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The effect of airports on regional development: Evidence from the construction of regional airports in Norway

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1. Introduction

Air transport is a key factor in the transport system. In addition to enabling fast travels over long distances, improvements in the air transport network are proposed as a strategy for economic growth, and local economic development.

The airport transport system could affect the local economic development through several mechanisms. Firstly, by making a region more attractive. If interpreted as a regional amenity such effects could lead to population growth because of increased attractiveness (Glaeser, Kolko, & Saiz, 2001). Secondly, an airport can improve market access. This is particularly important along the Norwegian coast, where the economy is heavily dependent on natural resources that cannot be relocated. Thirdly, air transport can facilitate face-to-face contact between people living far apart and thereby increase productivity. For example, through the creation and flow of ideas (Blonigen & Cristea, 2015; Brueckner, 2003; Sheard, 2014). Finally, air transport reduces costs for firms and can facilitate specialization. A good example of this mechanism is when air transport enables management to more easily monitor and acquire information about plants located far from the headquarters (Giroud, 2013).

A growing body of literature investigates how air transport affects local economic development.[1] Almost all existing studies use air travel, or something similar, to explain regional outcomes such as population and employment.[2] The main challenge, then, is to deal with the simultaneity bias: air travels are also affected by the local economic development. Hence, we need a factor (instruments) that affects air travel, but with no direct effect on local economic development. Thus, instruments should be correlated with air travel, but can be excluded as an independent factor in the regression.

Most research uses lagged variables or regional fixed factors as instruments (Brueckner, 2003; Green, 2007; Percoco, 2010).[3] Such instruments are, however, often only weakly correlated with the variable of interest or cannot credibly be excluded as independent factors that affect regional development. Lagged air travels are a typical instrument. When a short lag is used (travels a few years earlier) the instrument tends to be strongly correlated with current travels, but likely to be driven by the same regional factors. When long lags are used, the instrument is only weakly correlated with air travels, but it is more likely to have no impact on the current regional development. The typical problem when using fixed factors as instruments, such as an airports hub-status, is that the hub-status likely depends on regional factors that are correlated with regional growth. More recent work, however, presents a different identification strategy using policy changes as instruments (Sheard, 2014; Blonigen & Cristea, 2015). With the exception of Sheard (2014), all studies report a significant—though varying—regional effects of air transport.

This paper contributes to this literature by studying changes in airport infrastructure rather than air traffic or similar variables used in the existing literature. This approach has two advantages. First, the logical link is between airport infrastructure and the regional economy. Hence, the hypothesis is: Do people move to area A if an airport is constructed in area A? The causal link between air

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[1] The literature examining the impact of airport accessibility can be divided into studies using either an aggregated or a regional perspective. Here, the focus is on the impact on regional development. Examples of contributions using an aggregated perspective include Cooper and Smith (2005), Sellner and Nagl (2010), and Smyth and Pearce (2007).

[2] Florida, Mellander, and Holgersson (2015) examine areas with or without an airport, but they do not consider changes in airport infrastructure.

[3] Other related research is Button, Doh, and Yuan (2010) that do not deal with endogeneity and Baker, Merkert, and Kamruzzaman (2015) that uses cointegration analysis.

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transport and population growth—as asserted in the existing literature—is less obvious. Should people move to A because people living in area A travel more? Moreover, as far as I know, no theory proposes that transport itself affects local economic development. Second, since infrastructure can be controlled more directly by policy makers, this analysis is more relevant for policy makers.

Still, there are empirical challenges when considering infrastructure changes, but they are different. Now the challenge is how to deal with the counterfactual outcome: What would the outcome have been without the airports? Since variables such population as tend to grow over time, a simple before-after analysis has no bearing on the causal effect. Hence, we must compare the outcome to an alternative. Ideally, the outcome should be compared to the counterfactual outcome, but the counterfactual outcome is always unobservable and must be replaced by an observable outcome.[4] The solution is to substitute the counterfactual outcome with some observable outcome (the control group).

This paper addresses the empirical challenges by using the construction of nine regional airports in Norway in 1970–1972 (hereafter the airports). This specific case was chosen because it was one of the largest changes in the Norwegian transport network. As outcomes, the paper considers population and employment at the municipality level. As treated units, I use the municipalities with a shorter distance to an airport after the construction of the airports. Three different strategies are used to construct the counterfactual outcome (control municipalities). The first set of controls are municipalities with no regional airport in the 1970–80 period, but with a regional airport constructed after 1980. The advantage with this control group is that the travel time to the closest airport is similar to the counterfactual travel time for the treated. This set of controls could result in biased estimates if the airports were constructed later because of weaker regional growth. To mitigate this concern the second set of controls are municipalities near regional airports constructed well before the airports. If the timing of constructing airports is correlated with regional growth, these controls should result in a lower estimated effect. Still, there can be some unobserved regional factors that explain the estimated effect. The third set of controls, therefore, uses municipalities that were “just not” affected by the construction of the airports. They are “just not” affected (treated) because the travel time to an existing airport is about the same as the travel time to one of the constructed airports. The strength of this control group—compared to the other two—is that the municipalities are more likely to be driven by the same regional factors as the treated municipalities.

This paper focuses on the impacts on regional population and employment. Although, as presented above, other economic effects are possible, such as reduced transport costs and increased productivity. Cost reduction in economic activities can in principle be captured in a cost-benefit analysis focusing on the transport market. Productivity gains, however, are additional to the benefits capture when focusing on the transport market and are not easy to identify. These gains are externalities arising from the air travels taking place; they can, for example, be driven by inter-city agglomeration. One of the reasons why it is difficult to identify net productivity benefits are that the total change in productivity—which is what we can observe—includes both the direct impact and the productivity effect. Since the direct cost impacts are captured in a standard cost-benefit analysis framework and the difficulty in isolating the productivity gains these benefits are not considered in this analysis.

This contribution builds on the existing work in the “airport effect” literature, but are also related to the literature investigating the effect on other transport modes. As this paper uses a difference-in-difference framework, the closest paper in the literature is Blonigen and Cristea (2015). The main difference is the use of changes in airport infrastructure rather than air travels. The empirical strategy taken in this paper has also much in common with Funderburg, Nixon, Boarnet, and Ferguson (2010) that examines the impact of highway construction in California in the United States with a related selection of treated and controls. Funderburg et al. (2010) consider census tracts close to the constructed highways as treated, while statistical tracts more than one mile from the highways are used as controls. Other related papers are Baum-Snow (2007), Duranton and Turner (2012) and Michaels (2008), which investigate the effect of highway improvements and Donaldson (forthcoming) and Donaldson and Hornbeck (2016), which considers the impacts from railroads.

The rest of the paper is organized as follows: Section 2 gives a brief overview of the development of the Norwegian air transport market, with emphasis on airport structure and the use of air transport. Section 3 presents the empirical strategy and the data used in the analysis. Section 4 presents the results. Section 5 concludes the paper.

2. The construction of the regional airports in the 1970s in Norway

The Norwegian airport network and the use of air transport has changed considerable since 1970. Today, air service use in Norway is far above the OECD average and one of the highest in Europe. In 2003, the domestic trip rate per capita was almost three times greater than the average trip rate for most European countries (Williams, Fewings, & Fuglum, 2007). Since 2003, the trip rate has increased further, and in 2015, the trip rate was almost five. The high trip rate can, to some extent, be explained by Norway's high per capita productivity, which is 80 percent above the European average (OECD, 2016). Another explanation is the dense Norwegian route network built to support a scattered population. In the 1970s, however, the situation was entirely different, with a trip rate of below one (Statistics Norway, 1972). The Norwegian GDP per capita was also very different and was 10 percent below the OECD average (Cappelen & Larsen, 2005). In 1970, only 18 airports existed, and in large parts of Norway, the travel time to the nearest airport was more than two hours.

The greatest change in the Norwegian airport network occurred in the late 1960s and early 1970s. To understand this change it is instructive to start in 1962, when a commission was established to consider the need for new airports in remote regions. The commission recommended a construction of eight new airports, which all should be served by jetliners (The Ministry of Transport and Communications, 1965).[5] The conclusion, however, made by the Ministry of Transport and Communication was to build only two of the proposed airports and instead of building the remainder six they build a network of smaller airports with a basic terminal building and 800-m runways (Short Take-Off and Landing Airports, STOLport). The political rationale for the decision was that, despite the higher operating costs (in total) and the need for supportive funding, it was preferable to provide services to several rural areas and support a scattered population pattern than to focus on only a few regions (Mathisen & Solvoll, 2012; Svanberg, 1990).

The operating deficit is currently covered by subsidies, using the public service obligation system (PSO) to ensure necessary air

[4] This problem is often referred to as the fundamental problem of causal inference (Holland, 1986).

[5] Stamrutestandard (in Norwegian).

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