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Determinants of air travel demand in Middle Income Countries

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ABSTRACT

The aim of this paper is to calculate the effects of air travel demand determinants in Middle Income Countries (MICs). Through static and dynamic panel data models from 32 countries during the period from 2002 to 2008, we found that the income elasticity is the most important determinant and that it is slightly higher than one. Income growth multiplied by income elasticity accounts for 75 percent of total passenger growth. Public policies such as an open skies agreements with the European Union have a positive effect on passenger growth, whereas structural changes, such as Low Cost Carrier (LCC) growth, have a marginal effect.

1. Introduction

Air travel demand studies have been of increasing interest to airlines, airports, government institutions and scholars in recent years, since air travel plays a key transport role as the globalization process advances and the features and traveling preferences of the population become more clearly defined. For airlines, analyzing and forecasting air travel demand is essential to managing their fleet. For airports, their assessment of their current and future demand is a fundamental part of their investment plans to expand facilities, while for governments forecasts are a key input for designing public policies to foster economic growth.

Since scholars have undertaken forecasts of air travel demand using various theoretical approaches, types of determinants, degrees of data aggregation, estimation techniques, forecasting methods, degrees of market maturity, world regions and types of travelers, the results are extremely different. Most papers on the subject have focused on the developed world, particularly the United States, the United Kingdom, Spain and Australia, with very few on the developing world (Wang and Song, 2010). The aim of this paper is to contribute to an understanding of the determinants of air travel demand in developing countries, particularly Middle Income Countries (MICs), by using static and dynamic panel data models for 32 countries during the period from 2002 to 2008.[1] This goal is relevant, because as far as we know, no-one has performed this exercise with MICs, and the effects of determinants in MICs may be different from those in High Income Countries (HICs). This paper therefore attempts to shed light on three specific issues: 1) What are the effects of air travel demand determinants in MICs? 2) Are these effects different from those observed in HICs? 3) To what extent does income growth explain total passenger growth in MICs?

The rest of the paper is as follows. Section two presents a literature review of air travel demand determinants around the world, section three discusses the theoretical and empirical issues for identifying and estimating air travel demand determinants in MICs, section four describes the dataset used in this document, section five presents the estimation and results of the econometric analysis, section six discusses the relevance of the empirical findings while the last section presents the conclusions.

2. Literature review

Two types of determinants of air travel demand have been identified in the literature: those outside and those inside the scope of airline control. Jorge-Calderon (1997) called the former geo-economic factors and the latter service-related factors. Geo-economic factors can be divided into activity and locational factors. Activity factors rely on the economic, cultural, and political characteristics of the population where the service is delivered. The most common determinants related to the activity in the literature are population (Abed et al., 2001; Bafail et al., 2000; Jorge-Calderon, 1997; Sivrikaya and Tunç, 2013; Vedantham and Oppenheimer, 1998) and economic growth in the form of gross domestic product (Chèze et al., 2012; Gillen, 2013; Kincaid and Tretheway, 2013;

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[1] This document assumes that HICs are developed countries, and that MICs and Low Income Countries (LICs) are developing countries.

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Vedantham and Oppenheimer, 1998), gross domestic product per capita (Cline et al., 1998; Gillen, 2013; Jorge-Calderon, 1997; Valdes and Ramirez, 2011) and total consumption expenditure (Abed et al., 2001 and Bafail et al., 2000). The most common locational factor is distance (Gillen, 2013; Grosche et al., 2007; Jorge-Calderon, 1997; Piermartini and Rousová, 2008; Sivrikaya and Tunç, 2013; Valdés and Ramirez, 2011). Other studies also include locational factors by considering countries in different parts of the world (Chèze et al., 2012; Gillen, 2013; Vedantham and Oppenheimer, 1998).

Factors related to service, such as price and quality, depend on the airline. Many studies include a price variable or proxy to record their effect (Chèze et al., 2012; Gillen, 2009; Jorge-Calderon, 1997; Sivrikaya and Tunç, 2013; Valdes and Ramirez, 2011) whereas for quality, frequency of departures, load factor and aircraft size are used as proxies.

Moreover, since structural changes and public policies have been key driving forces for air travel demand in recent decades, they must be considered in the empirical estimation of air travel demand in MICs. Those of interest to this study include: deregulation, liberalization and open skies agreements (OSAs) (Adler and Hashai, 2005; Gillen, 2013; Kincaid and Tretheway, 2013; Piermartini and Rousová, 2008; Swan, 2008), LCCs (Dobruszkes, 2009), trade and foreign direct investment (Gillen, 2013) and tourism (Jorge-Calderon, 1997; Sivrikaya and Tunç, 2013).

Bearing in mind all these determinants, we focused our attention on the income elasticity since economic growth has generally been recognized as the key driver for air transport demand (Oum et al., 2009). We also analyzed the effects of liberalization policies and OSAs in depth. For the income elasticity, we compiled a significant number of estimates. For this purpose, the most helpful document is by Gillen et al. (2007), which reports 132 estimates from fourteen papers on developed countries. We obtained another nineteen estimates from six studies on developed countries (Castelli et al., 2002; Department of Transport, 2009, 2011; Jorge-Calderon, 1997; Lubulwa, 1998), five estimates from the same number of studies on developing countries (Abed et al., 2001; Bafail et al., 2000; Cline et al., 1998; Conceição, 2010; Valdés and Ramírez, 2011) and four global estimates from two studies (Cheze et al., 2012; Gillen, 2013). Altogether, we compiled a total of 161 estimates. Fig. 1 shows the value and year of each of the 161 estimates depending on their category: developed, developing or world. Table 1 contains the statistical summary of the 161 estimates together with a summary of estimates since 1997.

If we analyze all these estimates, we find considerable variation due to the difference between the characteristics of the studies: year of study, aggregation level of data (origin-destination, country or region of the world), type of dataset (time series, cross section or panel), estimation method (OLS, Fixed Effects, Arellano Bond, etc.), market type (business, leisure, charter, domestic, international, short haul or long haul) and the inclusion of other key determinants in the estimation (exchange rate, price of substitutes, etc.). If we focus on the period since 1997, Fig. 1 reveals a significant decrease in variation in a subsample of 47 estimates.

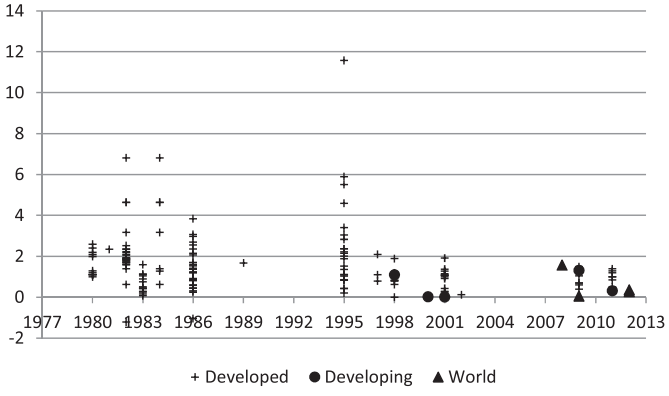

Fig. 1. Income elasticity for developed and developing countries and the whole world. Source: Gillen et al. (2007) and author's literature review.

Table 1
Summary statistics of all studies on income elasticities.

Statistic	All	Since 1997
5th percentile	0.13	0.02
First quartile	0.79	0.40
Median	1.28	1.00
Mean	1.59	0.90
Third quartile	2.00	1.20
95th percentile	4.60	1.58
Interquartile range	1.21	0.80
Number of estimates	161	47
Max.	11.58	2.10
Min.	−1.21	0.01
Variance	2.21	0.27
Skewness	2.86	0.10

Source: Gillen et al. (2007) and author's calculations based on literature review.

A possible explanation for the difference in estimates variation before and after 1997 could be that empirical estimations have overestimated the effect of income, since other factors have not been considered, such as network expansion, improvements in quality, exchange rate fluctuations, inflation, liberalization, deregulation and the LCC boom (Oum et al., 2009; Gillen, 2009; Swan, 2008). Gillen et al. (2007) found a similar pattern among earlier and more recent studies on price elasticity of demand.

For the period since 1997, the subsample contains five estimates from developing countries, and four estimates for the whole world, where there is no significantly different pattern from the estimates for developed countries. Therefore, an initial hypothesis is that the income elasticity of MICs is not significantly different from that of HICs. Empirical results may be more sensitive due to the characteristics of the study than to the countries' income level.

On the other hand, as regards OSAs, Piermartini and Rousová (2008), with a cross section dataset of 2289 routes covering 184 countries since 2005, found that 305 routes, which can be regarded as the most liberalized in the world,[2] had 0.58% more passengers than other routes. The authors also found a positive relation between the countries' income level and the degree of liberalization of bilateral air service agreements (BASA). Using the 50 most important international Canadian routes from 2003 to 2007, Gillen (2013) estimated that those which operated under an OSA had 0.504% more passengers than those without such an agreement. On the basis of a cross section dataset of over 800 routes covering 12 developing countries for 2005, Kincaid and Tretheway (2013) estimated the total increase of passengers due to the generalized adoption of open skies policies. The effects ranged from 9% for Morocco to 47% for Brazil, with a median of 33% for the twelve countries. The difference between Morocco and Brazil was mainly because Morocco has already adopted an OSA with the EU, which accounts for 80% of its international traffic. Therefore the adoption of open skies policies with other countries has less potential.

[2] These routes include those involving Norway (Norway not an EU member state) and the EU countries Iceland and Liechtenstein; those covered by the air transport agreement between EU and Switzerland and those between New Zealand and Brunei Darussalam and Singapore.