A GRAPHICAL ANALYSIS OF AIR TRAVEL DEMAND AND SOCIAL DEVELOPMENT: THE ROLE OF FINANCIAL INCLUSION

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ABSTRACT

Although the airline industry presents similar operational and management strategies worldwide, there might be particular characteristics among developed and developing economies that might impact demand accordingly. In this paper, the objective is to gather evidence that social development indicators might explain the development of air transportation services in emerging economies while specifically investigating the role of financial inclusion. Our results suggest that financial inclusion may not be associated to more passengers in High Income and in Low Income countries. However, the evolution of financial access could represent an indicator to increase demand in Upper Middle Income, Middle Income and Lower Middle Income countries. Therefore, financial inclusion may represent a dimension to be further explored in the literature of the determinants of air travel demand in developing economies. Further statistical analysis are required to corroborate our results.

Keywords: Air travel demand, Financial inclusion, Middle income economies.

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1. INTRODUCTION

Although the airline industry presents similar operational and management strategies worldwide, there might be particular characteristics among developed and developing economies that could impact demand accordingly. Country-specific levels of socioeconomic development and inhabitants capabilities are able to leverage or inhibit demand, i.e., the income-elasticity of air travel demand present different values among these economies: it is more accentuated in emerging than in developed economies.

According to the World Bank, "financial inclusion is a key enabler to reducing poverty and boosting prosperity" as it presents a dimension of population capabilities to access financial services such as transaction accounts, borrowings and financing (Demirguc-Kunt et al., 2018). Accessing financial services could facilitate day-to-day living, and helps people to plan for both long-term goals and unexpected events. As accountholders, it is expected that people may use other financial products, such as credit and insurance, which can improve the overall quality of life. Recently, engaging with digital financial inclusion represents another key characteristic of population capabilities to deal with digital payments and digital financial services (Arner et al., 2020).

In this paper, we specifically cover the role of financial inclusion as a social development indicator to investigate its relationship with the air travel demand, considering different income-level groups of countries. In fact, the world has seen an increase from 51% to 69% of banked adults from 2011 until 2017 (Demirguc-Kunt et al., 2018). The objective is to gather evidence that social development indicators might explain the development of air transportation services in emerging economies. Therefore, we explain that the dynamic of air travel demand is defined according to the income-level and there might be particularities of each income group that drive its growth. Our contribution rely on investigating a complementary dimension of social development as driver of air travel demand, other than focusing our analysis on the usual income and airfares as drivers.

Besides this introduction, the study is presented as follows: Section 2. presents similar studies that have already been done. Section 3. details the methodology proposed. Section 4. shows the results and the discussion. Finally, Section 5. pinpoints the main conclusions.

2. BACKGROUND

This section presents main empirical findings on the determinants of air travel demand. Due to the more mature aspect of airline market in developed economies, we substantially focus on the evidences from emerging economies, where social development is expected to arise and possibly impact air travel consumption. Besides that, the academy has also showed interest on better understanding the forces that drive air travel demand on these under development markets (Njoya & Knowles, 2020).

The literature shows that air travel demand possesses many drivers. The most traditional are income and airfares (or at least proxies for both) as explained by the consolidated consumer theory. Empirical evidences appear in the studies of both Valdes (2015) and Hakim & Merkert (2019) which investigate the determinants of air transport in emerging markets. The former study analyze a panel data of 32 middle-income countries and state that income is the main driver, what is corroborated by the latter that presents similar results while analyzing South Asian low-income countries. Open Skies Agreement and low-cost carriers penetration also play an important role in inducing demand on those markets.

Although the air travel demand is a high interest research topic due to the amount of literature available, Becken & Carmignani (2020) noted that pre-pandemic projections of demand could be unrealistic. In their study, they brought the environmental discuss to deny optimistic forecasts made by the industry and to propose a model accounting for emissions and economic changes. From their work we absorb the motivation to keep investigating the dynamics of air travel demand.

Adey et al. (2007) defended that new studies in the air transportation field should adopt the social perspective, what has been reinforced by Falcão et al. (2021). They said it would be a

fundamental piece for studies considering a transportation mode that classifies itself as a globalization inductor. By taking their perspective, Frazão & Oliveira (2020) identify a positive correlation between reducing income inequality and air travel demand in Brazil. They also provide evidence that an emerging middle-class in the country is associated with a higher price-elasticity of air travel consumption. Evidences of middle-class airline tickets consumption behavior are also provided by Carvalho et al. (2020) whose study demonstrates that access to credit is an indicator that should be included in air travel demand modelling in emerging economies.

Some studies also investigate the role of the Human Development Index (HDI), which is a wide accepted indicator of a country socioeconomic development. İnan et al. (2021) and Santos et al. (2021) provide contrasting evidences of the existing relationship between this index and air travel demand. While the former findings' show a negative correlation, the latter's show positive results, which indicates that better quality of life associated to better economic conditions would be an inductor of passengers. Such results suggest that the relationship between social development and air travel demand may not be similar throughout the world.

The role of financial inclusion in boosting or inhibiting air travel demand is less explore in the extant literature, although Santos et al. (2021) presented an empirical assessment by a two-step econometric approach and panel data to investigate the problem. Their results show a significant influence of financial inclusion over the air travel demand in Brazil in the 2010s. Specifically, the authors investigated the role of access to credit and the opposite effect caused by the adjacent household indebtedness, what economists call the *boom and bust* effect over consumption. In the context of financial inclusion metrics, such study considered variables close to monetary values such as credit, financing and household debt.

3. RESEARCH DESIGN

We employ a graphical analysis to accopmplish the objetive proposed of gathering evidence of the role of financial inclusion to explain air travel demand in emerging economies. We consider the evolution of financial inclusion indicators and the evolution of air travel demand to plot figures and then analyze the results. By doing so, we are able to visually observe differences in the role of financial inclusion among groups of countries that present distinct income level. Subsection 3.1. describes the database and subsection 3.2. provides further details about the analysis.

3.1. Data description

In this paper, we use the World Development Indicators (WDI) database, which is publicly provided by the World Bank Group (WBG) (World Bank, 2021). They explain that WDI database is "the World Bank's premier compilation of cross-country comparable data on development", presenting more than 1,400 socioeconomic and development indicators for 217 economies and more than 40 country groups [1]. The WDI database offers quality data regarding 6 dimensions of development: poverty and inequality; people; environment; economy; states and markets; and global links. Most of the data are available annually since the 1960s, but there are series that have started to be monitored recently. For instance, the financial inclusion indicators are available for just three years: 2011, 2014, and 2017.

As an initial attempt to achieve the proposed objective, our study considers the data regarding the groups of countries classified by income level. It means that our data refers to six classes of countries: High Income; Upper Middle Income; Middle Income; Lower Middle Income; Low & Middle Income; and Low Income. By doing that, we lose the granularity of the data that is available in the country-level but we are able to investigate our main topic of interest: differences among developed and developing countries considering their income level.

[1] The World Bank, available at https://datatopics.worldbank.org/world-development-indicators/

3.2. Graphics description

We observe historical compound annual growth rates (CAGR) of financial inclusion variables to generate our figures and plot them in the X-axis – they represent our instruments of social development. The Y-axis present the historical CAGRs of air travel demand. Since data are available for three time periods, we adopted observations from 2011 (initial value) and 2017 (final value) to calculate the CAGR for both air travel demand and financial inclusion indicators as presented by Equation 1, where N denotes the time interval between initial and final periods ($N = 2017 - 2011 = 6$). The indicators considered for the study are presented in Table 1.

$$CAGR = \left(\frac{Final\ Value}{Initial\ Value} \right)^{\frac{1}{N}} - 1 \qquad (1)$$

We use the volume of air passengers as our variable of air travel demand, but we encourage future research to consider ATMs (aircraft total movements) as well – they are also available in the same database. Our analysis consider four dimensions of financial inclusion as social development indicators. These indicators are related to the capability of inhabitants to access the financial system but they do not account for the availability of financial products, such as borrowings and financing – as in Santos et al. (2021).

Therefore, four figures are presented considering CAGRs of financial inclusion indicators and air travel demand. We consider groups of countries according to their income level classified by the World Bank in the WDI database. Considering distinct income groups allows us to differentiate the dynamics between richer and poorer countries, which is our proxy to infer about the development level of a country. We use neither the GDP nor the GDP per capita because it was easier to use the original classification on income provided by the original database.

4. RESULTS AND DISCUSSION

The current section presents the results. Figure 1 shows the relationship between the evolution of the share of the population aged 15 or more that owns an account at a financial institution or with a mobile-money service provider (MMSP) and the evolution of air travel demand. The figure suggests that the air travel demand have increased more in Upper Middle Income countries, even though financial inclusion evolution were higher in Low Income countries. It is possible to suggest that financial inclusion in Upper Middle Income, Middle Income and Lower Middle Income countries may have a higher probability to be correlated with air travel demand. On the other hand, in Higher Income and in Low Income countries there is a lower probability of observing correlations between these phenomena.

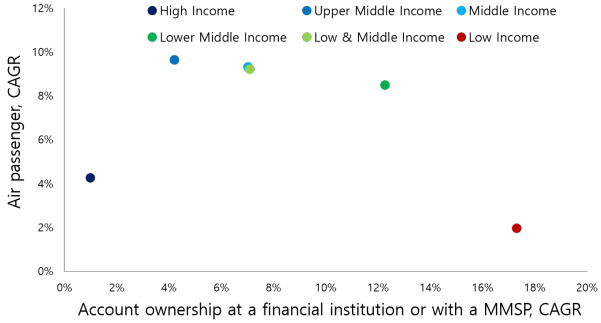

Figure 1 Account ownership at a financial institution or with a MMSP.

Figure 2 shows the relationship between the evolution of the number of Automated teller machines (ATMs) per 100,000 adults and the evolution of air travel demand. Results suggest that ATMs actually decreased in High Income countries what is suggestive of more digitalisation of financial services. Again, Low Income countries form the group of countries with more financial inclusion. Upper Middle Income and Middle Income countries present similar results. In Figure 3, we consider the evolution of borrowers from commercial banks in the X-axis -- data of High Income and Low Income countries are missing. The figure suggests that Upper Middle Income, Middle Income and Low & Middle Income countries have similar characteristics. Differently from whats is observed in Figures 1 and 2, Lower Middle Income countries presented lower evolution of financial inclusion compared to Upper Middle Income and Middle Income countries. This is suggestive that Lower Middle Income countries have received financial services infrastructure but the penetration of financial services has not been too expressive as in other income groups. This is also observed and corroborated by Figure 4.

Table 1 Variables description

Air transport	**Dimesion**
Air transport demand	# of passengers carried
Financial inclusion	**Dimesion**
Account ownership at a financial institution or with a MMSP	% of population aged 15+
Automated teller machines (ATMs)	# per 100,000 adults
Borrowers from commercial banks	# per 1,000 adults
Commercial bank branches	# per 100,000 adults

Note: MMSP stands for *mobile-money service provider*.

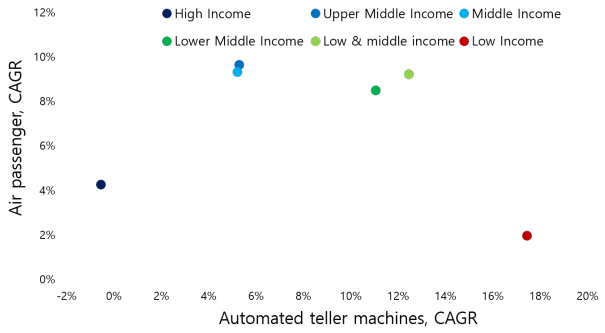

Figure 2 Automated teller machines.

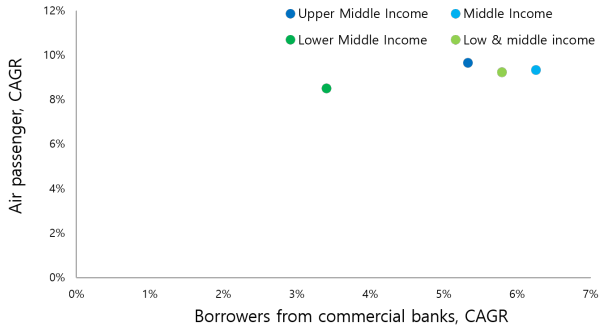

Figure 3 Borrowers from commercial banks.

In Figure 4, we present the relationship between the evolution of the number of commercial bank branches per 100,000 adults and the evolution of air travel demand. Again, negative CAGR of this indicator in High Income and Upper Middle Income countries might be associated to digital financial inclusion. From Figure 4 we understand that the evolution of commercial bank branches in Upper Middle Income and in Middle Income countries may have not increased air passengers as its evolution is close to 0%. Also, we note that this indicator have icnreased more in Lower Middle Income than in Low Income countries, but it is not possible to say that it has a direct positive correlation with air passengers. By the way, we state that the much more pronounced evolution of passengers in Lower Middle Income compared to Low Income countries should be a result of higher income instead of financial inclusion measured by commercial bank branches.

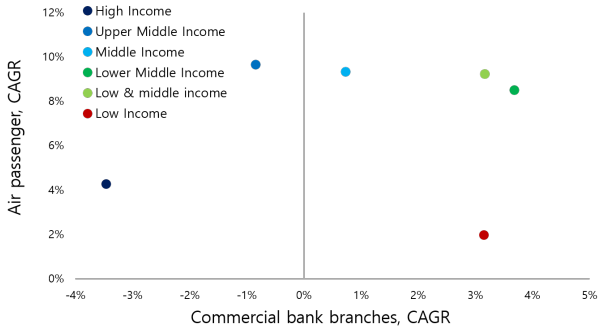

Figure 4 Commercial bank branches.

Based on the results, we note that higher levels of financial inclusion in Low Income countries were not enough to boost air travel demand, suggesting that the industry may not rise from the expansion of financial infrastructure and services. However, if the income level increases, we observe that moderate levels of financial inclusion in Lower Middle Income, Middle Income, and Upper Middle Income countries may be associated with higher air travel demand. Finally, we observe that financial inclusion does not present much evidence to be able to leverage air travel demand in High Income countries. This support our hypotheses that the air travel demand do present different behavior among developed and developing economies and financial inclusion might be a dimension able to explain this consumption behavior in emerging markets.

5. CONCLUSIONS

In this paper, we present an evaluation of the relationship between financial inclusion and air travel demand while considering aggregate data from distinct income-level groups of countries. Our contribution regards in presenting an assessment of a social development dimension that may impact air travel consumption in emerging economies, shedding a light on the role of financial inclusion. Results suggest that financial inclusion may not be associated to more passengers in High Income and in Low Income countries. However, the evolution of financial access could represent an indicator to induce more demand in Upper Middle Income, Middle Income and Lower Middle Income countries. Future research could provide further investigations to improve statistical robustness of evidences gathered in the study. We also encourage other sources of air transportation data to be used and more investigations considering the topic of digital financial inclusion and air transportation.

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