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A drive for better air service: How air service imbalances across neighboring regions integrate air and highway demands

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ABSTRACT

Between 2000 and 2010, newly merged U.S. airlines decreased service to airports in small and mid-sized metropolitan regions, opting to consolidate their operations at high-value airport hubs (passenger transfer points). At this point travelers living in small and mid-sized regions likely began leaking, or abandoning their local airport to take flights from hub airports offering more convenient flight options. The extent of this practice, however, is not well established. Our study asks to what extent airline consolidation deepened the divide in service levels between airports that are 100–300 miles apart, and seeks to estimate the magnitude of air traveler leakage at small and medium airports across the U.S. We estimate that travelers living in small and mid-sized metropolitan regions have the incentive to "leak" from their airport to a distant, better-served airport. Our estimates suggest that 15.7%–31.8% of the total passengers living proximate to a small or mid-sized airport have the incentive to leak. Our estimates range from 10.8% to 33.0% for travelers facing a non-stop itinerary from their local airport and 33.3%–85.1% for travelers facing a connecting itinerary. The potential leaked passengers contribute 1–2.75% of average daily highway traffic at heavily congested portions of the interstate highways connecting airports and up to 10–12% of traffic on low density portions of the highway. Our study illustrates the relationship between interregional surface transportation and the aviation system by estimating the number of travelers who may choose to travel long distances by car to access a relatively busier, larger airport with better service. The results of this study help to shape the evolving role of airport managers in controlling demand and delay at major hub airports and in building and managing air service and smaller airports across the U.S.

1. Introduction

Airport owners and operators (often called "airport sponsors," typically cities or sub-or multi-state authorities), Metropolitan Planning Organizations (MPOs), and state transportation agencies have long come together to plan local roads, rail transit systems, and highways proximate to airports to facilitate local mobility and reduce congestion. Hub airports with high levels of air service can be large trip generators for a region; consider that Los Angeles International Airport is the largest trip generator in the LA region (Giuliano et al., 2010; Gordon and Richardson, 1996). Thus, planning airport access for passengers and employees within an airport's catchment area, or in a region with multiple airports (comprising a Multiple Airport System), is a critical role for airports in managing local congestion and promoting airport access.

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Since the 2000 s, however, significant changes in the aviation system have possibly extended the geography over which passengers engage in an airport choice decision. When seven major U.S. network airlines merged into three in the 2000 s, the newly merged airlines consolidated their networks: they concentrated flights at their key hubs and reduced flights in smaller, marginally profitable markets (Fuellhart et al., 2016; Ryerson and Kim, 2013). It is therefore possible that airports that serve as airline hubs, with their relatively higher levels of air service, were able to expand their catchment areas by attracting more passengers residing in the catchment areas of relatively smaller airports that lost service due to airline mergers. The practice of a traveler choosing a substitute airport – typically one that is 100–300 miles away from their local airport – is broadly referred to as a traveler "leaking" to another airport.

Airports and supporting infrastructures are enormous public investments, made in anticipation of better serving existing and potential future travel demands. In essence, in planning airports, planners seek to match the transportation supply to the market demand as best as possible, to maximize the efficient usage of public monies. Therefore, airport managers as well as federal, regional, and highway planners should be concerned with airport market leakage. Leakage indicates the fluidity with which travelers' substitute air and surface transportation over a wide geography possibly leading to an imbalance in infrastructure use. In addition, stemming the concentration of airport demand on a few airports, rather than spreading this demand out to a number of regional airports, renders the aviation system vulnerable to outages at large airports and creates more demand for airport infrastructure in already constrained urban locations. Passengers leaking to a large airport in a neighboring city could depress air demand at a local airport, thus perpetuating a vicious cycle of flight levels being reduced and airfares going up, encouraging more passenger leakage, and so on. Airport market leakage is also an indication of fleeing economic development. As travelers abandon their local airport, they are reducing the flow of revenue to their airport from parking fees, concessions, and ticket taxes. In short, leaking travelers contribute to the deepening of the divide of the economic development potential, both direct and indirect, across cities (Harrison and Hoyler, 2015).

In the following study, we seek to uncover a) the factors that could have encouraged leakage in specific air markets in the U.S. (i.e., changes in relative air service and air fare levels at airports 100–300 miles apart since the mid-2000 s) and b) the leakage magnitude, specifically the number of air travelers with a higher likelihood of choosing a distant, larger airport than their local airport. We scale the magnitude as a function of the current surface transportation flows and the airport demands such that the scale of the leakage through the past eight years is established. The results of this study help to shape the evolving role of airport managers in controlling demand and delay at hub airports and in building and managing air service at smaller airports across the U.S.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature, including the precipitating events in the aviation system that led to possible service and fare imbalances at relatively larger and relatively smaller airports and the body of literature that directly addresses traveler airport and airport access mode choice and airport market leakage. In Section 3 we present our study geographies and evaluate the relative changes in service and airfares at the airports over our study geographies. In Section 4 we present our methodology and estimate the quantity of passengers leaking to a distant airport and present our findings, for our study geographies, on the number of travelers leaked from a relatively small to a relatively large airport. These estimates enable us to compare the volume of traffic generated by leaked passengers and existing highway volumes on the most-likely traffic route of each passenger. In Section 5 we explore the implications of airport market leakage and then conclude with a discussion about the role of airports in managing their changing congestion levels and catchment areas.

2. Literature review

2.1. An environment ripe for airport market leakage

Between 2008 and 2013, six major U.S. carriers merged into three – United Airlines with Continental Airlines (2010), Delta Air Lines with Northwest Airlines (2008), and American Airlines with US Airways (2013) – during a period of large variations in fuel price and economic recession. These newly merged airlines consolidated their networks and hub operations and established fewer, more concentrated airline hubs (Ryerson and Kim, 2013). Hub airports situated in the largest cities saw their air service strengthen while airports in smaller metropolitan areas lost significant service (Brueckner et al., 2013). Fuellhart et al. (2016) find that between 2003 and 2013, hub airports situated in the largest cities (particularly in the Northeast corridor) and leisure regions such as Florida and the southeast saw increases in their air service, while airports in smaller metropolitan areas (airports roughly between the top 50–75 of U.S. airports by passengers carried, particularly in areas such as the Rust Belt, Appalachia, Mississippi Valley, and parts of Idaho, Montana, and the rest of the Intermountain West) lost significant air service. The authors develop a map displaying the change in departures, passenger levels, and available seats and find that airports within 100–300 miles of the busiest airports in the Southeast, the South, the Midwest, and the West (such the small airports proximate to the hub airports of San Francisco and Los Angeles CA; Dallas Fort Worth and Houston TX; Atlanta GA; Charlotte NC; Phoenix AZ) lost passengers and flight frequency while these metrics increased at the hub airports. These findings indicate the widening discrepancies between 2003 and 2013 in flight frequency, number of destinations served, and airfares at airports with significant service versus those without.

The service imbalances have caused airports that lost service to actively seek out new air service. Airport sponsors do not directly control airline or passenger demand; they have, however, have long sought to attract airlines to their airports, believing that air services stimulate regional economic development (Brueckner, 2003; Button et al., 2010; Button and Taylor, 2000; Green, 2007; Sheard, 2014). In fact, air service is viewed as so critical to a local economy that many airport sponsors provide incentive packages funded by airport revenue to retain and build new service, in the U.S. and throughout the world (Hihara, 2012; Malina et al., 2012; Ryerson, 2016a, 2016b; Smyth et al., 2012). Incentives may also be used at relatively small airports with little service to reduce

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