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Connecting African urban areas: airline networks and intra-Sub-Saharan trade

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ABSTRACT

Despite efforts to enhance the efficiency of the African air transportation sector through such actions the Yamoussoukro Decision, African represents less than 2% of the world's air passenger kilometers. This is despite the fact that air transportation can act as a means of transporting traded goods directly (including the individuals that are the "product" of tourism) and provide complementary services of labor mobility for those engaged in the production of more bulky goods that are shipped by land and maritime modes. We examine the network of intra-Sub-Saharan African airline connections to highlight the differential access enjoyed by the region's largest cities. Second, we develop a quantitative framework linking the availability of air connections to the main international trade flows in sub-Sahara Africa. Our findings suggest that, although there is a positive link between air transportation and economic development in Africa, the multilateral efforts at reducing institutional impediments to more open aviation markets have not produced significant results.

1. Introduction

Aviation is the fastest growing means of both passenger and freight transportation. In lower income countries, however, it has traditionally been seen much more as a luxury good rather than as an instrument, appropriately used, for fostering economic growth. This has changed somewhat as activities including tourism, and the export of "exotics", such as flowers and fruits (Vega, 2008) have become important for many developing countries, and as there has been significant growth in the production of lower weight, high value products in these countries. Even the traditional extractive industries increasingly rely on air transportation to move personnel and ensure rapid access to components for equipment repair. Overall, however, African air traffic has only grown slowly. For example, according to the World Tourism Organization (UNWTO), tourism growth has lagged behind other regions; e.g. its market share for global tourism grew from 3% in 1980 to 5% in 2010, whereas that for arrivals in the Asia Pacific grew from 8% in 1980 to 22% in 2000.[1]

The focus here is on the link between the provision of air transportation services between Sub-Saharan African countries and the level of trade between them. Trade being seen here not as end in itself, but acting as a driver of economic growth; a view supported in Sub-Saharan context by the analysis of Bruckner and Lederman (2012). To develop this new perspective trade between the Sub-Saharan macro-region and the rest of the world is not considered. It is appreciated that this in no-way represents a full assessment of the role of air transportation in economic development, not least because some of these countries main markets are outside of the area. The interest is in whether developments in air service provision between countries in this region have facilitated, or even stimulated, intra-regional trade. Unlike investment in rail or road transportation that largely carries traded bulk commodities from remote regions, air transportation is more likely tied to urban areas where populations are increasingly concentrated.

The large scale movement of populations to cities, combined with the types of service airlines provide, means that most of the gains from enhanced aviation is to be felt in urban areas, although the extreme notion of the creation of African "Aerotropoles" along the lines suggested by Kasarda and Lindsay (2011) is unlikely in the near future. In 1950 (the start of the "independence period") 14.7% of Africa's inhabitants were urban, in 2000 this had risen to 37.2% and the United Nations expects it to rise to 45.3% in 2015. Lagos, Nigeria, that in 1963 had 665,000 inhabitants and 8.7 million in 2000 is expected to become the world's 11th largest

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[1] General data on global tourism is regularly up-dated at the UNWTO web site; http://www2.unwto.org/.

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city by 2015 with 16 million inhabitants. The urbanization of Sub-Saharan Africa in particular, is growing rapidly.[2]

The Sub-Saharan region, however, contains some of the poorest countries in the world, and, overall, some of the most sparsely populated. Attempts at improving economic conditions, both by countries themselves but also involving international organizations such as the World Bank, the United Nations, and the International Monetary Fund have only enjoyed limited success. In the context of transportation, a long-standing focus on surface infrastructure investment has often proved costly and ineffective. Air transportation has largely been neglected until recently, in part because of an emphasis on developing extractive and manufacturing industries that are mainly dependent on surface modes for market access. The air transportation infrastructure in Sub-Saharan Africa, and in particular ground-based navigation aids, consistently score badly in international comparisons (e.g. Schlumberger and Weisskopf, 2014).

There have also been changes in the way multi-lateral aid has been directed. The World Bank, for example, has traditionally put limited finance into equipment such as aircraft for state-owned airlines, and infrastructure projects. More recently, the liberalization of the air transportation sector, the privatization of many state-owned airlines, and a reorientation of thinking more generally towards trade creation, have seen it shift to a more policy and regulatory support function.

2. Intra-African trade issues

Intra-African trade and international mobility is limited compared to most of the world. An institutionalist may think this surprising. The region contains the South African Customs Union (SACU), established in 1910 and the world's oldest surviving customs union; indeed Africa has 14 trading blocs with overlapping members. Most countries belong to at least two blocs, and many three. Much of sub-Sahara's trade, however, is with Europe and America with only about 12% "internal" with other African countries. Africa's trade looks all the more meager given that fifteen of its countries are landlocked; so much of what crosses their internal borders is in transit, and on its way to or from other countries. The World Bank (Limdo and Venables, 1999) has estimated that such countries pay about 50% more in transportation costs than coastal countries, and have up to 60% lower volumes of trade. We adjust for the possible effects of this geographical factor on intra-African trade flows in addition to GDP differentials.

While the lack of genuine free trade, as opposed to the rhetoric of free trade agreements, is one reason for the limited movement of people and goods, poor infrastructure in the context of difficult physical terrain is another. The World Bank, for example, estimates that only one-third of Africans living in rural areas are within 2 km of an all-season road, compared with two-thirds of the population in other developing regions, and there is considerable variation between countries with a range from 5% for Sudan to 67% for Lesotho. Furthermore, by way of comparison, there are 16.8 km of road per 1000 km^2 in Sub-Saharan Africa compared to 124 km for middle-income countries throughout the World.[3]

The problem is also not only a lack of investment, but also poor maintenance of what is there. Infrastructure, and especially energy and transportation infrastructure, can be expensive to both provide and maintain, and poses serious security issues especially for landlocked nations that have to rely on third-party countries for access to international markets. Surface transit routes also tend to be monopoly channels with the potential for rent-seeking charges being levied for using them. In this context it would seem that air transportation would assume a priority in policy and planning. While it is not relevant to the movement of bulk commodities, air transportation offers flexibility and relatively low infrastructure costs, with a more convenient mix of mobile and fixed capital for developing public–private partnerships, when it comes to high-value low bulk trade items, including the persons involved in the service sector and tourists.

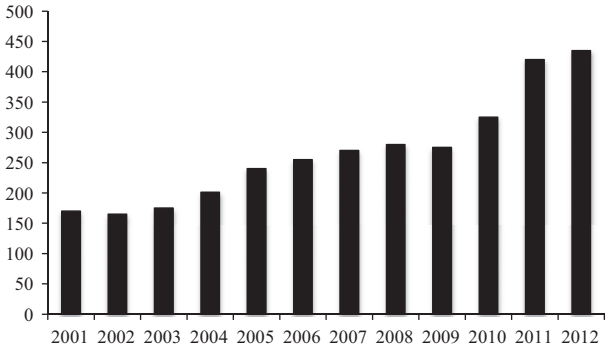

Fig. 1. Sub-Saharan Africa air transportation passengers (annual for January in millions). *Source*: http://data.worldbank.org/indicator/IS.AIR.PSGR.

In the particular context of international transportation, there is also the political challenge of conflicts between short- and long-term objectives (Button, 2010). In the short-term, countries often have limited foreign exchange reserves and thus treat international transportation essentially as an "import" and levy a variety of taxes on it and, because airlines have traditionally been state owned, seek to protect their "flag carrier". *Quid pro quo* actions inevitably lead to aggregate sub-optimal levels of transportation supply and high transportation costs. For longer term development, and, most markedly when it is export led, this lead can stymie the flow of goods from the country, as well as pushing up the price of key components needed in the creation of a modern industrial base.

3. Air transportation issues in the region

In terms of the overall size of its market, depending on the units of measurement used, Africa represents less than 2% of the world passenger aviation market, and less than 1% of the cargo market. Fig. 1, for example, provides some details of the growth in Sub-Saharan air passenger traffic, but this is totally dwarfed by global flow; indeed a graph fitting this data with global data would require two separate scales.

Looking forward, Boeing Commercial Airplanes (2012) forecasts, based on projected trends in such things as GPD, fuel prices, and demographical factors, indicate that African revenue passenger kilometers will grow on average by 5.7% per annum between 2013 and 2032, and cargo by 6.6% compared to global growth of 5% for each. Airbus' (2013) forecasts are slightly lower for Africa, for example 5.1% per annum for revenue passenger kilometers. This outpaces global trends slightly, but it is from a very low base.

A major issue is the lack of genuine interconnectivity within the African air transportation network despite efforts over the years to improve this.[4] Modern legal initiatives began in 1961 when 10 African nations signed the Treaty on Air Transportation in Africa (the Yaoundè Treaty) that established a jointly owned airline, AirAfriqué, although this went into liquidation in 2002. More importantly from a

[2] http://esa.un.org/Unpd/Wup/.

[3] http://data.worldbank.org/topic/infrastructure.

[4] There are some hub and spoke structures (Ssamula, 2012) based upon Johannesburg, Abuja, and Nairobi, but many of the routes are thin. Arvis and Shepherd (2011) provide a more rigorous of the linkages between airline networks in Africa using a connectivity index.