Airline Consolidation, Merger Retrospectives, and Oil Price Pass-Through

Report by **MARSHALL STEINBAUM**

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Executive Summary

Since it was deregulated in 1978, the airline sector has undergone a series of profound restructurings. Under the former regulated system, many companies operated as near-monopolists on a subset of the national air network, and the largest carriers offered nationwide service on the highest-trafficked competitive routes. Deregulation reduced cross-subsidization within the system, and so it put many less healthy competitors out of business by exposing them to fare and service competition.

As the legacy airlines consolidated, the rapid growth of "low-cost" competitors ate into profitability in the sector, to the point of serial bankruptcies in the late 1990s and early 2000s. All of this reduced coverage on the network and squeezed stakeholders like employee pension plans and suppliers, but for those places that continued to be served, prices were low and service was reasonably good. This was post-1970s antitrust policy at its best: Consumers seemingly benefited from a competitive market structure in which incumbents could never get too comfortable, for fear of triggering a price war with one of the low-cost carriers.

As a result of those bankruptcies, however, the remaining airlines have resurrected themselves through consolidation, stabilizing the incumbents and ushering in an era of high profits, based on unbundling services (e.g., fees for bags, leg room, boarding priority, and so on) and price discrimination—all enabled by a lack of competition. In fact, in many cases, managed consolidation was the express means of resolving a bankruptcy. Hence, on the theory that low-cost carriers were disciplining the market, antitrust scrutiny was light-to-nonexistent.

The resulting status quo works for the airlines themselves, though consumers, including passengers violently dragged by law enforcement from seats they paid for, might disagree. In "Airline Consolidation, Merger Retrospectives, and Oil Price Pass-Through," we study the last 10 years in the airline sector, which saw the consolidation of six legacy carriers down to three, with only one low-cost carrier (Southwest) remaining a national player.

Key findings

- We analyze route-level effects of mergers in the airline industry, comparing average fare before and after the Delta-Northwest, Continental-United, and American-USAir mergers. We find that mergers do not necessarily reduce competition along the average route. The merger effect in the small subset of routes *most affected* by a given merger dominate the estimate of each merger's impact. In the case of Delta-Northwest, the effect is ambiguous; in Continental-United, the most-affected routes increased their average fare; and in American-USAir, average fares declined on the most-affected routes, net of extensive controls. This pattern yields an overall ambiguous effect of the mergers on prices when the data is pooled.

- We believe that the route-level procedure for forecasting and analyzing the economic impact of airline mergers is probably inadequate to answer the question of whether mergers, and changes in airline market structure more generally, are pro- or anti-competitive. Hence, it would be useful to develop

alternative tools and sources of data, looking beyond headline fares and a wider range of empirical strategies.

- We study two episodes in which oil prices—a key input for airlines—declined precipitously, one in 2008 and the other starting in 2014. The outcome of interest is the extent to which those oil price declines were reflected in route-level fares. We find that the routes in which concentration increased the most between the two episodes are those where the rate of pass-through declined most. This suggests that a cumulative loss of competition was responsible for consumers benefiting less from the windfall of low oil prices.

- Thus, it is likely that as routes became more concentrated over nearly a decade, the result was higher fares for consumers than would have been the case all else equal.

Our analysis is a narrow look at the airlines sector: We lack data on ancillary fees and unbundling, and can thus only study headline fares. We also neglect crucial issues like network coverage, nor do we look at the increasingly important phenomenon of "common ownership" among airlines at the shareholder level, by a small, overlapping set of large fund managers. But our conclusion is that merger-by-merger review, relying on a route-level difference-in-difference methodology for assessing competitive effects, is insufficient to ensure that the sector remains competitive. In particular, the current paradigm for merger analysis does not address the possibility that coordinated effects might arise from mergers in concentrated markets—because by their nature, coordinated effects cannot be cleanly attributed to any one merger. This highlights the need for a more holistic approach to competition policy, including reviving monopolization jurisprudence.

There's reason to believe the airline industry now features the worst of both worlds: a fully privatized, high-markup oligopoly, without the redeeming features of complete coverage and high-quality service that characterized the regulated era. In this sense, the airline sector looks like finance and telecoms: consolidation and recapitalization through profits, enabled by lax antitrust policy that found reason to waive through a series of mergers after deregulation destabilized industries. Deregulation, however, was premised on the idea that free-market competition would discipline the market, so the government no longer had to. In the absence of antitrust policy, though, that premise appears to have been flawed.

Airline Consolidation, Merger Retrospectives, and Oil Price Pass-Through *

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Abstract

Between 2008 and 2016, commercial airlines in the US underwent a significant consolidation: the six largest legacy carriers merged down to three, and there were many smaller consolidations as well. The federal government did not take enforcement action to block any of the three mega-mergers: Delta-Northwest in 2008, United-Continental in 2011, or American Airlines-USAir in 2013. In this paper, we use a public administrative database of flight itineraries to analyze those mergers and the changing state of competition in the airline sector. Difference-in-difference-type analysis of the individual mergers reveals inconclusive results. We then consider the pass-through of declines in oil prices to route-level fares in two different oil price "episodes," one in 2008 and one beginning in 2014. Routes on which the decline in pass-through between the two events was largest were the routes where concentration increased most between the 2008 and 2014 episodes. We interpret these results as implying the inadequacy of the current antitrust regime in at least one sector: Merger-by-merger review, based on a route-level difference-in-difference procedure, may be insufficient to protect competition against larger changes in industry structure.

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1 Introduction

The airline industry is a networked oligopoly with some characteristics of a public utility. It requires high fixed investment to sustain a viable business: Firms must operate multiple inter-locking nodes in order to provide an effective service to consumers. Traditionally, that has provided a rationale for at least some pricing power and operating profits, at least when the economy is strong, in order to cross-subsidize in both space and time. As such, we would not expect the tenets of perfect competition to apply, nor should they.

Notwithstanding that, in the late 1970s the United States deregulated its airline industry, and the resulting competition among legacy carriers from the regulated era, plus new entrants, substantially reduced fare prices, especially on well-trafficked routes. Service declined, however, for less profitable parts of the network. A boom-and-bust cycle littered the landscape with organized bankruptcies, while profit margins were low even in good times. Ultimately, in the past 10 years, consolidation stabilized the sector, fares, ancillary fees, and profit margins crept up, and service further concentrated on high-traffic routes and stratified according to customers' willingness to pay. All of this created the fully-privatized oligopoly we have now.

This paper explores the last 10 years in the airlines industry and focuses on two primary questions: first, were the three largest mergers, Delta-Northwest, United-Continental, and American-USAir, anti-competitive? Second, has the trend toward concentration over time had any effect on route-level competition?

To answer the first question, we perform a merger retrospective using a route-level difference-in-difference approach: Were routes that became more consolidated as a result of the merger priced significantly differently after it than similar routes whose concentration did not change or changed less? We perform this analysis separately for each of the three mergers, as well as all together in a pooled specification. The results under our preferred specification, defined below, indicate that the three mergers had largely neutral effects, when results for all three are pooled. When the mergers are examined individually, the sign of the merger coefficient is

entirely driven by the routes on which the change in market concentration as a result of the merger was largest.

In order to answer the second question, we focus on two episodes in which the price of oil–an important operating cost for airlines–declined precipitously: one starting in the summer of 2008, the next beginning in the final quarter of 2014. The structure of the industry was very different in 2008 relative to 2014, so we view the two oil price drops as natural experiments to test whether there was any change in the degree of competition. We find prima facie evidence that pass-through was weaker in the second episode than the first, but the difference is small relative to the size of the actual oil price decline and may be due to the different macroeconomic circumstances surrounding each episode. Thus, we draw no strong conclusion regarding overall change in pass-through throughout the industry.

However, we do link route-level changes in pass-through to changes in concentration. Routes that became more concentrated between the two episodes show the largest reductions in oil price pass-through between the first and second episodes.

We interpret these results as evidence that concentration in the airline sector has reduced competition. Because of the unclear picture painted by the merger retrospectives, it's difficult to say that that is the result of any one transaction or set of transactions. Holding the route constant, the degree of concentration varies over time for other reasons, as does a route's traffic and its distribution of fares. There is also a large degree of heterogeneity across routes in the cross-section, and some important changes in the cross-sectional pattern of key route-level observables over time. Focusing on the oil price events allows us is uncover a meaningful pattern from a complex picture.

It should be said that answering only these two research questions, using only the publicly-available data described below, is not a complete assessment of the state of competition in the airlines industry. We only consider the impact of consolidation and market structure on consumer-facing fares, not on consumer-relevant indicators like customer service, ancillary fees, or network coverage, let alone non-consumer welfare effects like the health of the airline

industry supply chain, the state of its labor market, or the impact that changes in its structure affect the structure of its customers, for instance (potentially) by causing geographic concentration around the dwindling number of airports that serve as hubs. We also neglect the question of "common ownership" by the same small, overlapping set of large institutional investors, a potential reason why individual airlines would choose not to compete with their rivals, since that would eat into shareholders' profits. Still, the data we do have allows us to draw several conclusions.

Taking these two sets of findings together, our conclusion is that merger-by-merger review, looking only at route-level variation in expected change in concentration, has been insufficient to guard against the potential for anti-competitive conditions to arise on routes where concentration increases. The evidence in this sector warrants not just a retrospective look at individual merger approvals, but analysis of the industry as a whole, with implications for competition policy in airlines and potentially more generally. We return to this theme in the conclusion

The remainder of this paper is organized as follows: Section 2 reviews the literature on merger control in airlines. In Section 3, we describe the construction of our dataset and report summary statistics related to the evolution of the airline sector over time. In section 4, we present our merger retrospective results. In Section 5, we explain our pass-through results. Section 6 concludes.

2 Literature Review

The literature on competition in the airline sector is extensive, given the availability of data and the concern over concentration following deregulation, bankruptcies, and the thinning-out of the network, as well as the opportunities it offers to study alternative models that deviate from perfect competition. Here, we briefly review the subset of this literature that is most relevant to antitrust and merger review.

Past merger retrospective analyses for airlines tend to find indeterminate results in evalu-

ating mergers between legacy carriers, as we do. The consensus appears to attribute this to the conjecture that legacy carriers do not compete with one another, but rather are in competition with "low-cost" carriers dating from the de-regulated era (Kwoka, Hearle and Alepin (2016) Goolsbee and Syverson (2008)). Luo (2014) finds no effect from the Delta-Northwest merger, and attributes that to the fact that they were both legacy carriers. Carlton et al. (2017) considers the same three mergers we do and concludes they were affirmatively pro-competitive, albeit with very small treatment groups. Retrospectives for older mergers (Republic/Northwest, US-Air/Piedmont, and TWA/Ozark), on the other hand, do tend to find a substantial price effect (Kwoka, 2013).

Brueckner et al. (2015) is the only paper, to our knowledge, that goes beyond the dataset used in this paper to take on the issue of ancillary fees. The authors conclude that introducing baggage fees reduced the fare for standard tickets, but not as much as the bag fee itself. They thus conclude that the fees constitute pro-competitive price discrimination.

Azar, Schmalz and Tecu (forthcoming) look at the potential for anti-competitive effects not from mergers between airlines, but rather mergers between common owners of airline shares, and finds anti-competitive effects, though O'Brien and Waehrer (2017) doubt that the relationship between such mergers and fare increases is causal.

3 Data

The United States Department of Transportation's Bureau of Transportation Statistics collects a 10 percent sample of US commercial airline itineraries and publishes it on a quarterly basis as the Airline Origin and Destination Survey. In this context, an itinerary is a set of airline tickets purchased at a given time. An itinerary can be one-way or round-trip, as well as (less frequently) "open-jaw," or multi-city. Each component of an itinerary is a "trip," and a trip consists of one or more "flights." A trip with exactly one flight is "nonstop." For example, a round-trip itinerary might be Washington, DC–>Chicago–>Washington, DC. Each of the

arrows represents a trip. If the plane flies directly from Washington, DC to Chicago, and the same is true on the return trip, those trips each consist of one nonstop flight. If the passenger stopped in Cincinnati on each leg, then the trips would not be nonstop, and they would each consist of two flights.

We analyze the domestic component of this data after aggregating itineraries to the route level—the basic unit of our analysis, at which market concentration is calculated. A route is defined by the pair of either airports or "city-markets" (in which multiple airports within a metropolitan area are combined). The pairing is not direction-specific. We drop itineraries that are neither one-way nor round-trip, and then for each pair of endpoints, aggregate over trips to calculate route-level observables like average fare for each route or the share of total trips that are non-stop for each quarter.

Once we have routes constructed, we compute the route-level Herfindahl-Hirschman Index (HHI) using each airline's share of route traffic (rather than their shares of route revenue). We compute "adjusted HHI" to account for post-merger concentration, since even after mergers are consummated, the merging parties report their ticketed traffic separately for several years. These adjusted HHIs take into account the four largest post-2005 mergers: USAir-America West (September 2005), Delta-Northwest (December 2008), United-Continental (October 2010), and American-USAir (December 2013).

We add two macro-level variables to the dataset: crude oil prices and the total US population. We adjust for inflation by reporting ticket and oil prices in 2010 dollars.

3.1 Summary Statistics

The airline sector has changed a great deal over the course of our dataset (from 1993 to 2016), and those changes are not a monotonic upward trend in consolidation. In this section, we report summary statistics of the route-level dataset described in the previous section. We focus on the version of the dataset that has airports, rather than "city-markets," as its endpoints, and that includes both nonstop and one-stop trips. The "city-markets" data is similar to the

airport data, with generally muted time series dynamics, implying a degree of substitution between airports within a city-market in response to changing concentration and changes in airport-level network characteristics.

For each indicator, we plot both the average across routes by quarter (weighted by route-level passenger traffic), as well as the distribution across routes at the beginning and end of the series. The general pattern is that competition increased throughout the 1990s: average fares went down and volume and distance flown went up. After around 2000, the dynamics became more complicated as airlines went bankrupt in the aftermath of the 2001 recession, then gradually consolidated. Route-level market concentration (as measured by the Herfindahl-Hirschman Index) gradually increased over the 2000s and 2010s until declining more recently (Figure 1). Overall, the distribution of route-level HHIs is similar now to what it was at the start of the dataset, though this masks the effect of many of the low-traffic routes—which were likely to have been highly concentrated–having effectively dropped out of the dataset (Figure 2). The histogram of routes by the number of trips taken shows this: The mass point at the low-traffic routes has lost considerable density to the rest of the distribution, and the right tail has lengthened somewhat, so the most-trafficked routes are more heavily trafficked now than they were in 1993 (Figure 4). Thus, thinning out the network had the composition effect of reducing measured concentration.

The average fare (average of weighted route-level averages, to be precise) declined during the 1990s and through the recession and bankruptcies that followed, and it then stabilized during the subsequent period of consolidation. It eventually started increasing following the 2008 financial crisis, before the more recent decline (Figure 5). Recall that fares here do not include ancillary service costs, which have been increasingly unbundled from headline fares. The distribution exhibits a notable decline in variation in the cross section of routes, which probably reflects the concentration of traffic on the highest-traffic routes as the densest links in the network gained at the expense of the least-traveled (Figure 6). Similarly, the nonstop distance of the average route (weighted by passengers) increased through the 1990s and leveled

off in the 2000s-2010s, because the shortest-haul flights lost traffic to longer ones (Figures 7 and 8).

The overall picture is one in which competition increased during the 1990s—albeit with a steady loss of service on un-trafficked routes that were probably unprofitable to serve in the deregulated era. Ultimately this "race to the bottom" (from the perspective of airlines) culminated in mass bankruptcy. The result of those bankruptcies was serial consolidation that recapitalized the industry through profits.

4 Merger Retrospective Analysis

Starting with the Delta-Northwest merger in 2008, the six largest legacy carriers merged into three. In this section, we consider the effect of each merger in turn on the average fares on the routes most "treated" by the merger, comparing them to a control group of similar routes in which concentration would not be expected to increase significantly as a result of the merger.

We run regressions of the following form:

$$\Delta \log(p_{ij}) = \alpha + \beta \cdot \Delta \text{HHI}_{ij}^{\text{exp}} + \gamma \cdot X_{ij} + \delta_i + \delta_j + \varepsilon_{ij}, \tag{4.1}$$

Where i and j are route endpoints, $\Delta \log(p)$ is the change in the log mean price on the ij route, $\Delta\text{HHI}^{\text{exp}}$ is the ex-ante expected change in concentration on the route from combining market shares of the merging parties, X is a set of route-specific controls, and δ_i and δ_j are endpoint fixed effects (included in some specifications). ϵ_{ij} is an error term.

In tables 1 and 2, we report results for each of the three mergers taken individually, and then a pooled result. In each of those specifications, the "pre-" period is the average fare on the route in the quarter just before the merger closes, and the "post-" period is the quarter two years after the quarter following the closing. We include controls for the level of HHI on the route pre-merger, the nonstop distance between route endpoints, the number of trips, the fraction of

trips that are non-stop, and the fraction of trips that are round-trips. In some specifications, we include market shares for each airline. In a different set of specifications, the "pre-" period is the average fare on the route in the two years prior to the merger and the "post" period is the average for the two years following it; those results are similar to tables 1 and 2.

The first reported coefficient estimates in tables 1 and 2 are for $\hat{\beta}$, and they represent the percentage change in mean fare for a one-unit level change in expected HHI, pre- versus post-. For example, the estimate in column (6) of panel B in Table 1 is interpretable as "increasing the HHI by 10,000 (going from completely unconcentrated to completely concentrated) would be expected to increase mean fare on a route by 0.44 percent, controlling for observables."

Overall, the results indicate that the mergers had heterogeneous effects. The United-Continental merger raised average fares on the routes where concentration would have been expected to increase most, while the American-USAir merger reduced them.[1] The Delta-Northwest merger had ambiguous effects across specifications. Given this, the pooled sample is also ambiguous.

There is a major difficulty in reading too much into these results, however: Most mergers do not affect most routes, and as a consequence, the results in a given merger are driven by a small subset of routes that are significantly affected by that merger. As an example, Figure 9 is a binned scatterplot of the change in log mean fare across routes on the expected change in HHI as a result of the American Airlines-USAir merger (without controls). The change in HHI on most routes was less than 500, and the most-affected routes show a decline in mean fares (for this merger), so this is reported as the "effect" of that merger. Scatterplots for the other mergers show a similar impact: Most routes are relatively unaffected, and the effect on the most affected routes dominates the estimate.

We turn now to the question of the cumulative effect of all three mergers, and the more general trend of consolidation in the airline sector.

[1]One possible candidate for why the American-USAir merger appears to have reduced fares in the data is precisely that it occurred shortly before the decline in oil prices we discuss in Section 5, and that that contaminates the diff-in-diff procedure if the oil price decline did not affect the treatment and control groups in the same way.

5 Oil Price Pass-Through

Oil is an important input to production for the air travel industry, and hence fluctuations in the price of oil affect the price of air travel. The oil market is sufficiently international in character, and airlines are just one of the purchasers of oil, such that we view fluctuations in the price of oil as largely exogenous shocks to the airline sector. Figure 10 depicts the time series of international crude oil prices and average ticket fares in our dataset.

In this section, we assess the competitive state of that sector in light of the experience of two different oil price shocks: large declines that occurred in 2008 and 2014. In the aggregate time series, both episodes were associated with a subsequent decline in fares. The question we confront is whether the pattern and extent of that "pass-through" of oil prices to fares changed, and whether any changes are explained by route-level concentration.

The identifying assumption used in this approach to pass-through is different than in the difference-in-difference analysis of mergers in Section 4. For diff-in-diff, we essentially treat changes in concentration caused by mergers as exogenous high-frequency variation in concentration, from which we can estimate a causal effect of concentration on price. For the pass-through analysis, we assume changes in concentration over a relatively long time period (between 2008 and 2014) are uncorrelated with changes in pass-through, other than through their competitive impact–a stronger and potentially more problematic assumption than the approach taken to merger retrospectives. Nonetheless, the channel by which changes in oil prices are likely to affect market exit and entry, and therefore confound identification—namely fuel costs—can be controlled for by including route distance in regression.

While important, this identification issue also highlights the shortcomings in using merger control as the sole policy tool with which to protect competition. Other remedies for affecting market structure would, likely, have to depend on less-well-identified empirical analysis of counterfactuals. But heightening the methodological burden to prove reductions in competition–to the point that only mergers, and only a small subset of mergers, receive any

scrutiny at all–is one of the dimensions in which the antitrust enforcement regime has potentially become too lax. And while increasing methodological standards in empirical economics ought to be reflected in policy analysis, it's worth noting that antitrust policy has changed wildly in the past–in the direction of weakening enforcement–under a far lower standard. By the empirical standards of today, in fact, that change in policy was undertaken on the basis of theory alone.

Figure 11 depicts one panel for each oil price decline episode, with the oil price plotted by the red dashed line. The average fare in each of five route distance quintiles is plotted along with it. Given that oil's share of input costs would presumably be increasing in the distance between route endpoints (if the other costs of production are more fixed in nature), we would guess that fares on long-distance routes would be more responsive to changes in the price of oil. The chart seems to provide visual evidence that fares were more responsive to fluctuations in the price of oil in the first episode relative to the second, and further, that pass-through was increasing in distance in the first episode (the expected relationship), but not so much in the second.

We then look to route-level concentration. Figure 12 breaks out the routes by distance: the shortest-distance routes (first quintile) are shown in the top panel, and the longest-distance routes (fifth quintile) in the bottom. Within each panel, routes are sorted into HHI quantiles. The first implication is that fares appear to be unresponsive to oil price fluctuations in either episode for short-distance routes (consistent with expectations), whereas fares are more responsive in the first episode than in the second among long-distance routes–repeating the conclusion from Figure 11, but in this case with greater clarity once we focus on the extremes of the distance distribution. The level of HHI, on the other hand, plays no obvious role. Average fares in all of the HHI quantiles appear to have roughly the same responsiveness to oil price reductions in both episodes: responsive in the first, less responsive in the second.

We turn next to analyzing the effect of the *change* in concentration on the *change* in pass-through, across routes, between the two oil price decline episodes. We seek to answer the

question "Do cumulative route-level concentration dynamics explain changes in the degree of pass-through observed in aggregate between the two episodes?"

We run regressions of the following form:

$$\Delta \log(p_{ij}^{2014}) - \Delta \log(p_{ij}^{2008}) = \alpha \cdot \Delta \text{HHI}_{ij}^{2008-2014} + \beta \cdot X_{ij} + \gamma \cdot \Delta X_{ij} + \delta_i + \delta_j + \varepsilon_{ij} \tag{5.1}$$

In this formulation, the 2008 "episode" is defined as 2008Q2-2009Q2 and the 2014 "episode" is 2014Q2-2016Q2. $\Delta \log(p_{ij}^{2008})$ is the change in mean fare between the quarter before 2008Q2 and the quarter after 2009Q2, and $\Delta \log(p_{ij}^{2014})$ is defined analogously for the 2014 episode. $\Delta \text{HHI}_{ij}^{2008-2014}$ refers to the change in route-level concentration between its average value during the 2014 episode and its average value during the 2008 episode. X_{ij} is the same set of controls as in Section 4, with the addition of the level of concentration on the route. ΔX_{ij} is the change in those controls between the two episodes. X_{ij} is set to the average value of the controls across the entire period 2008Q2-2016Q2.

Table 3 displays the results of one particular specification of this regression, though all of them are qualitatively similar. The coefficients on the change in concentration are uniformly positive and significant, meaning that those routes that experienced the largest increase in concentration between the two oil price decline events, net of controls, are also the routes where the change in pass-through was largest. These results are also robust to other checks: using city-markets rather than airports as the route endpoints and using only nonstop flights.

We thus conclude that cumulative route-level concentration in the sector has reduced competition, even if individual merger-by-merger review would have failed to discern or slow this trend. Furthermore, the very fact that changes in concentration affect the degree of pass-through is evidence for the existence of above-marginal-cost pricing in the sector: characteristic of a networked oligopoly with high fixed costs of operation, where perfect competition would not be expected to obtain.

6 Conclusion

This paper concludes that consolidation in the airline sector resulted in declining sensitivity of route-level fares to fluctuations in the price of oil, suggesting that the industry has become less competitive since the current merger wave began in the late 2000s, and specifically, since the oil price decline that began in the summer of 2008. We reiterate that this analysis is a fairly narrow look at the airline industry: we do not account for ancillary service fees, customer service, or other consumer-facing outcomes, let alone the larger organization of the industry and its impact on economic outcomes facing other stakeholders.

Nonetheless, we can draw some larger conclusions from this and other work: In a deregulated network oligopoly with relatively high fixed costs, such as airlines, there's a tendency for competition to produce a boom-and-bust cycle. Thus, there's also a tendency for incumbents to consolidate to protect themselves from that and ensure sufficiently robust profit margins, so that they are able to weather downturns and maintain service on the network–or at least, the profitable parts thereof.

In this sense, the recent history of airlines mimics the recent history of the financial sector: Deregulation increased the potential to earn high profits, but it also created a more pronounced boom-and-bust cycle. In response, in order to maintain service on these utility-like networks, policy has accommodated consolidation and recapitalization-through-profits, to the point that only a few large incumbents utterly dominate the market.

But this was the exact trend that pushed the government to adopt a more stringent antitrust policy in the first place–the policy that has been systematically dismantled over the last 40 years. Instead of choosing between unstable service and exploitative private monopoly, alternative options exist for structuring the industry to provide comprehensive and affordable coverage, while limiting both the upside and the downside for private actors. Those options include, traditionally, rate regulation and coverage requirements, and less traditionally, public options in competition with private players.

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Figures and Tables

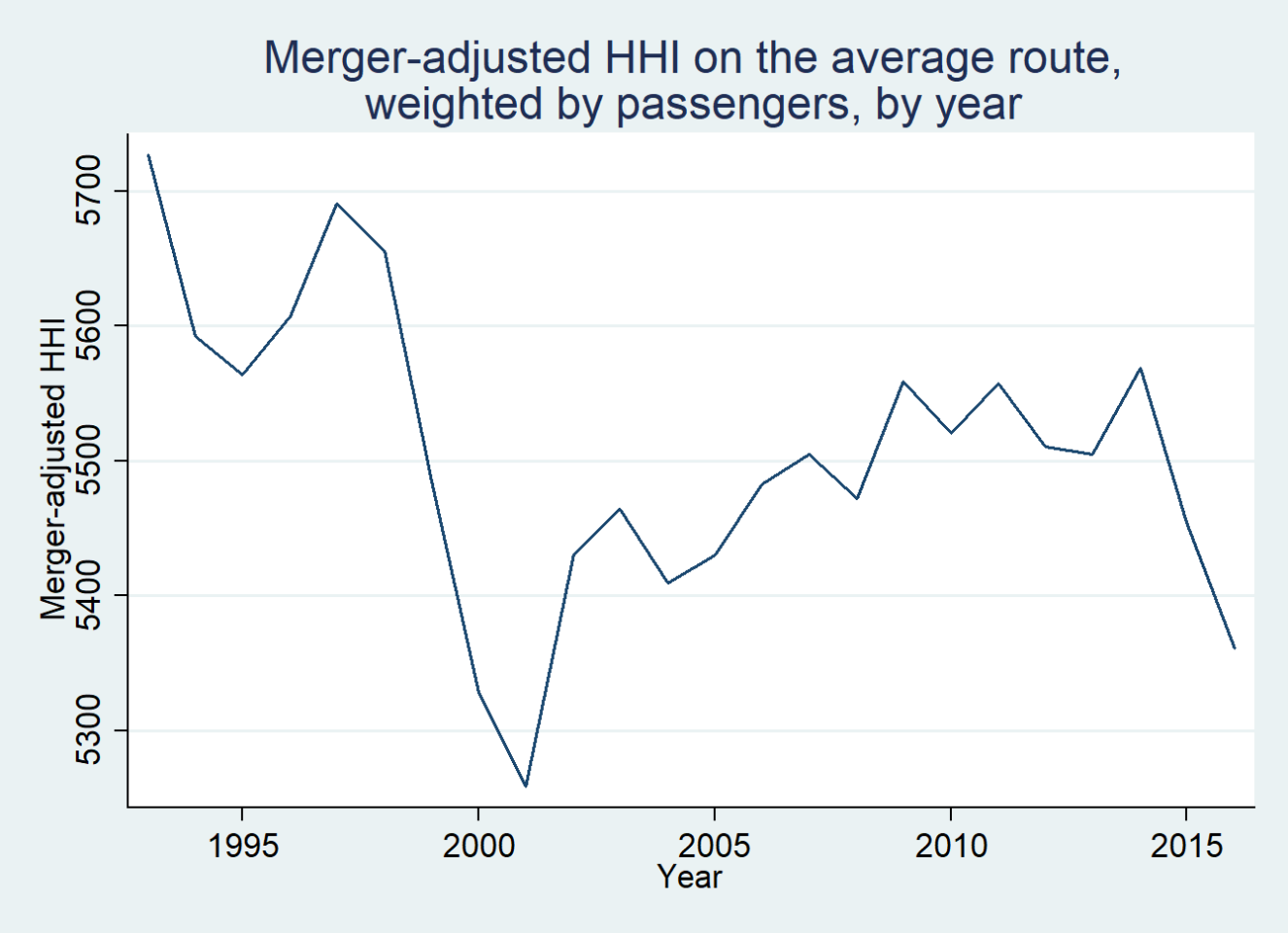

Figure 1. Average merger-adjusted HHI on airport-to-airport routes, weighted by passenger counts.

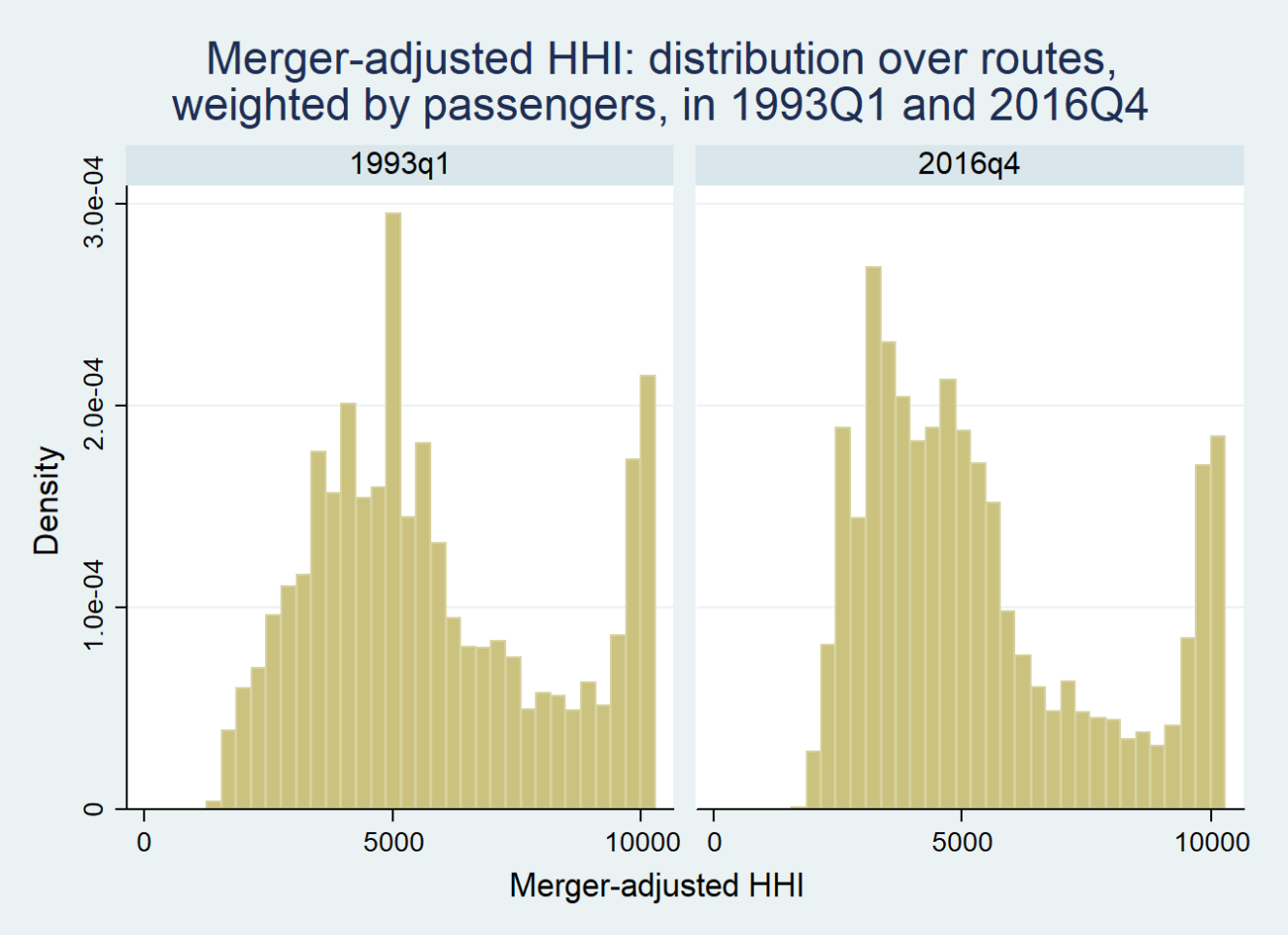

Figure 2. Distribution of merger-adjusted HHI on airport-to-airport routes, weighted by passenger counts, in 1993 and 2016.

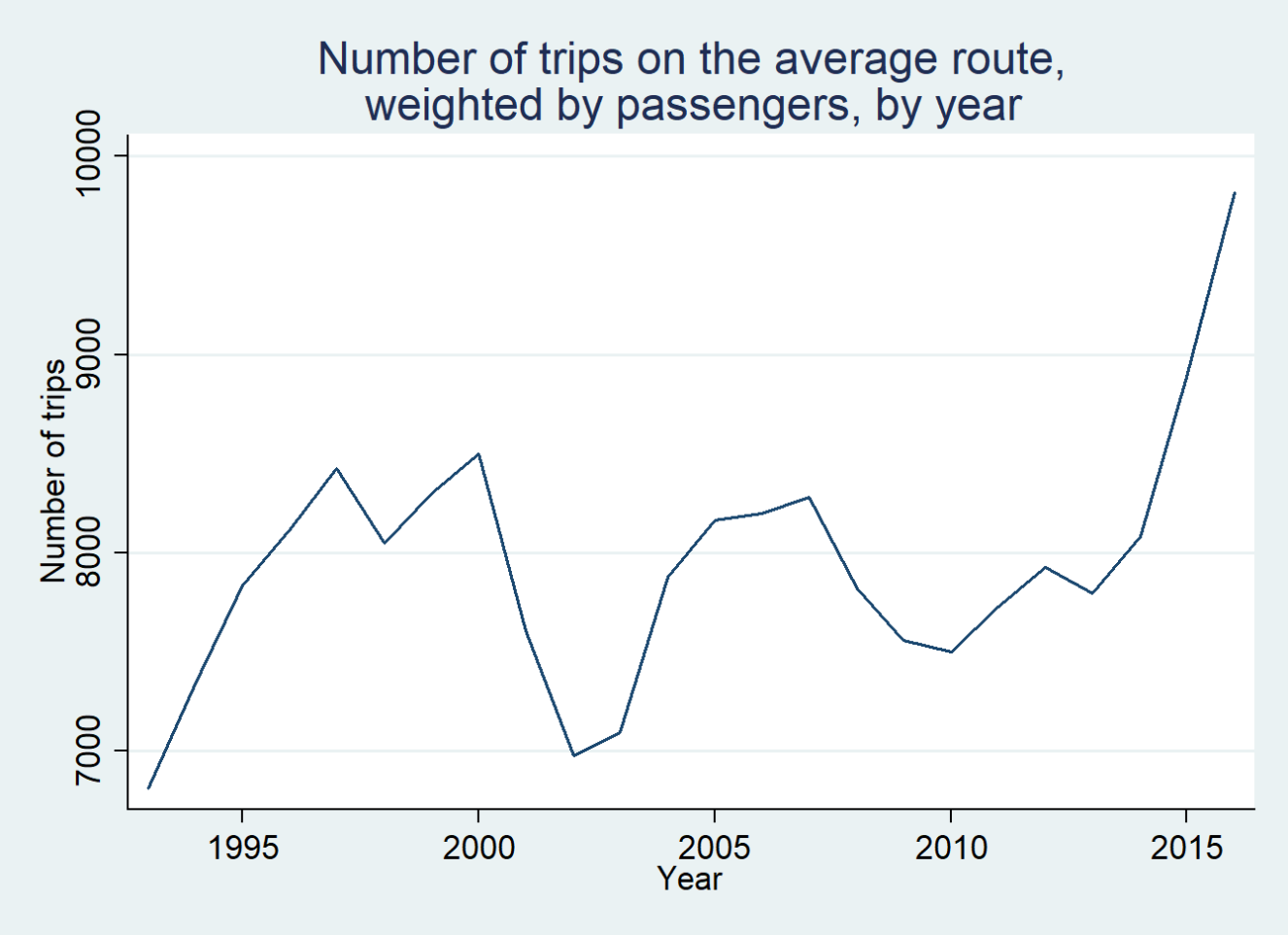

Figure 3. Number of trips on the average passenger-count-weighted airport-to-airport route.

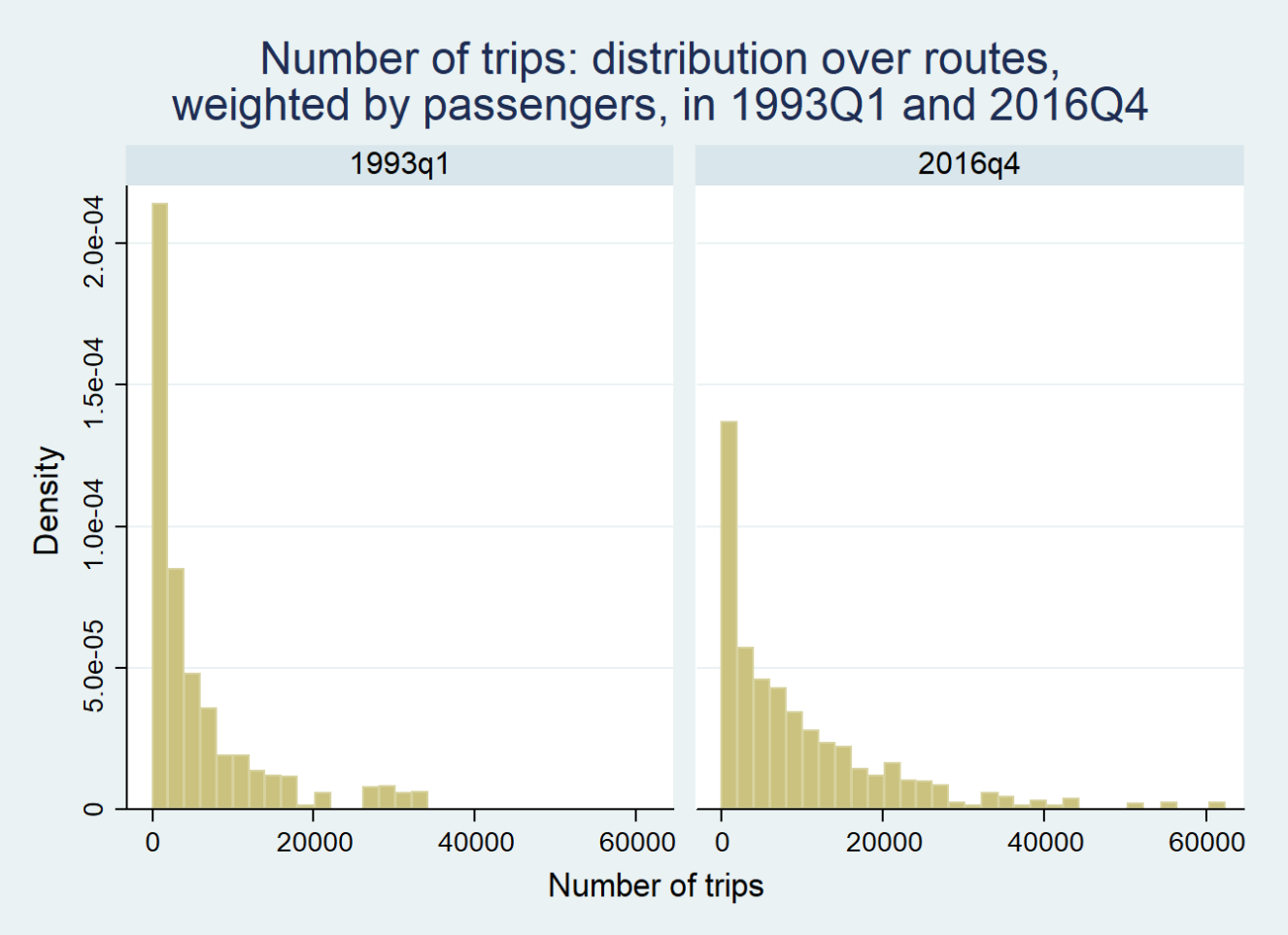

Figure 4. The distribution of routes by number of trips taken, in 1993 and 2016.

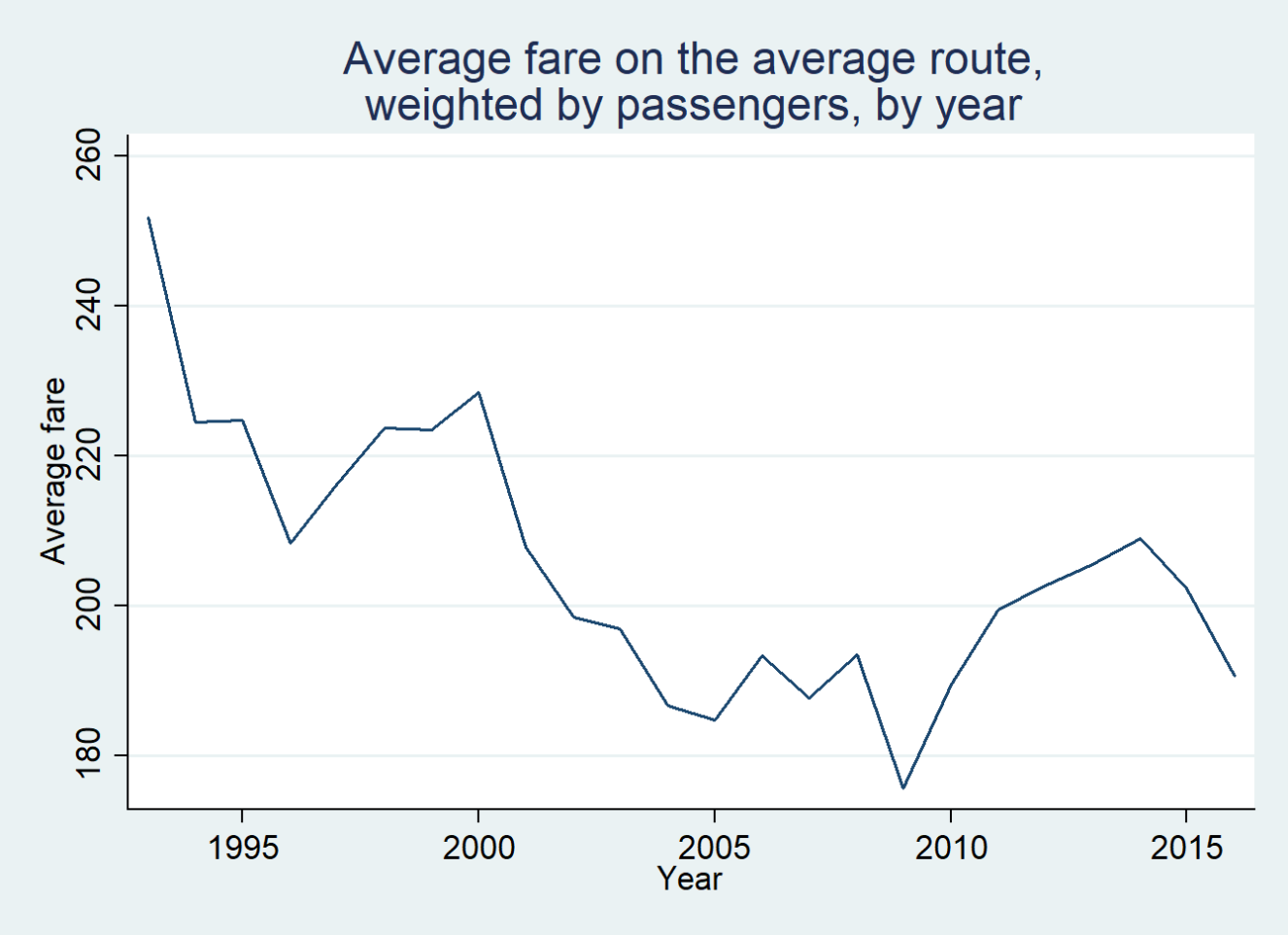

Figure 5. Average fare on the average passenger-count-weighted airport-to-airport route.

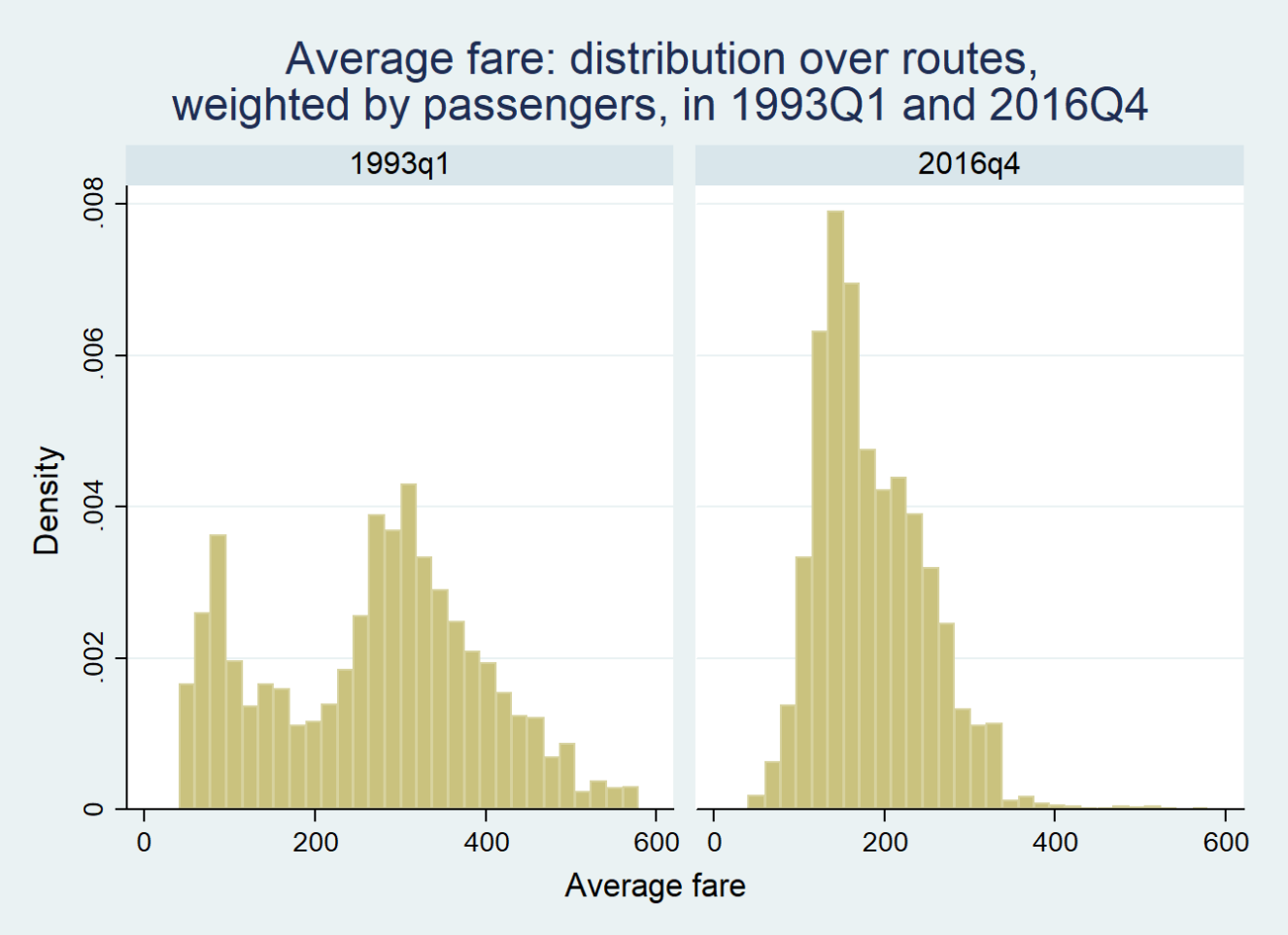

Figure 6. The fare distribution across routes, in 1993 and 2016.

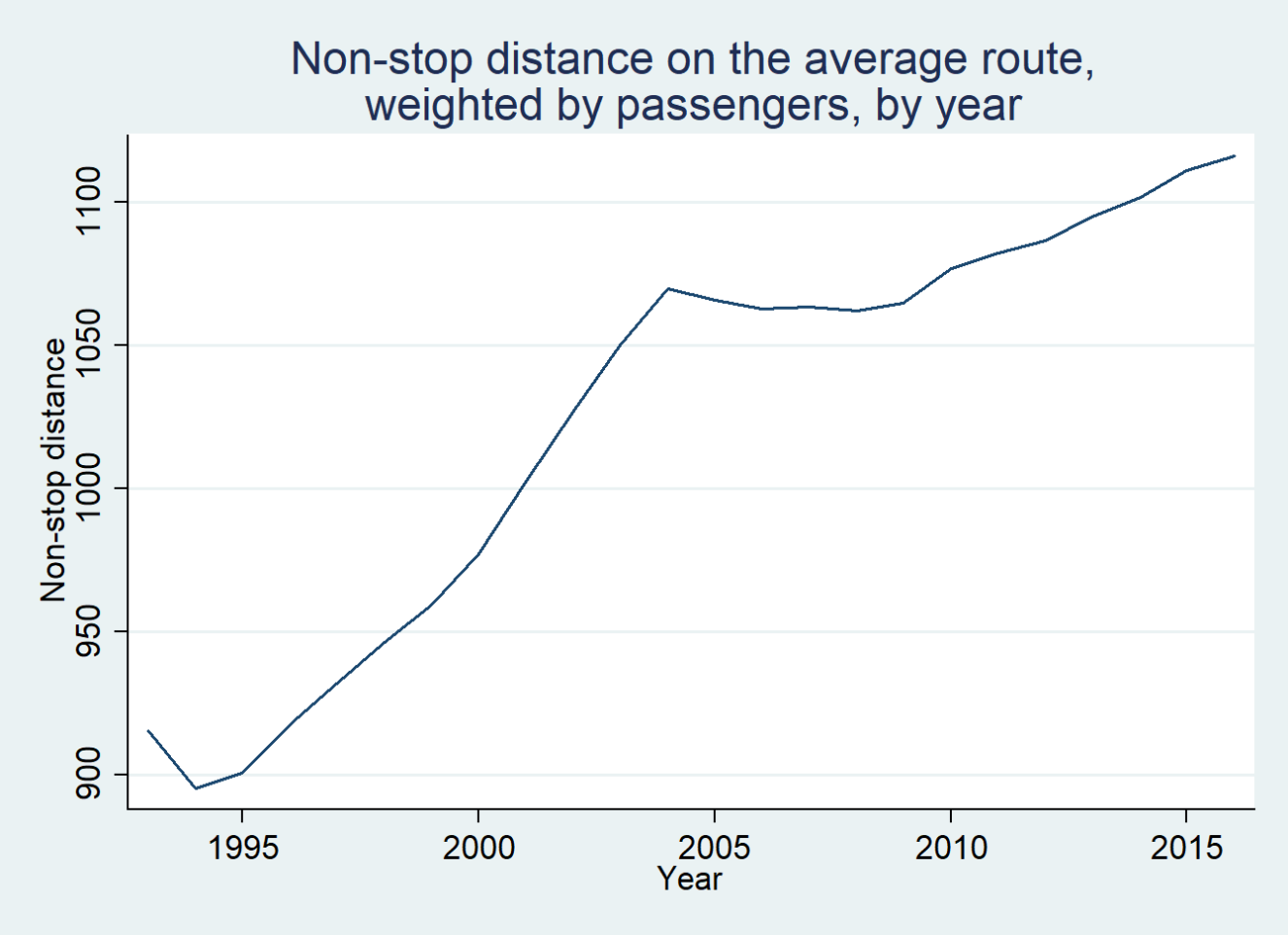

Figure 7. Average nonstop distance on the average airport-to-airport route.

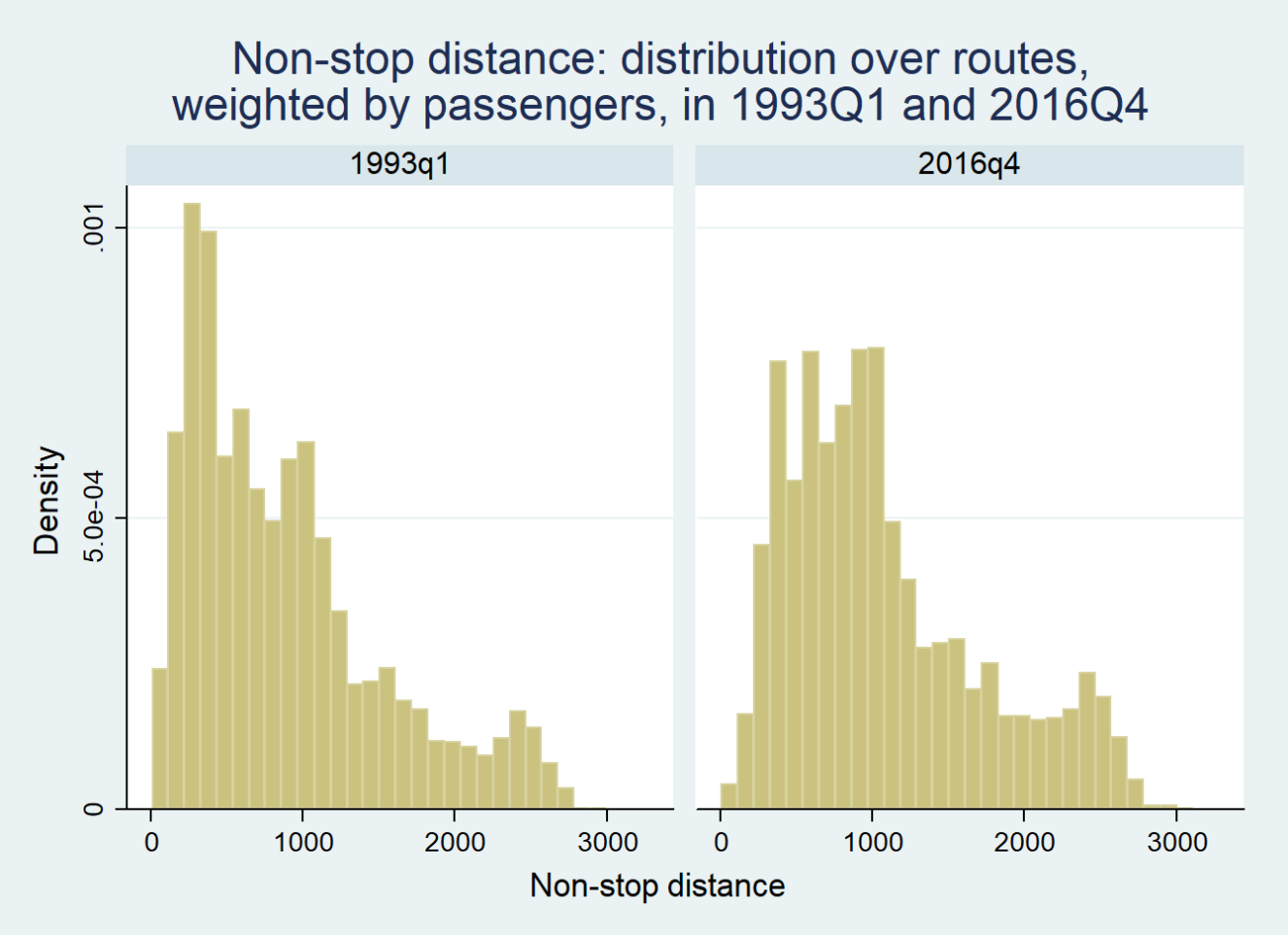

Figure 8. The distance distribution across routes, in 1993 and 2016.

Table 1. Merger-by-merger retrospective analysis. Effect of expected change in route-level HHI on log price differences (immediately pre-merger to 2-year post-merger, airport level).

Panel A: Delta-Northwest (2008)

	Change in Log Average Ticket Price					
	(1)	(2)	(3)	(4)	(5)	(6)
Expected HHI change	-2.4e-05***	2.7e-06	1.4e-05*	2.2e-06	1.3e-05*	3.8e-06
	(5.2e-06)	(4.9e-06)	(6.0e-06)	(6.0e-06)	(6.0e-06)	(7.2e-06)
Initial HHI		7.4e-06***	-2.8e-06		-9.6e-07	-6.4e-06**
		(1.8e-06)	(1.8e-06)		(2.2e-06)	(2.2e-06)
Non-stop distance		6.3e-06	3.0e-06		8.6e-07	1.7e-07
		(6.8e-06)	(6.5e-06)		(7.5e-06)	(7.2e-06)
Number of trips		1.1e-06	4.6e-07		1.0e-06	2.8e-07
		(1.3e-06)	(1.1e-06)		(9.7e-07)	(8.4e-07)
Fraction non-stop		.0352**	.0352**		.0593***	.0493***
		(.0127)	(.0108)		(.0132)	(.014)
Fraction round trips		-.1988***	-.0548		-.1586**	.03
		(.0513)	(.0724)		(.0552)	(.0589)
Constant	-.0037	.0857	.0256	-1.176***	-1.229***	-.7355***
	(.0043)	(.0447)	(.0758)	(.0201)	(.071)	(.0905)
Airline shares	N	N	Y	N	N	Y
Endpoint dummies	N	N	N	Y	Y	Y

Panel B: United-Continental (2011)

	Change in Log Average Ticket Price					
	(1)	(2)	(3)	(4)	(5)	(6)
Expected HHI change	5.1e-05**	5.6e-05**	4.1e-05*	4.7e-05*	4.8e-05**	4.4e-05*
	(1.8e-05)	(2.0e-05)	(2.0e-05)	(1.8e-05)	(1.8e-05)	(1.7e-05)
Initial HHI		-1.7e-06	-1.3e-05***		-1.1e-05***	-1.6e-05***
		(1.9e-06)	(1.8e-06)		(2.5e-06)	(2.5e-06)
Non-stop distance		-5.1e-06	-1.1e-06		1.2e-05	1.1e-05
		(5.1e-06)	(5.0e-06)		(7.6e-06)	(8.2e-06)
Number of trips		-1.1e-06	-1.5e-06		2.0e-06*	1.6e-06
		(7.8e-07)	(8.1e-07)		(9.5e-07)	(1.0e-06)
Fraction non-stop		.0196	.0021		.0843***	.0648***
		(.0117)	(.0117)		(.0163)	(.0175)
Fraction round trips		-.2525***	-.0223		.0375	.1589**
		(.0481)	(.0691)		(.055)	(.0611)
Constant	.0189***	.2414***	.1304	-.0822	-.148	-.0097
	(.0044)	(.0418)	(.0724)	(1.4e+05)	(.)	(.)
Airline shares	N	N	Y	N	N	Y
Endpoint dummies	N	N	N	Y	Y	Y

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2. Merger-by-merger retrospective analysis (continued). Effect of expected change in route-level HHI on log price differences (immediately pre-merger to 2-year post-merger, airport level).

Panel C: American-USAir (2014)

	Change in Log Average Ticket Price					
	(1)	(2)	(3)	(4)	(5)	(6)
Expected HHI change	-6.0e-05***	-5.7e-05***	-2.8e-05**	-2.8e-05**	-2.5e-05**	-2.1e-05*
	(1.1e-05)	(1.1e-05)	(1.0e-05)	(9.1e-06)	(9.2e-06)	(9.3e-06)
Initial HHI		-1.4e-07	-1.2e-06		-5.2e-06*	-6.7e-06*
		(1.9e-06)	(2.0e-06)		(2.5e-06)	(2.6e-06)
Non-stop distance		-3.2e-06	-1.6e-06		1.6e-05*	9.7e-06
		(5.0e-06)	(5.3e-06)		(7.3e-06)	(7.9e-06)
Number of trips		-1.9e-07	-1.3e-07		7.3e-07	1.1e-07
		(7.8e-07)	(8.3e-07)		(5.7e-07)	(7.2e-07)
Fraction non-stop		-.0582***	-.092***		.0805***	.05**
		(.0118)	(.0127)		(.0164)	(.016)
Fraction round trips		-.3212***	-.0557		-.1725***	-.0255
		(.0544)	(.0484)		(.0508)	(.0518)
Constant	-.0536***	.2479***	-.0158	-.2967	-.1805	-.3254
	(.0044)	(.0456)	(.0882)	(6.2e+05)	(1.9e+05)	(3.7e+05)
Airline shares	N	N	Y	N	N	Y
Endpoint dummies	N	N	N	Y	Y	Y

Panel D: Pooled Results

	Change in Log Average Ticket Price					
	(1)	(2)	(3)	(4)	(5)	(6)
Expected HHI change	-3.4e-05***	-3.2e-05**	-5.8e-06	-2.3e-06	2.4e-06	1.7e-06
	(9.9e-06)	(1.0e-05)	(8.1e-06)	(7.3e-06)	(7.4e-06)	(7.3e-06)
Initial HHI		1.2e-06	-5.4e-06***		-5.9e-06***	-1.0e-05***
		(1.2e-06)	(1.1e-06)		(1.4e-06)	(1.4e-06)
Non-stop distance		-5.8e-07	6.1e-07		9.9e-06*	7.5e-06
		(3.2e-06)	(3.1e-06)		(4.3e-06)	(4.6e-06)
Number of trips		-1.2e-07	-2.5e-07		1.3e-06**	6.5e-07
		(5.0e-07)	(5.0e-07)		(4.5e-07)	(4.8e-07)
Fraction non-stop		-.0017	-.0232***		.0741***	.0538***
		(.007)	(.0069)		(.0091)	(.0093)
Fraction round trips		-.1072***	-.0594		-.1051***	.045
		(.0301)	(.0351)		(.0311)	(.033)
Constant	-.0123***	.0732**	.1067*	-.8437***	-.5678***	-.7724***
	(.0026)	(.0267)	(.0442)	(.0308)	(.0478)	(.1578)
Airline shares	N	N	Y	N	N	Y
Endpoint dummies	N	N	N	Y	Y	Y

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

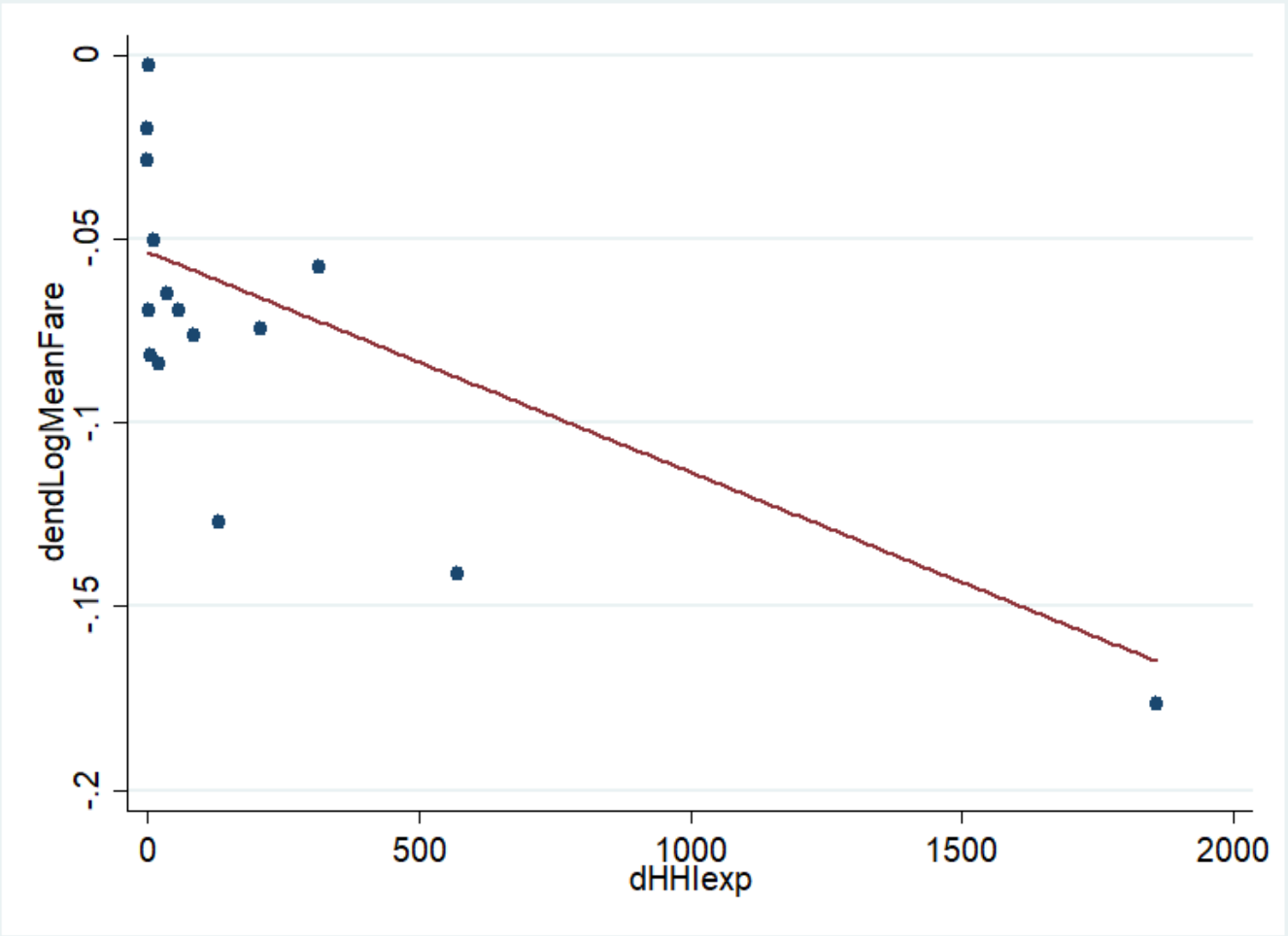

Figure 9. Binscatter of the change in mean fare on expected change in concentration across routes for the American-USAir merger (2013).

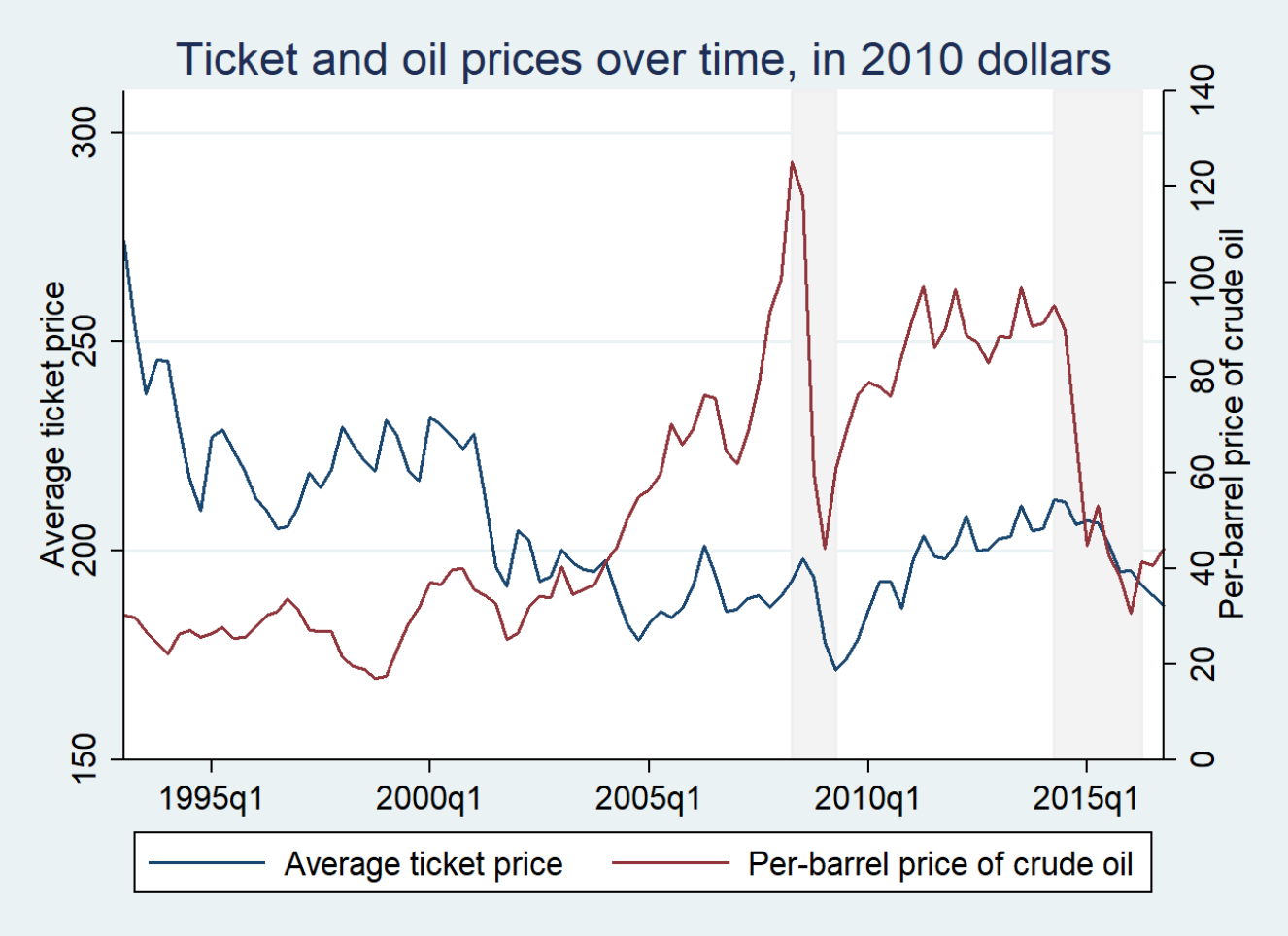

Figure 10. Time series of the international price of a barrel of crude oil (right axis) and the average ticket price across routes (left axis), by quarter.

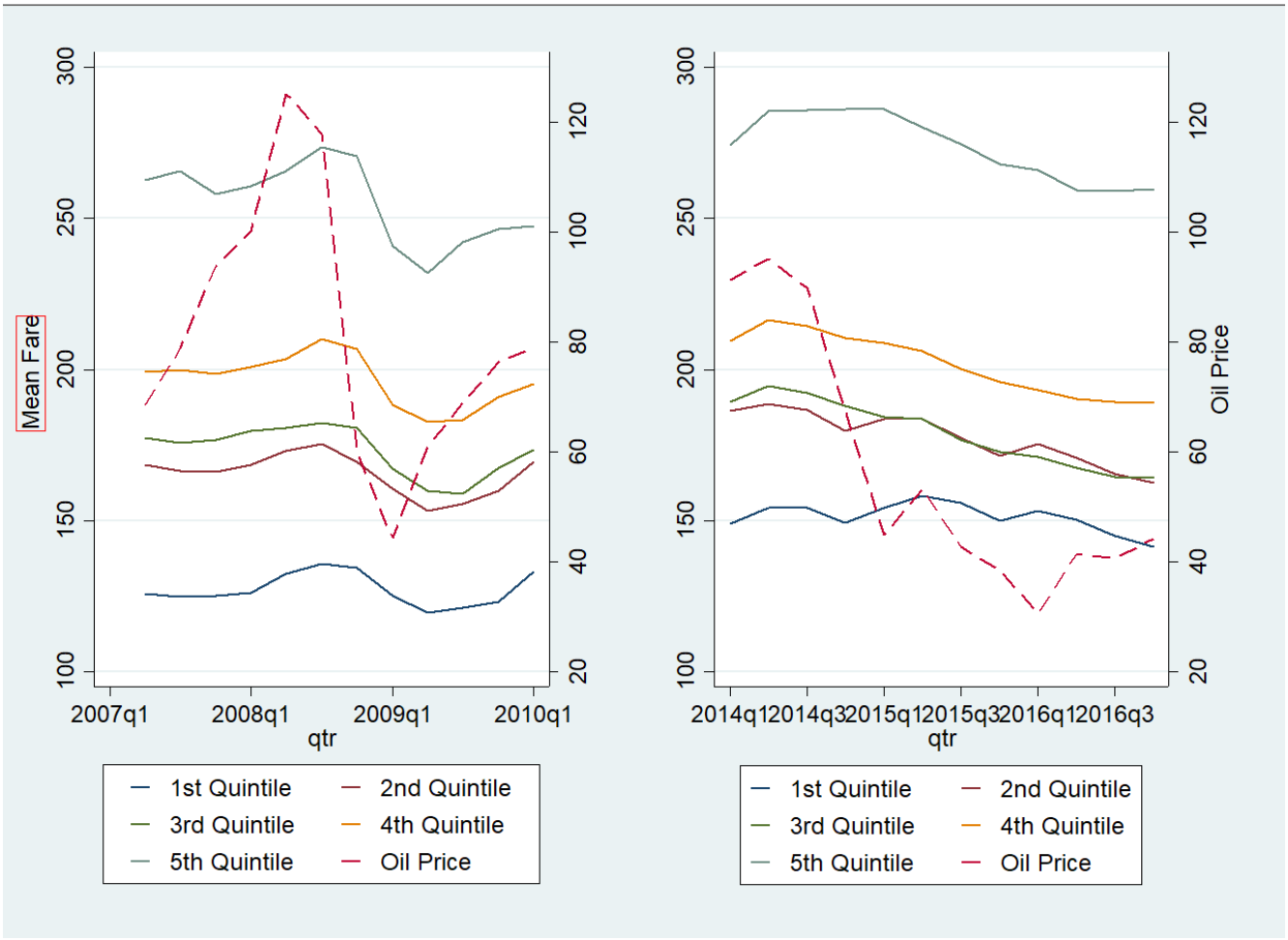

Figure 11. Time series of the international price of a barrel of crude oil (right axis) and the mean fare by distance quintile in each of the two oil price decline episodes. Given that fuel constitutes a larger share of total costs for long-distance routes, we would expect those routes to respond more to fluctuations in the price of oil.

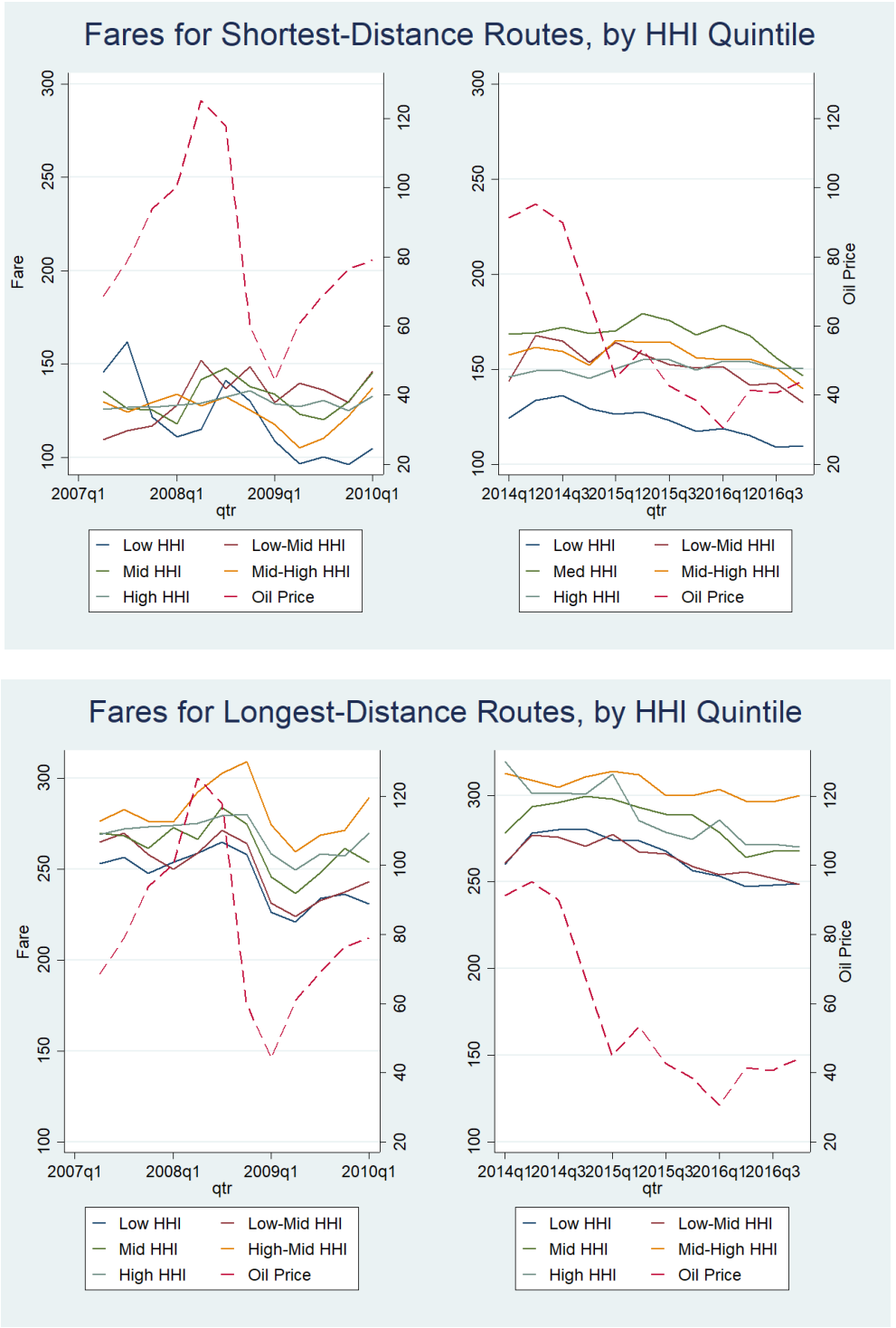

Figure 12. Time series of fares in response to two declines in oil prices, by HHI quantile. Top panel is routes in the shortest distance quintile, and bottom panel is routes in the longest distance quintile. Given that fuel constitutes a larger share of total costs for long-distance routes, we would expect those routes to respond more to fluctuations in the price of oil. If the degree of pass-through is affected by market power, then the degree of pass-through on routes with higher concentration (in response to a decline in input prices) would be lower.

Table 3. Effect of change in HHI on change in log pass-through, airport level, controls at 2008Q2-2016Q2 averages

	Change in Pass-through Between Two Oil Price Decline Episodes					
	(1)	(2)	(3)	(4)	(5)	(6)
Change in HHI	2.1e-05***	1.5e-05***	1.8e-05***	1.3e-05***	1.7e-05***	1.2e-05***
	(4.2e-06)	(4.0e-06)	(4.0e-06)	(3.9e-06)	(3.4e-06)	(3.5e-06)
HHI		4.0e-07	2.9e-06		-2.3e-06	1.0e-06
		(2.9e-06)	(2.5e-06)		(3.2e-06)	(3.2e-06)
Non-stop distance		-8.8e-06	-2.4e-05***		3.2e-05***	1.9e-05
		(7.8e-06)	(7.0e-06)		(9.8e-06)	(1.1e-05)
Number of trips		-2.2e-06	-5.0e-06***		-2.5e-07	-2.3e-06
		(1.9e-06)	(1.2e-06)		(1.4e-06)	(1.2e-06)
Fraction non-stop		-.1016***	-.0675***		.0791***	.0758***
		(.0226)	(.0161)		(.0206)	(.021)
Fraction round trips		.1271	.2657**		-.2675**	-.1401
		(.0902)	(.0892)		(.0888)	(.0886)
Change in reported controls	Y	Y	Y	Y	Y	Y
Airline shares	N	N	N	Y	Y	Y
Change in airline shares	N	Y	N	Y	N	Y
Endpoint dummies	N	N	N	N	Y	Y

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$