



Impacts of airline mergers on passenger welfare



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ABSTRACT

Since 2005, the US airline industry has undergone a series of consolidations. We provide a comprehensive assessment of the overall effects of five major recent mergers on passengers' welfare. We compute consumer surplus changes using passenger discrete choice models based on the attributes of airlines and routes. We then evaluate these changes, as well as changes in frequency and fare, using a difference-in-differences approach. Our major findings include large consumer welfare gains following the DL-NW and UA-CO mergers, welfare gains in regions dominated by the larger carrier in the merger, and welfare losses in highly concentrated markets following legacy mergers.

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1. Introduction

Since its deregulation in 1978, the U.S. airline industry has experienced two major waves of airline consolidations. During the first wave of mergers and bankruptcies, starting right after the deregulation and lasting until the early 1990s, the number of major domestic carriers dropped from 23 to 8 (Bailey and Liu, 1995). During this same time period, hub-and-spoke mode of service became the norm for mainline carriers, while point-to-point service became rare, contrary to what most researchers predicted before deregulation (Bailey and Liu, 1995). The second wave of mergers started with the US Airways – America West Airlines merger in 2005 and ended with the most recent American Airlines – US Airways merger. During this time period the number of mega carriers (defined as the carriers that carry at least 5% of the total U.S. domestic passengers) decreased from seven (namely, US Airways (US), Delta Airlines (DL), Northwest Airlines (NW), United Airlines (UA), Continental Airlines (CO), Southwest Airlines (WN), and American Airlines (AA)) to four (AA, DL, UA, WN). We examined all mergers in the past decade where the combined carrier after the merger carried at least 10% of all the U.S. domestic passengers. Since the most recent merger between Alaska Airlines (AS) and Virgin America (VX) has not yet received a single operating certificate from the FAA, this merger is excluded from our analysis.

Researchers hold a variety of views toward the passenger impacts of consolidations. Some theorists have concluded that merging carriers may reduce their operating costs by enhancing their hub-and-spoke networks (Levine, 1987; Brueckner and Spiller, 1991, 1994). This reduction in operating costs may in turn benefit the passengers. In contrast, others suggested that the fares may increase due to market power gains following the merger (Borenstein, 1990; Kim and Singal, 1993; Morrison, 1996; Veldhous, 2005; Peters, 2006). Although a majority of these studies found that there is an increase in fares after mergers, a few found a decrease or no significant change (Zhang and Round, 2009). Nonetheless, the aforementioned studies almost exclusively focused on the fare changes following the mergers, assuming that fare is the major, or even the only,

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consideration when the passengers decide which flight(s) to take. However, in actuality, passengers usually take into consideration other factors, such as service frequency, travel time, and airline brand.

Although a majority of past research on mergers has focused on the fare impacts alone, in recent years a few studies have taken into consideration other factors such as service frequency (Richard, 2003) and airline service quality (Steven et al., 2016). Steven et al. (2016) focused exclusively on service quality (measured by late flights, mishandled bags, involuntary boarding denials and flight cancellations, with service frequency not included), but the effects of fare changes were not included in their study. Richard (2003) considered only the nonstop service frequency and his conclusions were based on a small dataset, consisting of the flights from only one airport (Chicago O'Hare International Airport) for one year (1993). Bilotkach (2011) examined the relationship of multi-market contact and airline service frequency in the context of the US-HP merger, and found a resulting decrease in service frequency. In an investigation of the merger between Japan Airlines (JAL) and Japan Air System (JAS), using the estimation and simulation of a structural model (a nested logit model of demand and profit maximization model of supply), Doi and Ohashi (2015) found a reduction in costs and a frequency increase due to network consolidation, and an increase in fare and decrease in consumer surplus on routes where merging airlines overlapped. Keating et al. (2013) provide a prospective analysis of the DL-NW merger, taking into account both fare and frequency/service quality. They predict consumer surplus gains on both overlapping and non-overlapping routes, though they do not conduct a full retrospective analysis (using, for instance, difference-in-differences methods). Carlton et al. (1980) consider the potential benefits to passengers (taking into account frequency and travel time) of the North Central Airlines-Southern Airways merger using a conditional logit model. Carlton et al. (2016) present a difference-in-differences analysis of the frequency and fare effects of the three recent legacy airline mergers, focusing on overlapping routes, and find capacity increases and no significant adverse fare effects. Bailey and Liu (1995) concluded that in a world in which passengers value not only lower fares but also higher service quality (such as that measured by scope of operations or network density), existence of fewer, rather than more, domestic carriers results in higher welfare, because the positive effects of an increase in network scale outweigh the negative effects of fare increases, as per their model. They further suggested that the socially optimal number of domestic carriers might be even smaller than the actual number when they published their findings in 1995, which was the time just after the first wave of airline consolidations.

The present study is, to our knowledge, the first to analyze and compare the impacts of multiple mergers on overall passenger welfare, derived from passenger discrete choice models of fare and service quality measures, using a difference-in-differences approach. We analyze the welfare effects due to each of the five recent mergers of major carriers starting with the US Airways – America West Airlines merger in 2005 and ending with the American Airlines – US Airways merger in 2013. We develop a discrete choice model with fare, service frequency (both nonstop and one-stop), travel time, and other carrier and route attributes as parameters. The consumer surplus, also incorporating fare, service frequency, travel time and other attributes, is calculated for each market as a measure of passengers' welfare. In order to evaluate the welfare impacts of these mergers, we compare the difference between consumer surplus before and after the merger in markets affected by the merger with the difference between consumer surplus before and after the merger in markets not affected by the merger. In other words, we use the markets not affected by the merger as a control group and therefore can separate out the effects of mergers from those of changes in other extrinsic factors such as oil price changes and changes in economic conditions.

Our study makes two main contributions. (1) We provide a holistic assessment of the overall passenger impact of the mergers by capturing not only fare changes but also changes in service quality as measured by both nonstop and one-stop service frequency, travel times as well as other attributes of the routes and carriers. We demonstrate that in addition to the effects of fare changes, the effects of frequency changes also play a very important role in determining the welfare consequences. The welfare consequences in our study are calculated by incorporating these multidimensional attributes. We thus provide a methodological approach for evaluating mergers that incorporates a broad-based consumer surplus measure in a difference-in-differences analysis. (2) Previous studies focused on only one or two mergers at a time. However, we analyze the impact of all five major mergers in the second wave of mergers and study general impacts that the mergers bring to the passengers, by observing the similarities and differences across the effects of these five mergers. Using our methodology, we uncover several major results: (1) The DL-NW and UA-CO mergers were accompanied by significant increases in consumer surplus, driven in large part by percentage increases in frequency. (2) Passengers from regions that were dominated before the merger by the primary carrier in the merger generally saw consumer surplus and nonstop frequency gains, while those in regions that were dominated before the merger by the secondary carrier in the merger generally lost nonstop service frequency and often lost consumer surplus. (3) As the number of existing legacy carriers decreased, consumer surplus gains from legacy mergers decreased. (4) The DL-NW merger resulted in consumer surplus losses for very small communities, while the UA-CO merger resulted in consumer surplus gains for these communities. (5) Legacy mergers resulted in consumer surplus losses in highly competitive markets.

The rest of this paper is organized as follows. Section 2 describes the data sources used in our analyses and provides details of some key data pre-processing steps. Section 3 discusses the passenger choice model used in this study. Section 4 summarizes the passenger choice model estimation results. Section 5 describes the calculation of consumer surplus as well as the difference-in-differences estimator used to measure the welfare change caused by the merger. Section 6 presents a series of key findings of this research and Section 7 provides the conclusions and discussion.

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