets, where increased competition and service quality improvements jointly drive traffic growth.

While the estimates in Table 3 provide robust average elasticities for the sample, these results necessarily aggregate across markets with heterogeneous economic structures, network configurations, and competitive conditions. Such aggregation may conceal cross-country variation in the magnitude and significance of demand responses to the determinants. To examine this heterogeneity, Table 4 reports the results of estimating the same 2SLS specification separately for each of the seven sample countries.

From Tables 4 and it is possible to observe three important points. First, frequency matters everywhere, but its impact is significant where international leisure flows dominate flows dominate (e.g., Morocco) or where network expansion may attract more passengers (e.g., Nigeria). Second, price reductions remain important, especially in more price-sensitive markets (Ethiopia, Algeria), reinforcing the value of measures that intensify competition and reduce operating costs. Third, network position and competition amplify both margins: positive connectivity and LCC share coefficients across countries indicate that hub development, entry facilitation, and route liberalization can turn frequency or fare change into larger demand elasticity.

4.2.1. Frequency

The country-specific 2SLS results in Table 4 show a statistically significant and positive association between flight frequency and passenger demand across all seven markets. In the results the elasticity ranges from 0.54 in South Africa to 0.75 in Morocco, with consistently strong coefficients in Algeria (0.63), Nigeria (0.70), Egypt (0.67), Ethiopia (0.61), and Kenya (0.57). These magnitudes imply that a 1 % increase in yeary departures leads to a 0.54–0.75 % increase in passenger volumes, indicating the importance of schedule convenience as a driver of demand. Higher frequencies reduce schedule delays, improve connection options, and can stimulate competition, thereby attracting more travellers (Wei, 2014). The stronger effect in countries such as Morocco may be due to high tourism demand, while in Nigeria, it could be linked to a large population and robust economic activities. The relatively smaller elasticity for South Africa likely reflects a mature market with already high frequencies, where additional flights yield smaller proportional gains. Similar to these findings, Hakim and Merkert (2019) showed that increased frequency stimulates air passenger demand by improving

Table 4
2SLS estimates of domestic air passenger demand for each sample country.

	Dependent variable: *lnPassenger*						
	Algeria	Nigeria	South Africa	Egypt	Ethiopia	Morocco	Kenya
ln(Frequency)	0.63*	0.70*	0.54*	0.67*	0.61*	0.75*	0.57*
ln(Fare)	− 0.57*	−0.50*	−0.49*	−0.55*	−0.61*	−0.42*	− 0.53*
ln(Population)	0.33*	0.24	0.23*	0.27*	0.22	0.17*	0.14
ln(GDP)	0.30*	0.45*	0.37*	0.41*	0.22*	0.20*	0.32*
ln(Connectivity)	0.57*	0.62*	0.75*	0.66*	0.73	0.70	0.65*
lnDistance	0.05	0.07	−0.04*	0.08	0.17	0.15	0.18
$\ln Distance^2$	−0.21*	− 0.18	− 0.14	− 022	− 0.26	− 0.19	− 0.11
Government Share	0.50*	− 0.28	− 0.45	0.33	0.36*	0.13*	−0.26*
LCC Share	0.28	0.50*	0.65*	0.36*	0.02	0.54*	0.44*
Education Index	0.28	0.15	0.26*	0.19*	0.17	0.25*	0.30*
Constant	1.61*	3.77	5.65*	1.92*	3.91	7.22*	2.45*
Route FE	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
Year FE	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
N	1100	606	834	299	537	404	474
R^2	0.83	0.70	0.71	0.73	0.68	0.72	0.69
$F-stat$	14.2	21.5	18.3	19.1	20.7	26.4	16.7
Hansen J $(p-val)$	0.27	0.35	0.33	0.30	0.29	0.31	0.28
Hausman $(p-val)$	0.015	0.012	0.011	0.013	0.010	0.009	0.014

Note: * $p < 0.05$

schedule convenience and intensifying route-level competition.

4.2.2. Fare

Airfare has a statistically significant and negative effect on passenger demand across all markets, with elasticities ranging from − 0.42 in Morocco to −0.63 in Ethiopia. These results are consistent with economic theory and prior empirical evidence that higher prices suppress demand (Dargay and Hanly, 2001; Alperovich and Machnes, 1994). The largest fare elasticities are observed in Ethiopia (−0.61) and Algeria (−0.57), suggesting that demand in these markets is particularly sensitive to changes in ticket prices. This may be linked to the limited presence of low-cost carriers and the dominant role of national airlines such as Ethiopian Airlines and Air Algérie, which face fewer competitive pressures to lower fares. By contrast, Morocco (−0.42) and South Africa (−0.49) show the least price sensitive demand, potentially reflecting more competitive market structures, greater network integration, and a higher proportion of inelastic leisure and business travel. Nigeria (−0.50), Egypt (−0.55), and Kenya (−0.53) fall near the sample average, indicating balanced sensitivity between affordability and service quality considerations. Although the model estimates demand elasticity at the route level, the impact of airfare on air travel likely reflects market conditions in the catchment area.

4.2.3. Population

Population size generally has a positive relationship with passenger demand. Bhadra and Wells (2005) and Dobruszkes et al. (2011) highlight that population size and density, especially in urbanized areas, influence passenger demand. The study's findings reveal that high population alone does not drive higher air travel demand, emphasizing the importance of other factors. Nigeria (≈218 million in 2022) and Ethiopia (≈123 million in 2022), the top two populated countries in Africa, do not have higher passenger demand than South Africa (≈60 million in 2022) and Morocco (≈37 million in 2022). Population size coefficients in Nigeria, Kenya, and Ethiopia are not statistically significant, indicating that factors beyond population size, such as economic conditions, urbanization, infrastructure quality, and air travel culture, play significant roles. For instance, South Africa's relatively higher air travel demand could be attributed to its more developed infrastructure, higher GDP per capita, and established travel habits. The insignificant population size coefficients in Nigeria, Kenya, and Ethiopia highlight the need to consider multiple factors when assessing air travel demand.

4.2.4. GDP

GDP per capita has a positive and significant relationship with air travel demand. This indicates that economic prosperity boosts air travel demand, consistent with previous studies. Marazzo et al. (2010) and Dargay and Hanly (2001) found a strong correlation between GDP and air travel demand. The study's observation of a weaker relationship may reflect regional differences or varying stages of economic development in Africa compared to other regions. The effect is stronger in Nigeria and Egypt. Conversely, the impact of GDP is relatively weaker in Ethiopia and Morocco. In Nigeria, higher GDP is strongly linked to increased disposable income and higher demand for air travel. However, the variations in the impact of GDP across these countries can be explained by differences in their economic structures and sectoral dynamics. Nigeria's growing economy has increased disposable income, particularly among wealthier segments, driving demand for air travel, despite high costs. Urbanization and business activities also boost domestic air travel, especially for business trips between major cities like Lagos, Abuja, and Port Harcourt. This aligns with Nwaogbe et al. (2023), which found that National Disposable Income and Airfare are key determinants of domestic air travel demand in Nigeria. Their study showed strong statistical relationships between these factors and passenger demand, with significant P-values of 0.0013 and 0.0017, respectively.

The impact of GDP on domestic air travel varies significantly between Egypt and Morocco. In Egypt, the relationship is stronger, with a coefficient of 0.41, indicating that as GDP increases, there is a more significant rise in domestic air travel demand. This could be attributed to Egypt's diversified economic structure, where a growing economy likely boosts domestic consumption, tourism, business travel, and government-related air travel. The tourism sector in Egypt is a key contributor to the economy, supporting 1.2 million jobs and contributing USD 15.0 billion to GDP (IATA, 2023a). In contrast, Morocco's GDP has a relatively weaker impact on domestic air travel, with a coefficient of 0.20. The substantial contribution of tourism to Morocco's economy, with the sector generating USD 8.5 billion in GDP and employing over 680,000 people (IATA, 2023b), means that demand for domestic air travel is less sensitive to changes in the country's economic performance. Despite Morocco having a significant middle class relative to its population, the total number of middle-class individuals is lower due to its smaller population of 37 million in 2022 compared to Egypt's 111 million and Nigeria's 218.5 million. This larger population base in Egypt and Nigeria results in a greater number of middle-class individuals, leading to a stronger influence of GDP per capita on air travel demand. Compared to Egypt and Morocco, Algeria's air transport sector is still developing but shows significant potential. The aviation sector contributes USD 2.1 billion (0.9 % of GDP), supporting 59,200 jobs (IATA, 2023c). Algeria, though making progress, lags behind in terms of infrastructure, tourism and economic impact.

Conversely, Ethiopia, despite its large population of 123 million, has a lower concentration of middle-class individuals, as noted by Deloitte in 2024 (Deloitte 2025), which may limit the impact of GDP per capita on air travel demand in the country. Despite strong economic growth, with a 7.2 % GDP increase in FY 2022/23, it remains one of the poorest countries, with a per capita income of $1,020, aiming for lower-middle-income status by 2025 (World Bank, 2023). The aviation sector in 2023 contributed USD 2.0 billion, or 1.2 % of Ethiopia's GDP, and supported 527,400 jobs (IATA, 2023c). According to Johnston (2008) and Lucas and Jones (2009), the correlation between economic growth and air travel demand may not be constant over time and is influenced by other factors.

Kenya stands as the most developed economy in East Africa, with a thriving tourism industry. The country also benefits from a robust aviation sector, supported by an open economy and a liberalised air transport market that includes both private and low-cost carriers (Njoya et al., 2020). The aviation industry plays a vital role in Kenya's economy, supporting around 410,000 jobs and contributing approximately US $3.2 billion to the GDP, which represents about 4.6 % of the nation's total economic output (IATA, 2023c). South Africa, on the other hand, is the most advanced economy in sub-Saharan Africa and the country with the strongest domestic air travel market on the continent. Its well-established aviation sector plays a crucial role in the country's economic growth, facilitating business, tourism, and trade. The relatively strong relationship between GDP (0.37) and domestic air travel in South Africa can be attributed to the significant economic contributions made by the air transport sector, which supports 3.2 % of the country's GDP, or US $9.4 billion (IATA, 2023b).

4.2.5. Connectivity

Connectivity, measured by the number of direct flights from an airport, show a strong and statistically significant positive effect on passenger demand across all sample countries. Elasticities range from 0.57 in Algeria to 0.75 in South Africa, with particularly high values also in Ethiopia (0.73), Morocco (0.70), and Nigeria (0.62). These results indicate that better connected airports attract more passengers by facilitating both regional and international travel, improving access to onward transfer connections, and enhancing schedule convenience. The strong effect observed in South Africa reflects the hub role of OR Tambo International Airport in Africa's air transport network, while Ethiopia's high elasticity highlights Bole International Airport's importance as a rapidly expanding intercontinental hub. High connectivity not only stimulates tourism but also supports business travel and trade, thereby contributing to economic development. This finding is consistent with Bhadra and Kee (2008) and Dobruszkes (2011), which highlight the importance of airport connectivity and regional hubs in driving air travel demand.

4.2.6. Distance

The effect of geographical distance on passenger demand shows mixed results. While the direct distance coefficient is positive, the squared distance coefficient is negative, indicating diminishing returns on passenger numbers for very long distances. This suggests air travel is preferred for medium to long distances but faces competition from other modes of transport for short distances. Country-specific results show variations, with a positive impact in Ethiopia and Morocco, possibly due to the vast geographical areas and significant international travel, respectively. The study's findings align with general trends in the literature, where air travel is preferred for longer distances but may face competition from other transport modes for short distances.

4.2.7. Government share

The effect of government ownership of airlines on passenger demand is ambiguous. However, at the national level, state ownership positively influences demand in Algeria, Ethiopia, and Morocco, likely due to better funding and reliable services and enhanced connectivity, which can boost passenger confidence and usage. In these countries, government support helps maintain a stable and extensive flight network. In contrast, the negative impact in Kenya and Nigeria might be due to competitive crowding out or operational inefficiencies, which can result in poor service quality, lower reliability, and reduced passenger demand. These mixed results highlight that the effectiveness of state ownership varies by context, with some countries benefiting from state-run airlines while others do not. The literature, such as studies by Luke and Walters (2013), generally suggests that deregulation and reduced state control boost air travel demand. The study's mixed findings indicate that the impact of state ownership may depend on specific national contexts and the effectiveness of state-run airlines.

4.2.8. Low-cost carrier share

The presence of low-cost carriers significantly boosts air travel demand, as shown by coefficients of the sample countries. This effect is particularly strong in South Africa, Morocco, and Nigeria, where LCCs provide affordable travel options, increasing accessibility and demand. Low-cost airlines are particularly relevant in the African context lower average incomes and underdeveloped surface transport network. The Centre for Aviation (CAPA) reported that in 2019, low-cost carriers (LCCs) accounted for 60 % of the South African market, whereas their share in the overall intra-Africa market was approximately 13 %. LCCs based in South Africa include Mango Airlines, Fastjet, FlySafair, and Lift. Other countries like Egypt (FlyEgypt), Kenya (Jambojet), and Morocco (AirArabia Maroc) also have LCCs, though their fleets remain small (Klišauskaitė, 2022, January 18). The lower impact in Ethiopia might reflect a less developed LCC. Several studies indicate that the emergence of low-cost airlines has been pivotal for the development of air travel and tourism, similar to the impact of charter airlines and aviation deregulation (Bieger and Wittmer, 2006; Graham and Dennis, 2010; Castillo-Manzano et al., 2011; Efthymiou and Christidis, 2023).

4.2.9. education index

The education index positively affects travel demand, across the sample countries, indicating that higher education levels correlate with higher air travel demand. This is particularly evident in South Africa Kenya, and Morocco, where better-educated populations likely have higher disposable incomes and greater propensity to travel. Cook et al. (2017) argue that individuals with higher education levels typically have higher incomes, which leads to a greater likelihood of using air travel for leisure.

To place our elasticity estimates in context, we compare them with those reported in prior studies from other regions. The estimated elasticities across the seven African countries reveal broadly consistent patterns in air travel demand, with some notable variations. Fare elasticities range from −0.42 to −0.61, indicating moderately inelastic demand across all markets. These values are slightly higher (in absolute terms) than typical estimates for domestic routes in the United States (≈−0.4; Escañuela Romana et al., 2023) and Europe (−0.3 to −0.4; InterVISTAS, 2007). Frequency elasticities, ranging from 0.54 to 0.75, are comparable to those observed in European markets (around 0.4; Boonekamp et al., 2018), highlighting the strong influence of service availability on stimulating demand. Income elasticities, proxied by GDP per capita and ranging from 0.20 to 0.45, are slightly lower than those typically found in high-income markets (0.4–0.6; Brons et al., 2002). This suggests that income growth in Africa translates less directly into air travel expansion, likely due to affordability constraints and limited-service coverage.

Overall, the comparative evidence indicates that African domestic air travel demand follows mechanisms similar to those observed elsewhere, though with heightened sensitivity to service frequency and slightly stronger fare responsiveness. These findings emphasize the potential benefits of liberalization under the Single African Air Transport Market (SAATM) and improvements in service connectivity, in line with broader continental integration initiatives.

5. Conclusions and implications

The aim of this study was to investigate the key determinants of domestic air travel demand within African countries, addressing a gap in the existing literature that has largely focused on international routes or domestic air travel in regions like the U.S., Europe, or Asia. The study's comprehensive inclusion of socio-economic variables (like education levels and GDP per capita) and service-related factors (such as flight frequency, airfare, and the presence of low-cost carriers) enriches the understanding of what drives domestic air travel in Africa.

At the scientific level, this study contributes to the broader aviation literature by highlighting the unique dynamics of the African market. It underscores the importance of considering both socio-economic and service-related factors simultaneously to fully understand air travel demand. The impacts vary across countries, reflecting the diverse economic and infrastructural landscapes of Africa. Our findings emphasize the need for tailored policies that address the specific socio-economic conditions and service quality gaps in different African regions.

At the policy level, these results have direct implications. Policies promoting low-cost carriers, improving airport connectivity, and fostering economic growth are essential for stimulating domestic air travel across the continent. The African Continental Free Trade Area (AfCFTA) is poised to increase trade and economic activity, which can lead to higher demand for air travel (African Union, 2018). Our study confirms a bi-directional causal link between aviation and economic activity, suggesting that economic growth and increased trade can drive air travel demand, while investment in aviation infrastructure and promoting low-cost carriers can contribute to overall economic growth.

Within this policy context, our findings align with key African Union initiatives. The Programme for Infrastructure Development in Africa (PIDA-PAP 2) emphasizes the importance of developing Africa's transportation infrastructure (AUDA-NEPAD, 2023). Our results support the objectives of the Single African Air Transport Market (SAATM), which aims to create a unified air transport market in Africa (African Union, 2015), promoting low-cost carriers, improving airport connectivity, and reducing regulatory barriers to stimulate domestic air travel and foster economic growth.

In terms of policy implications, the study highlights the importance of supporting low-cost carriers (LCCs), which have a positive impact on air travel demand. Governments could consider policies that reduce regulatory barriers and invest in airport infrastructure to foster a more competitive and accessible air travel market. The results corroborate the conclusions of earlier studies that identify a strong correlation between deregulation and growth in African aviation (Njoya et al., 2018; Abate and Christidis, 2020). The significance of airport connectivity in driving demand suggests that investments in airport expansion, increased direct routes, and improved intermodal transport links are crucial. Enhancing connectivity not only boosts air travel demand but also promotes regional economic integration, facilitating trade and tourism. Government support in increasing connectivity would be, therefore, fundamental for ensuring the availability of supply in aviation services, as suggested in a growing number of studies (for example, Abate et al., 2020). Additionally, the positive correlation between GDP per capita, education levels, and air travel demand suggests that broader economic and educational policies could indirectly boost air travel.

For the aviation industry, airlines could focus on optimizing pricing strategies to balance affordability and profitability, particularly in price-sensitive markets. Increasing flight frequency on high-demand routes and enhancing airport connectivity through strategic route planning could attract more passengers. The findings suggest that airlines should target growth in regions with higher GDP growth, larger populations, and higher educational attainment, as these areas are likely to see increasing demand for domestic air travel. With the rise of LCCs, traditional carriers may need to differentiate their offerings by enhancing customer experience, offering loyalty programs, and ensuring reliable service to maintain a competitive edge.

While this study provides valuable insights for policymakers and industry stakeholders in Africa, limitations should be acknowledged. Data availability constraints, particularly regarding route-level competition, fuel price volatility, and national policy interventions may have affected the precision of elasticity estimates. These data were omitted from the analysis because comparable, publicly available information was not consistently obtainable across all sample markets. Despite these limitations, the findings provide a more nuanced understanding of the determinants of domestic air travel demand in Africa and offer an empirical foundation for evidence-based policy and investment decisions in the region's aviation sector. Further research is needed to address existing data limitations and to explore additional factors, such as route-level competition, digital connectivity, and tourism potential, that may shape future demand dynamics.

CRediT authorship contribution statement

Tassew Dufera Tolcha: Writing – review & editing, Writing – original draft, Visualization, Software, Methodology, Formal analysis, Data curation, Conceptualization. **Eric Tchouamou Njoya:** Writing – review & editing, Writing – original draft, Formal analysis, Data curation, Conceptualization. **Panayotis Christidis:** Writing – review & editing, Data curation, Conceptualization.

Disclaimer

The information and views set out are those of the authors and do not necessarily reflect the official opinion of Molde University College, DCU Business School, or the European Commission.

Appendix 1. First-Stage Regression Results

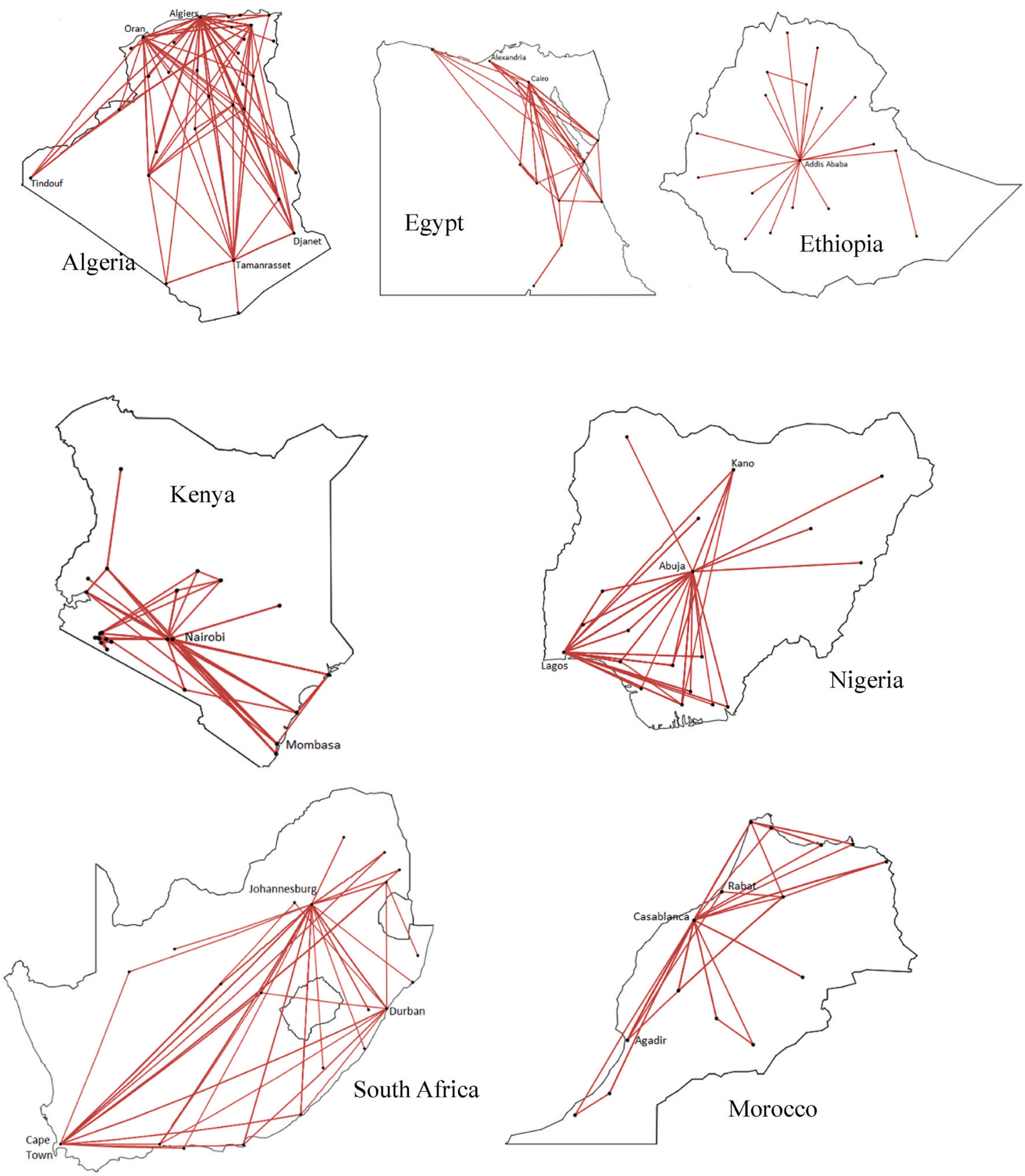
	Dependent Variables			
	lnFare	*Std. Error*	*lnFrequency*	*Std. Error*
ln(*Inflation*)	0.13***	0.041		
MktStructure	− 0.185***	0.051		
Liberalization	− 0.142**	0.068	0.23***	0.055

(*continued on next page*)

(*continued*)

	Dependent Variables			
	lnFare	*Std. Error*	*lnFrequency*	*Std. Error*
ln(*Distance*)	0.32	0.42	0.13	0.370
lnAircraftSize			− 0.21**	0.085
lnOperators			0.305***	0.070
Constant	1.51	1.11	0.97	1.07
Observations	4, 254		4, 254	
R-squared	0.67		0.71	
F-stat	28.3		35.9	

Appendix 2. Domestic air transport networks of the sample countries as of June 2023



Appendix 3. Variance Inflation Factors (VIF) report

Variable	VIF	1/VIF
ln(Fare)	2.13	0.47
ln(Frequency)	2.56	0.39
ln(GDP)	3.48	0.29
ln(Population)	3.02	0.33
ln(Connectivity)	2.21	0.45
LCC Share	1.85	0.54
Government Share	1.92	0.52
ln(Distance)	2.44	0.41
Education Index	2.11	0.47
Mean VIF	**2.41**	–

Data availability

Data will be made available on request.

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