Journal of Urban Economics 80 (2014) 133–152

Contents lists available at ScienceDirect

Journal of Urban Economics

www.elsevier.com/locate/jue

Airports and urban sectoral employment ☆

Nicholas Sheard

Aix-Marseille University (Aix-Marseille School of Economics), CNRS, & EHESS, 2 rue de la Charité, 13236 Marseille cedex 02, France

ARTICLE INFO

Article history:
Received 23 January 2013
Revised 4 January 2014
Available online 23 January 2014

JEL classification:
F14
H54
R41

Keywords:
Air travel
Services trade
Transportation infrastructure

ABSTRACT

This paper estimates the effects of airport infrastructure on relative sectoral employment at the metropolitan-area level, using data from the United States. To address the potential endogeneity in the determination of airport sizes, the 1944 National Airport Plan is used to instrument for the current distribution of airports. Airport size is found to have a positive effect on the employment share of tradable services, controlling for overall local employment, but no measurable effect on manufacturing or most non-tradable sectors. The effect of airport size on overall local employment is practically zero, suggesting that airports lead to specialization but not growth at the metropolitan-area level. The implied elasticity of tradable-service employment with respect to airport size is approximately 0.22. The results are relevant to the evaluation of airport construction or improvement projects that aim to benefit the local economy by making travel to and from the metropolitan area more convenient.

1. Introduction

Passenger aviation is dependent for its operation on an extensive network of airports that allow flights to take off and land, the storage and maintenance of aircraft, and passengers to transfer to other modes of transportation. Airports are costly to construct and the land they occupy has a sizable opportunity cost. The construction or improvement of airports is commonly financed by public funds and arguments made for the expansion of airport capacity regularly cite the effects on the local economy, suggesting a perceived public interest in the quality of the local air connection.[1] It remains unclear, however, whether airports actually attract activity to the local area or whether cities with stronger growth or larger service sectors simply have larger airports in response to demand for air travel. The lack of natural experiments or other obvious sources of exogenous variation makes it difficult to measure the effects of airports on local employment and other economic outcomes and as a result these effects have not been reliably quantified.

This paper estimates the effects of airport infrastructure on the employment shares of particular sectors at the metropolitan-area level. That is, the primary aim is to determine the effects of airports on relative employment in those sectors. To relate these effects to absolute numbers of employees, an attempt is made to estimate the effect of airports on overall local employment. The analysis is conducted for metropolitan areas in the United States of America (henceforth the "US") and uses passenger air traffic as the measure of airport size. To address the problem of airport sizes being determined by factors endogenous to sectoral composition, the analysis uses the 1944 National Airport Plan to instrument for airport sizes in 2007. Sectoral employment is a fundamental outcome variable as it reflects the importance of the air connection for attracting productive activity in specific industries, some of which are the explicit targets of airport development policies. The findings are informative about the effects of airports on the local economy but also contribute to the broader body of research on the effects of transportation infrastructure.

To identify the effect of airports on local sectoral employment, it is necessary to find a source of variation in airport sizes that is otherwise exogenous to local employment shares. The 1944 National Airport Plan satisfies these criteria. It was the first national plan for the US airport network to come into effect and strongly

☆ The author thanks Anders Akerman, Jan Brueckner, Pierre-Philippe Combes, Anca Cristea, Gilles Duranton, Keith Head, Russell Hillberry, Shuhei Kitamura, Sarah Miller, Daniel Sturm, and seminar participants at the Aix-Marseille School of Economics, the University of Alberta, the 2012 Canadian Economics Association Annual Conference, the 2012 Urban Economics Association European Meeting, the 2012 Urban Economics Association North American Meeting, the 2013 Australasian Trade Workshop, and the 2013 European Economic Association annual meeting for helpful comments and suggestions. Special thanks to Sergiy Protsiv for assistance with GIS software. Any remaining errors are my own.

E-mail address: nicholas.sheard@univ-amu.fr
URLs: https://sites.google.com/site/nicholassheard/

[1] To indicate the replacement value of a major airport and the degree of public funding, Denver International Airport is the most recent major US airport to have been built, opening in 1995, and was constructed at a cost of $4.8 billion, $4.4 billion of which was from public funds (General Accounting Office, 1995). Improvements currently underway to Chicago's O'Hare International Airport are estimated at more than $13 billion (Federal Aviation Administration, 2005). The costs of constructing the proposed new London airport in the Thames Estuary, including the rail link to the city, are currently estimated at £50 billion (Thames Hub team, 2011).

http://dx.doi.org/10.1016/j.jue.2014.01.002
0094-1190/

influenced the subsequent development of airports as, since the Civil Aeronautics Act of 1938, inclusion in the most recent version of the National Airport Plan has been a prerequisite for federal spending on airports and updates to the plan are made incrementally. The persistence of sites developed in the past has been ensured by the increasing costs of acquiring land to expand airports or to construct new facilities. In addition, the 1944 National Airport Plan is plausibly exogenous to factors besides airports that influence current productive activities, for two primary reasons. Firstly, the authors stated the criteria they used to plan the allocation of airports and these are unrelated to factors for contemporary or current industry-level production. And secondly, controlling for population and regional differences, the planned airports were uncorrelated with contemporary industry shares.

The effect of airport size on relative employment is estimated for a range of industries including manufacturing, services, construction, and retail and wholesale trade. Airport size is found to have a positive effect on the employment shares of services that could be considered to be 'tradable', but no measurable effect on manufacturing or 'non-tradable' services. Of the remaining sectors, only retail trade appears to be affected by airports.

The interpretation of these results is that air travel facilitates face-to-face contact, aiding the delivery of tradable services, so their production tends to be located in metropolitan areas with larger airports and presumably exported to other places. Manufacturing also involves the production of tradable goods but personal travel plays a less prominent role in their production and delivery, so it has less reason to be located near a large airport and appears not to be affected. Non-tradable products must be produced near their customers, so airport size should not be directly relevant to their location.

To test whether the increase in employment in tradable services represents additional jobs in the metropolitan area or a reallocation of labor from other sectors, a similar technique is used to provisionally estimate the effects of airport size on the employment rate and on the growth in metropolitan-area employment. No significant effect on either outcome is evident. This suggests that the effect of airports on sectoral employment is driven more by the reallocation of labor within a metropolitan area than by changes in the overall level of employment. Metropolitan areas with larger airports specialize in the production of tradable services, but do not increase in size as a result.

Based on the estimated relative coefficients and the effect on overall employment, the elasticity of the absolute number of employees in tradable services with respect to airport size is approximately 0.22. This means that a 10% increase in the air traffic in a metropolitan area with a million residents would lead to around 1650 additional service jobs.

Despite the vast public spending on airports, only a handful of studies have attempted to measure the effects of airports on the broader economy using techniques that treat the inherent endogeneity in airport size. This type of exercise involves substantial empirical challenges. Unlike other modes of transportation, air travel is barely subject to the constraints of physical geography and its infrastructure is not route-specific. These characteristics make it difficult to identify the effects of airports using the techniques that are applied to other types of transportation infrastructure.

Brueckner (2003) estimates the effect of airports on overall and industry-specific employment in US metropolitan areas using the status of airports as airline hubs and geographical centrality to instrument for air traffic levels. Both instruments have potential weaknesses: 'hub' status implies a substantial increase in traffic but is driven by an endogenous choice on the part of airlines that may respond to sectoral employment, while the 'centrality' instrument is not strong. In contrast, the instrument used in this paper clearly explains a substantial amount of the variation in the current distribution of airports and is more plausibly exogenous to other factors for current employment. However, the results from the two exercises are largely consistent: Brueckner (2003) finds a positive effect of airport size on service employment, with an elasticity somewhat smaller than that found in this paper, and no effect on manufacturing employment.

Other papers estimate the effect of airports on local economic growth. Green (2007) finds that airports have a positive effect on economic growth, though the use of physical airport size and industry-level employment to instrument for air traffic makes the results questionable. Blonigen and Cristea (2012) exploit the 1978 deregulation of the US airline industry as a source of variation in air traffic levels. They find a positive effect of airports on growth, in particular for communities at either end of the size distribution. This paper estimates the effect of airports on growth but, in contrast to these previous studies, finds that the effect of airports on growth is unmeasurably small.

The infrastructure required for air travel differs fundamentally from surface-based transportation in that it is concentrated almost entirely at rather than between the nodes of the network.[2] That said, this paper is related to a broader body of research on the importance of transportation infrastructure. In particular, the identification strategy employed here is informed by recent work on the effects of roads by Baum-Snow (2007), Michaels (2008), Duranton and Turner (2011, 2012) and Duranton et al. (2013), each of which uses the federal highway plan from 1944 or 1947 to instrument for current roads. Further research includes studies of the effects of railways (Donaldson, 2010; Donaldson and Hornbeck, 2011) and ports (Clark et al., 2004). Relative to these modes of transportation, air travel is fast for long trips and impractical for short trips. As such, the results presented in this paper reflect a particular type of accessibility, but one that helps to complete the picture of how accessibility affects the local economy.

The analysis proceeds as follows. A simple theoretical model is presented in Section 2 to frame the empirical analysis. The data are described in Section 3, including a detailed description of the 1944 National Airport Plan. Section 4 presents the results of the empirical estimation and a number of robustness checks. Some concluding remarks are presented in Section 5.

2. Model

The model presented here is intended as a simple representation of the mechanisms that explain the current allocation of airports and relate current airports to relative sectoral employment. Consistent with the aims of the paper, the model has multiple sectors and aggregates employment by metropolitan area. The model derives from the theoretical framework of Redding and Venables (2004) and Duranton et al. (2013) but is simplified somewhat as the lack of data on trade flows for services necessitates a less detailed treatment of market access. The model therefore represents the delivery of products more crudely, with exporting behavior inferred from the production in a given metropolitan area relative to the size, wealth, and other characteristics of its population.

The set-up of the model is as follows. The economy is comprised of M metropolitan areas, indexed by m, and I industries, indexed by i. Each metropolitan area produces a distinct variety of each industry's product. The sole factor of production is labor, which moves freely between sectors and metropolitan areas and is allocated

[2] This was not always the case. In the early days of flight, regularly-operated routes or 'airways' were marked with bonfires, later replaced by light and then radio beacons, and lined with emergency landing fields (Komons, 1978). Some airfields were constructed primarily as refueling stops for long-haul flights. Modern navigation technology, increased ranges and reliability of aircraft, and the overall prevalence of airfields made these facilities obsolete by the early 1990s (Bilstein, 2001).